B.S. Abdur Rahman®
Crescent
Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

Regulations 2025
Curriculum and Syllabi
(As approved by the 24th Academic Council – August 2025)

B.Tech.
(Electrical & Electronics Engineering)

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REGULATIONS 2025

CURRICULUM AND SYLLABI (I & II semesters)
(as approved by the 24th Academic Council – August 2025)

B.TECH. ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE INSTITUTION

VISION

B.S. Abdur Rahman Crescent Institute of Science and Technology aspires to be a leader in Education, Training and Research in multidisciplinary areas of importance and to play a vital role in the Socio- Economic progress of the Country in a sustainable manner.

MISSION

- To blossom into an internationally renowned Institute.
- To empower the youth through quality and value-based education.
- To promote professional leadership and entrepreneurship.
- To achieve excellence in all its endeavors to face global challenges.
- To provide excellent teaching and research ambience.
- To network with global Institutions of Excellence, Business, Industry and Research Organizations.
- To contribute to the knowledge base through Scientific enquiry, Applied Research and Innovation.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION

VISION

To achieve excellence in the programs offered by the Department of Electrical and Electronics Engineering through quality teaching, holistic learning and innovative research.

MISSION

- To offer Under Graduate, Post Graduate & Research programs of industrial and societal relevance.
- To provide knowledge and skill in the Design and realization of Electrical and Electronic circuits and systems.
- To impart necessary managerial and soft skills to face the industrial challenges.
- To pursue academic and collaborative research with industry and research institutions in India and abroad.
- To disseminate the outcome of research and projects through publications, seminars and workshops.
- To provide conducive ambience for higher education, teaching and research.

PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES

B.TECH. (ELECTRICAL AND ELECTRONICS ENGINEERING)

PROGRAMME EDUCATIONAL OBJECTIVES

On successful completion of the programme, the graduates will

PEO 1 solve real world problems related to electrical and electronics engineering in industry through strong foundation in mathematics, science and engineering.

PEO 2 design, implement, and evaluate electrical and electronics systems, addressing contemporary challenges and considering societal and environmental aspects.

PEO 3 exhibit effective communication, teamwork, and leadership skills, enabling them to become entrepreneur and to work collaboratively in multidisciplinary environments.

PEO 4 pursue higher education to choose career path in teaching and research.

PEO 5 uphold ethical and professional values, promoting sustainable practices and demonstrating social responsibility in their engineering endeavours

PROGRAMME OUTCOMES:

- PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

- PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural,

language, and learning differences PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

- PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAMME SPECIFIC OUTCOMES

PSO1:

Design, simulate, and analyze electrical, electronic, and magnetic systems to develop efficient and sustainable solutions for real-world engineering problems.

PSO2:

Demonstrate professional competence by applying technical knowledge, modern tools, and teamwork skills in industrial and multidisciplinary environments.

REGULATIONS – 2025

B.TECH. DEGREE PROGRAMMES

(Under Choice Based Credit System)

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) **"Programme"** means B.Tech. Degree Programme.

ii) **"Branch"** means specialization or discipline of B.Tech. Degree Programme like Civil Engineering, Mechanical Engineering, etc.,

iii) **"Course"** means theory / practical / laboratory integrated theory / seminar / internship / project and any other subject that is normally studied in a semester like English, Mathematics, Environmental Science, Engineering Graphics, Electronic Devices etc.,

iv) **"Institution"** means B.S. Abdur Rahman Crescent Institute of Science and Technology.

v) **"Academic Council"** means the Academic Council, which is the apex body on all academic matters of this Institute.

vi) **"Dean (Academic Affairs)"** means the Dean (Academic Affairs) of the Institution who is responsible for the implementation of relevant rules and regulations for all the academic activities.

vii) **"Dean (Student Affairs**)" means the Dean (Students Affairs) of the Institution who is responsible for activities related to student welfare, conduct of co-curricular, extra-curricular events and discipline in the campus.

viii) **"Controller of Examinations"** means the Controller of Examinations of the Institution who is responsible for the conduct of examinations and declaration of results.

ix) **"Dean of the School"** means the Dean of the School of the department concerned.

x) **"Head of the Department"** means the Head of the Department concerned.

2.0 ADMISSION

2.1a) Candidates for admission to the first semester of the eight semester B. Tech. degree programme shall be required to have passed the Higher Secondary Examination of the 10+2 curriculum (Academic stream) prescribed by the appropriate authority or any other examination of any University or authority accepted by the Institution as equivalent thereto. Grade 12 or equivalent stage of education (Level 4) as per NEP 2020.

2.1 b) The student shall have studied at least any three of the following courses: Physics, Mathematics, Chemistry, Computer Science, Electronics, Information Technology, Biology, Informatics Practices, Biotechnology, Technical Vocational Subjects, Agriculture, Engineering Graphics, Business Studies, Entrepreneurship at 10+2 level. In case if the student has not studied any or all the courses viz., mathematics, physics and chemistry, he / she shall undergo bridge course(s) in the concerned course(s) at 10+2 level knowledge (Level 4 of NEP 2020).

2.2 Notwithstanding the qualifying examination, the candidate might have passed at 10+2, the candidate shall also write an entrance examination prescribed by the Institution for admission to certain programmes. The entrance examination shall test the proficiency of the candidate in the courses considered eligible for admission on the standards prescribed for 10+2 academic stream.

2.3 Candidates for admission to the third semester of the eight semester B.Tech. programme under lateral entry category shall be required to have passed minimum Three years / Two years (Lateral Entry) Diploma examination in any branch of Engineering / Technology or passed B.Sc. Degree from a recognized University as defined by UGC and passed 10+2 examination with Mathematics as a subject or Passed three year Diploma of Vocation Stream (D.Voc) in the same or allied sector or any other examination of any other authority accepted by the Institution as equivalent thereto.

2.4 The Institution shall offer suitable bridge courses in Mathematics, Physics, Engineering drawing, etc., for the students of diverse backgrounds.

2.5 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the Institution in adherence to the guidelines of regulatory authorities from time to time.

2.6 The eligibility and admission criteria prescribed by the respective programme regulating bodies shall be strictly followed for the selection and admission of candidates to the specific programmes.

3.0 BRANCHES OF STUDY

3.1 Regulations are applicable to the following B.Tech. Degree programmes in various branches of Engineering and Technology, each distributed over eight semesters, with two semesters per academic year.

1. Aeronautical Engineering
2. Artificial Intelligence and Data Science
3. Automobile Engineering
4. Biotechnology
5. Civil Engineering
6. Computer Science and Engineering
7. Computer Science and Engineering (Cyber Security)
8. Computer Science and Engineering (Internet of Things)
9. Computer Science and Engineering (Artificial Intelligence and Machine Learning)
10. Electrical and Electronics Engineering
11. Electronics and Communication Engineering
12. Electronics and Computer Engineering
13. Electronics and Instrumentation Engineering
14. Information Technology
15. Mechanical Engineering
16. Polymer Engineering

4.0 STRUCTURE OF THE PROGRAMME

4.1 Every programme has a curriculum with syllabi consisting of theory and practical courses as per AICTE such as,

i) Basic Science Courses - BSC
ii) Humanities and Social Sciences including Management Courses - HSC
iii) Engineering Science Courses - ESC
iv) Professional Core Courses - PCC
v) Professional Elective Courses - PEC
vi) Open Elective Courses - OEC
vii) Laboratory Courses – LC
viii) Laboratory Integrated Theory Courses – LITC
ix) Mandatory Non Credit Courses- MNC
x) Project - PROJ (Project work, seminar and internship in industry or at appropriate workplace)

4.1.1 Mandatory Induction Programme for First Year Students

The first year students upon admission shall undergo a mandatory three-week Induction programme consisting of physical activity, creative arts, universal human values, literary, proficiency modules, lectures by eminent people, visits to local areas, familiarization with departments / schools and centres, etc.,

4.1.2 Personality and Character Development

All students shall enroll, on admission, in any of the following personality and character development programmes or in departmental societies:

- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- National Sports Organization (NSO)
- Youth Red Cross (YRC)
- Rotaract
- Crescent Indian Society Training Development (ISTD – C)
- Crescent Creative Strokes

- Crescent Technocrats club

The training activities / events / camp shall normally be organized during the weekends / vacation period.

4.1.3 Online Courses for Credit Transfer

Students are permitted to undergo department approved online courses under SWAYAM up to 40% of credits of courses in a semester excluding project semester with the recommendation of the Head of the Department / Dean of School and with the prior approval of Dean (Academic Affairs) during his / her period of study. The credits earned through online courses ratified by the respective Board of Studies shall be transferred following the due approval procedures. The online courses can be considered in lieu of core courses and elective courses.

4.1.4 Value Added Courses

The students are permitted to pursue department approved online courses (excluding courses registered for credit transfer) or courses offered / approved by the department as value added courses.

The details of the value added course viz., syllabus, schedule of classes and the course faculty shall be sent to the Dean (Academic Affairs) for approval. The students may also undergo the value added courses offered by other departments with the consent of the Head of the Department offering the course.

These value added courses shall be specified in the consolidated mark sheet as additional courses pursued by the student over and above the curriculum during the period of study.

4.1.5 Industry Internship

The students shall undergo training for a period as specified in the curriculum during the summer vacation in any industry relevant to the field of study.

The students are also permitted to undergo internship at research organizations / eminent academic institutions for the period prescribed in the curriculum during the summer vacation, in lieu of Industrial training.

In any case, the student shall obtain necessary approval from the Head of

the Department / Dean of School and the training has to be taken up at a stretch.

4.1.6 Industrial Visit

The student shall undergo at least one industrial visit every year from the second year of the programme. The Heads of Departments / Deans of Schools shall ensure the same.

4.2 Each course is normally assigned certain number of credits:

- one credit per lecture period per week
- one credit per tutorial period per week
- one credit for two to three periods and two credits for four periods of laboratory or practical sessions per week
- one credit for two periods of seminar / project work per week
- one credit for two weeks of industrial training or 80 hours per semester.

4.3 Each semester curriculum shall normally have a blend of lecture courses, laboratory courses, laboratory integrated theory courses, etc.

4.4 The medium of instruction, examinations and project report shall be in English, except for courses in languages other than English.

5.0 DURATION OF THE PROGRAMME

5.1 A student is expected to complete the B.Tech. programme in eight semesters (six semesters in the case of lateral entry scheme), but in any case not more than 14 continuous semesters reckoned from the date of first admission (12 semesters in the case of lateral entry students).

5.2 Each semester shall consist of a minimum of 90 working days including the days of examinations.

5.3 The maximum duration for completion of the programme as mentioned in clause 5.1 shall also include period of break of study vide clause 7.1 so that the student may be eligible for the award of the degree.

6.0 REGISTRATION AND ENROLLMENT

6.1 The students of first semester shall register and enroll for courses at the time of admission by paying the prescribed fees. For the subsequent semesters registration for the courses shall be done by the student one week before the last working day of the previous semester.

6.2 Change of an Elective Course

A student can change an enrolled elective course within 10 working days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

6.3 Withdrawal from a Course

A student can withdraw from an enrolled course at any time before the first continuous assessment test for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

7.0 BREAK OF STUDY FROM PROGRAMME

7.1 A student may be allowed / enforced to take a break of study for two semesters from the programme with the approval of Dean (Academic Affairs) for the following reasons:

7.1.1 Medical or other valid grounds

7.1.2 Award of 'I' grade in all the courses in a semester due to lack of attendance

7.1.3 Debarred due to any act of indiscipline

7.2 The total duration for completion of the programme shall not exceed the prescribed maximum number of semesters (vide clause 5.1).

7.3 A student who has availed a break of study in the current semester (odd/even) can rejoin only in the subsequent corresponding (odd/even) semester in the next academic year on approval from the Dean (Academic affairs).

7.4 During the break of study, the student shall not be allowed to attend any regular classes or participate in any activities of the Institution. However, he / she shall be permitted to enroll for the 'I' grade courses and appear for the arrear examinations.

8.0 CLASS ADVISOR AND FACULTY ADVISOR

8.1 Class Advisor

A faculty member shall be nominated by the Head of the Department as class advisor for the class throughout the period of study except first year. The class advisor shall be responsible for maintaining the academic, curricular and co-curricular records of students of the class throughout their period of study.

However, for the first and second semester, the class advisors (first year class advisors) are nominated by the first year coordinator.

8.2 Faculty Advisor

To help the students in planning their courses of study and for general counseling, the Head of the Department of the students shall attach a maximum of 20 students to a faculty member of the department who shall function as faculty advisor for the students throughout their period of study. Such faculty advisor shall guide the students in taking up the elective courses for registration and enrolment in every semester and also offer advice to the students on academic and related personal matters.

9.0 COURSE COMMITTEE

9.1 Each common theory course offered to more than one group of students shall have a "Course Committee" comprising all the course faculty teaching the common course with one of them nominated as a course coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Dean (Academic Affairs) depending on whether all the course faculty teaching the common

course belong to a single department or from several departments. The course committee shall ensure preparation of a common question paper and scheme of evaluation for the tests and semester end examination.

10.0 CLASS COMMITTEE

A class committee is constituted branch wise and semester wise by the Head of the Department / Dean of the School shall normally comprise of faculty members handling the courses, student representatives and a senior faculty member not handling any courses for that class as chairman.

10.1 The composition of class committees for first and second semester is as follows:

i) The first year coordinator shall be the chairman of the class committee
ii) Faculty members of all individual courses of first / second semester
iii) Six student representatives (male and female) of each class nominated by the first year coordinator
iv) The class advisor and faculty advisors of the class

10.2 The composition of the class committee for each branch from 3rd to 8th semester is as follows:

i) One senior faculty member preferably not handling courses for the concerned semester appointed as chairman by the Head of the Department
ii) All the faculty members handling courses of the semester
iii) Six student representatives (male and female) of each class nominated by the Head of the Department in consultation with the relevant faculty advisors
iv) All faculty advisors and the class advisors
v) Head of the Department

10.3 The class committee shall meet at least three times during the semester. The first meeting shall be held within two weeks from the

date of commencement of classes, in which the components of continuous assessment for various courses and the weightages for each component of assessment shall be decided for the first and second assessment. The second meeting shall be held within a week after the date of first assessment report, to review the students' performance and for follow up action.

10.4 During these two meetings, the student members shall meaningfully interact and express opinions and suggestions to improve the effectiveness of the teaching-learning process, curriculum and syllabi, etc.

10.5 The third meeting of the class committee, excluding the student members, shall meet after the semester end examinations to analyse the performance of the students in all the components of assessments and decide their grades in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the course faculty concerned.

11.0 CREDIT LIMIT FOR ENROLLMENT & MOVEMENT TO HIGHER SEMESTER

11.1 A student can enroll for a maximum of 36 credits during a semester including Redo / Predo courses.

11.2 The minimum credits earned by the student to move to 7^{th} semester shall not be less than 60 credits (40 credits for lateral entry students).

12.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

12.1 Every theory course shall have a total of three assessments during a semester as given below:

Assessments	Course Coverage in Weeks	Duration	Weightage of Marks
Assessment 1	1 to 6	1.5 hours	25%
Assessment 2	7 to 12	1.5 hours	25%
Semester End Examination	Full course	3 hours	50%

12.2 Theory Course

Appearing for semester end theory examination for each course is mandatory and a student shall secure a minimum of 40% marks in each course in semester end examination for the successful completion of the course.

12.3 Laboratory Course

Every practical course shall have 60% weightage for continuous assessments and 40% for semester end examination. However, a student shall have secured a minimum of 50% marks in the semester end practical examination for the award of pass grade.

12.4 Laboratory Integrated Theory (LIT) Courses

For laboratory integrated theory courses, the theory and practical components shall be assessed separately for 100 marks each and consolidated by assigning a weightage of 75% for theory component and 25% for practical component (for a 4 credit LIT course). Grading shall be done for this consolidated mark. Assessment of theory components shall have a total of three assessments with two continuous assessments carrying 25% weightage each and semester end examination carrying 50% weightage. The student shall secure a separate minimum of 40% in the semester end theory examination. The evaluation of practical components shall be through continuous assessment.

Component	Maximum Marks	Weightage for Final Grade	Mode of Assessment
Theory Component	100	75%	CAT1 (25%) + CAT2 (25%) + SEE (50%)

Practical Component	100	25%	Continuous assessment only
Final Grade Basis	Consolidated	100%	75% Theory + 25% Practical
Pass Requirement	-	-	Minimum 40% in Semester-End Theory Exam (SEE)

Note:

1. Proportionate weightage shall be assigned to LIT courses based on their credit value, whether 2 or 3 credits.

2. In Lab-Integrated Professional Elective courses, the laboratory component shall be assessed by the course faculty.

12.5 The components of continuous assessment for theory / practical / laboratory integrated theory courses shall be finalized in the first class committee meeting.

12.6 Industry Internship

In the case of industry internship, the student shall submit a report, which shall be evaluated along with an oral examination by a committee of faculty members constituted by the Head of the Department. The student shall also submit an internship completion certificate issued by the industry / research / academic organisation. The weightage of marks for industry internship report and viva voce examination shall be 60% and 40% respectively.

12.7 Project Work (Mini and Capstone Project)

Mini project work, shall be carried out individually or as a group activity involving a maximum of four students.

Each group shall identify a suitable topic within their domain, either disciplinary or interdisciplinary, based on the students' abilities and in consultation with the faculty mentor. The topic must lead to the development of a small-scale system or application.

The progress of the mini project shall be evaluated through three periodic reviews: two interim reviews and one final review. A project

report shall be submitted by the end of the semester. The reviews shall be conducted by a committee of faculty members constituted by the Head of the Department / Dean of the School.

An oral examination (viva voce) shall be conducted as the semester-end examination by an internal examiner approved by the Controller of Examinations, based on the project report.

The weightage for assessment shall be as follows:

• Periodic Reviews: 50%

- 25% by the Project Guide
- 25% by the Review Committee

• Project Report: 20%

• Viva Voce Examination: 30%

In the case of capstone project work, the project shall be carried out individually or as a group activity, involving a maximum of three or four students.

A committee of faculty members, constituted by the Head of the Department / Dean of the School, shall conduct three periodic reviews during the semester to monitor and assess the progress of the project.

At the end of the semester, students shall submit a project report, based on which a semester-end oral examination (viva voce) shall be conducted by an external examiner approved by the Controller of Examinations.

The assessment weightage shall be as follows:

• Periodic Reviews – 50%

- 25% by the Project Guide
- 25% by the Review Committee

• Project Report – 20%

• Viva Voce Examination – 30%.

12.8 Assessment of seminars and comprehension shall be carried out by a committee of faculty members constituted by the Head of the Department.

12.9 **For the first attempt of the arrear theory examination**, the internal assessment marks scored for a course during first appearance shall be used for grading along with the marks scored in the arrear examination. From the subsequent appearance onwards, full weightage shall be assigned to the marks scored in the semester end examination and the internal assessment marks secured during the course of study shall become invalid.

In case of laboratory integrated theory courses, after one regular and one arrear appearance, the internal mark of theory component is invalid and full weightage shall be assigned to the marks scored in the semester end examination for theory component. **There shall be no arrear or improvement examination for lab components**.

13.0 SUBSTITUTE EXAMINATIONS

13.1 A student who is absent, for genuine reasons, may be permitted to write a substitute examination for any one of the two continuous assessment tests of a course by paying the prescribed substitute examination fee. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accidents, admission to a hospital due to illness, etc. by a committee constituted by the Head of the Department / Dean of the School for that purpose. There is no substitute examination for semester end examinations.

13.2 A student shall apply for a substitute exam in the prescribed form to the Head of the Department / Dean of the School within a week from the date of assessment test. However, the substitute examination will be conducted only after the last instructional day of the semester.

14.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

14.1 A student shall earn 100% attendance in the scheduled contact

hours (such as lectures, tutorials, labs, etc.) for that course. However, a **relaxation** of up to 25% in attendance may be granted to account for valid reasons such as medical emergencies, participation in co-curricular or extracurricular activities with prior approval, or other genuine circumstances.

If a student's attendance falls below 75% in a particular course, even after considering the permissible relaxation, they will not be allowed to appear for the semester-end examination in that course. Instead, the student will be awarded an “I” grade (Incomplete) for the course.

14.2 The faculty member of each course shall cumulate the attendance details for the semester and furnish the names of the students who have not earned the required attendance in the concerned course to the class advisor. The class advisor shall consolidate and furnish the list of students who have earned less than 75% attendance, in various courses, to the Dean (Academic Affairs) through the Head of the Department / Dean of the School. Thereupon, the Dean (Academic Affairs) shall officially notify the names of such students prevented from writing the semester end examination in each course.

14.3 If a student’s attendance in any course falls between 65% and 75% due to medical reasons (e.g., hospitalization, illness) or participation in institution-approved events, they may be granted exemption from the minimum attendance requirement and allowed to appear for the semester-end exam. The student must submit valid documents to the class advisor upon rejoining, with approval from the HoD/Dean. Final approval for **condonation** will be granted by the Vice Chancellor based on the Dean (Academic Affairs)’s recommendation.

14.4 A student who has obtained an **“I”** grade in all the courses in a semester is not permitted to move to the next higher semester. Such students shall **repeat** all the courses of the semester in the subsequent academic year.

14.5 The student awarded **“I”** grade, shall enroll and repeat the course when it is offered next. In case of “I” grade in an elective course

either the same elective course may be repeated or a new elective course may be taken with the approval of the Head of the Department / Dean of the School.

14.6 A student who is awarded **"U"** grade in a course shall have the option to either write the semester end arrear examination at the end of the subsequent semesters, or to **redo** the course when the course is offered by the department. Marks scored in the continuous assessment in the redo course shall be considered for grading along with the marks scored in the semester end (redo) examination. If any student obtains "U" grade in the redo course, the marks scored in the continuous assessment test (redo) for that course shall be considered as internal mark for further appearance of arrear examination.

14.7 If a student with "U" grade, who **prefers to redo** any particular course, fails to earn the minimum 75% attendance while doing that course, then he / she is not permitted to write the semester end examination and his / her earlier "U" grade and continuous assessment marks shall continue.

15.0 REDO / PRE-DO COURSES

15.1 A student can register for a maximum of three redo courses per semester without affecting the regular semester classes, whenever such courses are offered by the concerned department, based on the availability of faculty members and subject to a specified minimum number of students registering for each of such courses.

15.2 The number of contact hours and the assessment procedure for any redo course shall be the same as regular courses, except there is **no provision for any substitute examination and withdrawal from a redo course**.

15.3 A student shall be permitted to pre-do a course offered by the concerned department, provided it does not affect the regular semester class schedule. Such permission shall be granted based

on the availability of faculty members, the maximum permissible credit limit of the semester, and the student's fulfillment of the necessary prerequisites for the course. The proposal shall be recommended by the Dean of the School and the Head of the Department, and shall require final approval from the Dean (Academic Affairs).

16.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

16.1 All assessments of a course shall be made on absolute marks basis. The class committee without the student members shall meet to analyse the performance of students in all assessments of a course and award letter grades following the relative grading system. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade Points
S	10
A	9
B	8
C	7
D	6
E	5
U	0
W	-
I	-
PA	-
FA	-

"W"- denotes withdrawal from the course

"I" - denotes "Incomplete" ie. inadequate attendance in the course and prevention from appearance of semester end examination

"U" - denotes unsuccessful performance in the course.

"PA" - denotes the 'Pass' of the zero credit courses.

"FA" - denotes the 'Fail' of the zero credit courses.

16.2 A student who earns a minimum of five grade points ('E' grade) in a course is declared to have successfully completed the course. Such a course cannot be **repeated by the student for improvement of grade**.

16.3 Upon awarding grades, the results shall be endorsed by the chairman of the class committee and Head of the Department / Dean of the School. The Controller of Examinations shall further approve and declare the results.

16.4 **Within one week** from the date of declaration of result, a student can apply for revaluation of his / her semester end theory examination answer scripts of one or more courses, on payment of prescribed fee, through proper application to the Controller of Examinations. Subsequently, the Head of the Department / Dean of the School offered the course shall constitute a revaluation committee consisting of chairman of the class committee as convener, the faculty member of the course and a senior faculty member having expertise in that course as members. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

16.5 After results are declared, grade sheets shall be issued to each student, which contains the following details: a) list of courses enrolled during the semester including redo courses / arrear courses, if any; b) grades scored; c) Grade Point Average (GPA) for the semester and d) Cumulative Grade Point Average (CGPA) of all courses enrolled from the first semester onwards.

GPA is the ratio of the sum of the products of the number of credits of courses registered and the grade points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

If C_i, is the number of credits assigned for the i^{th} course and GP_i is the

$$GPA = \frac{\sum_{i=1}^{n}(C_i)(GPi)}{\sum_{i=1}^{n} C_i}$$

Grade Point in the i^{th} course,

Where n = number of courses

The Cumulative Grade Point Average (CGPA) is calculated in a similar manner, considering all the courses enrolled from first semester.

"I", "W", "PA" and **"FA"** grades are excluded for calculating GPA.

"U", "I", "W", "PA" and **"FA"** grades are excluded for calculating CGPA.

The formula for the conversion of CGPA to equivalent percentage of marks shall be as follows:

Percentage equivalent of marks = CGPA X 10

16.6 After successful completion of the programme, the degree shall be awarded to the students with the following classifications based on CGPA.

Classification	CGPA
First Class with Distinction	8.50 and above and passing all the courses in first appearance and completing the programme within the prescribed period of 8 semesters for all students (except lateral entry students) and 6 semesters for lateral entry students
First Class	6.50 and above and completing the programme within a maximum of 10 semesters for all students (except lateral entry students) and 8 semesters for lateral entry students
Second Class	Others

16.6.1 Eligibility for First Class with Distinction

- A student should not have obtained 'U' or 'I' grade in any course during his/her study

- A student should have completed the UG programme within the minimum prescribed period of study (except clause 7.1.1)

16.6.2 Eligibility for First Class

- A student should have passed the examination in all the courses not more than two semesters beyond the minimum prescribed period of study (except clause 7.1.1)

16.6.3 The students who do not satisfy clause 16.6.1 and clause 16.6.2 shall be classified as second class.

16.6.4 The CGPA shall be rounded to two decimal places for the purpose of classification. The CGPA shall be considered up to three decimal places for the purpose of comparison of performance of students and ranking.

17.0 SUPPLEMENTARY EXAMINATION

Final year students and passed out students can apply for supplementary examination for a maximum of **three** courses thus providing an opportunity to complete their degree programme. Likewise, students with less credits in VI semester can also apply for supplementary examination for a maximum of **three** courses to enable them to earn minimum credits to move to higher semester. The students can apply for supplementary examination within three weeks of the declaration of results in the **even semester**.

18.0 DISCIPLINE

18.1 Every student is expected to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which tends to affect the reputation of the Institution.

18.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the Head of the Department / Dean of the School concerned shall be referred to a Discipline and Welfare Committee constituted by the Registrar for taking appropriate action.

19.0 MULTI ENTRY AND MULTI EXIT (MEME) FRAMEWORK

In accordance with the provisions of the National Education Policy (NEP) 2020, the programme shall support a Multi Entry – Multi Exit (ME-ME) framework to provide flexibility in the academic pathway of students.

19.1 Exit Option:

19.1.1 Credit Requirement for Award of B.Tech. Degree

To qualify for the award of a B.Tech. degree from the Institute, a student must successfully complete the total credit requirements as prescribed in the approved curriculum of the respective programme. The specific credit requirements are determined by the programme curriculum.

19.1.2 Provision for Multiple Exit

In alignment with NEP 2020 guidelines, the Institute provides students enrolled in undergraduate programmes with the option of multiple exits, subject to the following conditions:

a. Exit at the End of First or Second Year

Students may choose to exit the programme at the end of either the first year or the second year, provided they have fulfilled the prescribed academic requirements.

b. Application for Exit

A student intending to exit must submit a formal written application in the prescribed format at least **eight weeks prior to the scheduled end of the academic year**.

c. Departmental Recommendation

1. Upon receipt of the application, the concerned Department shall evaluate the academic record of the student and recommend the award of a **Certificate or Diploma** as applicable, based on the credits earned.

2. In the case of arrear courses, the Certificate/Diploma will be conferred only after successful clearance of all pending arrears.

d. Notification of Completion

Once a student has fulfilled the requirements for the award of Certificate/Diploma, the Department shall notify the same to Controller of Examinations for further processing and issuance.

20 ELIGIBILITY FOR THE AWARD OF DEGREE

20.1 A student shall be declared to be eligible for the award of B.Tech. degree provided the student has:

20.1.1 Successfully earned the required number of total credits as specified in the curriculum of the programme of study within a maximum period of 14 semesters (12 semesters for lateral entry) from the date of admission, **including break of study**.

20.1.2 Successfully completed the requirements of the enrolled professional development activity through various institute level clubs or department level membership in societies.

20.1.3 No dues to the Institution, Library, Hostel, etc.

20.1.4 No disciplinary action pending against him/her.

20.2 The award of the degree must have been approved by the Institution.

21 MINOR DEGREE PROGRAMMES OFFERED FOR STUDENTS

21.1 The students admitted in the following B.Tech. programmes can graduate with a minor degree, which is optional, along with a major degree.

21.2 The eligibility for choosing the minor degree is given as below:

<table>
<tr><th>Sl. No.</th><th>Minor Degree</th><th>Eligible Major Degree Programmes (from other Departments)</th><th>Offering Dept.</th></tr>
<tr><td>1.</td><td>Artificial Intelligence and Machine Learning</td><td rowspan="5">Mechanical Engineering
Aeronautical Engineering
Polymer Engineering
Automobile Engineering
Civil Engineering
Biotechnology
Electrical and Electronics Engg.
Electronics and Instrumentation Engg.</td><td>CSE</td></tr>
<tr><td>2.</td><td>Block Chain</td><td>CSE</td></tr>
<tr><td>3.</td><td>Cyber Security</td><td>IT</td></tr>
<tr><td>4.</td><td>Data Science</td><td>CSE</td></tr>
<tr><td>5.</td><td>Internet of Things (IoT)</td><td>ECE</td></tr>
<tr><td>6.</td><td>Virtual & Augmented Reality</td><td>Mechanical Engineering
Aeronautical Engineering
Polymer Engineering
Automobile Engineering
Civil Engineering
Biotechnology
Electrical and Electronics Engg.
Electronics and Instrumentation Engg.
Electronics and Communication Engg.</td><td>CSE</td></tr>
<tr><td>7.</td><td>Sensor Technology</td><td>Mechanical Engineering
Aeronautical Engineering
Polymer Engineering
Automobile Engineering
Civil Engineering
Biotechnology
Electrical and Electronics Engg.</td><td>IT</td></tr>
</table>

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
8.	Robotics	Artificial Intelligence and Data Science Computer Science and Engg. (AIML) Computer Science and Engg.(CS) Computer Science and Engg.(IoT) Computer Science and Engineering Information Technology Civil Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg.	Mech.
9.	3D Printing	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Information Technology Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	Mech.
10.	Electric Vehicles	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg.(AIML) Computer Science and Engg.(CS) Computer Science and Engg. (IoT) Information Technology Civil Engineering Biotechnology Electronics and Communication Engg.	EEE

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
11.	Industrial Automation	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Computer Science and Engineering Information Technology Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electronics and Communication Engg.	EIE
12.	GIS and Remote Sensing	Artificial Intelligence and Data Science Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Computer Science and Engineering Information Technology Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	Civil

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
13.	Computational Biology	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Information Technology Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	Life Sciences

21.3 A student shall earn an additional 18 to 20 credits for the award of a minor degree.

21.4 A student shall be awarded a minor degree only when he / she completes the requirements for the award of major degree stipulated in the respective programme.

22 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council has the right to modify the above regulations from time to time.

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B.S. ABDUR RAHMAN CRESCENT INSTITUTE OF SCIENCE AND TECHNOLOGY

B.TECH. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABI, REGULATIONS 2025

(Choice Based Credit System)

I – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	HSC	ENE 1181	English for Engineers	3	0	0	3
2.	BSC	MAE 1181	Matrices and Differential Calculus	3	1	0	4
3.	BSC	PHE 1181	Engineering Physics	3	0	2	4
4.	ESC	GEE 1101	Engineering Graphics	2	0	2	3
5.	ESC	GEE 1102	Design thinking	3	0	0	3
6.	ESC	GEE 1103	Digital Manufacturing and Fabrication Laboratory	0	0	2	1
7.	ESC	GEE 1104	Programming for problem solving	2	0	2	3
8.	MNC	GEE 1105	Environmental Sciences (MNC – I)	2	0	0	0
			Credits				**21**

II – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	HSC	MAE 1282	Transforms and its Applications	3	1	0	4
2.	BSC	CHE 1181	Chemistry for Engineering Applications	3	0	2	4
3.	ESC	GEE 1202	Basic Electric & Magnetic circuits	3	0	0	3
4.	ESC	MEE 1201	Engineering Mechanics	2	1	2	4
5.	ESC	EEE 1201	Electronic Devices	3	0	0	3
6.	PCC	EEE 1202	Electronic Devices Laboratory	0	0	2	1
7.	ESC	GEE 1206	Basic Electric & Magnetic circuits Laboratory	0	0	2	1
8.	HSC	GEE 1205	Universal Human Values (Humanities - I)	2	0	0	2
			Credits				**22**

III – SEMESTER

S. No	Course Category	Course code	Course Title	L	T	P	C
1.	BSC		Mathematics - III	3	1	0	4
2.	HSC		Humanities Elective - II	3	0	0	3
3.	PCC	EEE 2101	Digital Electronics	3	0	0	3
4.	PCC	EEE 2102	Electrical Machines-I	3	1	0	4
5.	PCC	EEE 2103	Electro Magnetic Theory	3	0	0	3
6.	PCC	EEE 2104	Transmission and Distribution	3	0	0	3
7.	PCC	EEE 2105	Digital Electronics Laboratory	0	0	2	1
8.		EEE 2106	Electrical Machines - I Laboratory	0	0	2	1
9.	HSC	GEE 2101	Soft Skills – I	0	0	2	1
10.	MNC	GEE 2102	Indian Constitution (MNC-II)	2	0	0	0
11.	PCC		Skill Development Courses*				3*
			Credits				**23**

IV – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PCC	EEE 2201	Electrical Machines - II	3	0	0	3
2.	PCC	EEE 2202	Power Electronics and Drives	3	0	0	3
3.	PCC	EEE 2203	Measurements and Instrumentation	3	0	0	3
5.	PCC		Program Elective I	3	0	0	3
6.	OEC		Open Elective I (Optional MOOC including foreign language)	3	0	0	3
7.	PCC	EEE 2204	Power Electronics and Drives Laboratory	0	0	2	1
8.	PCC	EEE 2205	Electrical Machines - II Laboratory	0	0	2	1
9.	PCC	EEE 2206	Mini Project - I	0	0	4	2
10.	HSC	GEE 2201	Soft Skills - II	0	0	2	1
11.	MNC	GEE 2202	IKS Course (MNC -III)	2	0	0	0
12	PCC		Skill Development Courses *				3*
			Credits				**22**

* (Applicable only for Exit category)

V – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PCC	EEE 3101	Power System Analysis	3	0	0	3
2.	PCC	EEE 3102	Control Systems	3	0	0	3
3.	PCC	EEE 3103	Power System Protection	3	0	0	3
4.	PCC	EEE 3104	Embedded Systems	3	0	2	4
5.	PEC		Program Elective II	3	0	0	3
6.	PEC		Program Elective III	3	0	0	3
7.	PCC	EEE 3105	Power System Analysis Laboratory	0	0	2	1
8.	PCC	EEE 3106	Control System & Instrumentation Laboratory	0	0	2	1
9.	HSC	GEE 3101	Soft Skills – III	0	0	2	1
10	INT	EEE 3105	Internship I [$]	0	0	0	1
			Credits				**23**

VI – SEMESTER

S. No	**Course Category**	**Course code**	**Course Title**	**L**	**T**	**P**	**C**
1.	HSC	MSE 3181	Fundamentals of Entrepreneurship	2	0	2	3
2.	PCC	EEE 3201	Renewable Energy Systems	3	0	0	3
3.	PCC	EEE 3202	VLSI	3	0	2	4
4.	PCC		Program Elective IV	3	0	0	3
5.	PCC		Program Elective V	3	0	0	3
6.	OEC		Open Elective II	3	0	0	3
7.	PCC	EEE 3203	Renewable Energy Systems Laboratory	0	0	2	1
8.	HSC	GEE 3201	Soft Skills – IV	0	0	2	1
			Credits				**21**

VII – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PCC	EEE 4101	PLC & SCADA	3	0	2	4
2.	PCC	EEE 4102	Electric Vehicle Technology	3	0	2	4
3.	PEC		Program Elective VI	3	0	0	3
4.	PEC		Program Elective VII	3	0	0	3
5.	PEC		Program Elective VIII	3	0	0	3
6.	OEC		Open Elective III (Optional MOOC)	3	0	0	3
7.	PROJ	EEE 4103	Mini Project - II	0	0	6	3
8.	INT	EEE 4104	Internship – II [$]	0	0	0	1
			Credits				**24**

VIII – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PROJ	EEE 4201	Capstone Project	0	0	18	9
			Credits				**9**

Total Credits - 162

[$] 15 days of Industrial training during the summer vacation of second year and third year. The credit will be awarded in the 5th and 7th semester.

LIST OF PROFESSIONAL ELECTIVE COURSES

Power Systems and High Voltage Engineering

Sl. No.	Course Code	Course Title	L	T	P	C
1.	EEEX 01	Distribution System Engineering	3	0	0	3
2.	EEEX 02	Electric Energy Generation, Utilization and Conservation	3	0	0	3
3.	EEEX 03	Energy Conservation and Audit	3	0	0	3
4.	EEEX 04	Flexible AC Transmission Systems	3	0	0	3
5.	EEEX 05	Industrial Power System Analysis and Design	3	0	0	3
6.	EEEX 06	Power System Operation and Control	3	0	0	3
7.	EEEX 07	Power System Transients	3	0	0	3
8.	EEEX 08	Restructured Power System	3	0	0	3
9.	EEEX 09	High Voltage Engineering	3	0	0	3
10.	EEEX 10	Micro-grid Protection	3	0	0	3
11.	EEEX 11	Smart Grid	3	0	0	3
12.	EEEX 12	Gas Insulated Substation	3	0	0	3
13.	EEEX 13	Cost Economics of Renewable Energy Systems	3	0	0	3

Electrical Machines and Drives

Sl. No.	Course Code	Course Title	L	T	P	C
1.	EEEX 21	Electrical Machine Design	3	0	0	3
2.	EEEX 22	Solid State Drives	3	0	0	3
3.	EEEX 23	Special Electrical Machines	3	0	0	3
4.	EEEX 24	HVDC Transmission	3	0	0	3
5.	EEEX 25	Wind Energy Conversion Systems	3	0	0	3
6.	EEEX 26	DC Micro Grid	3	0	0	3
7.	EEEX 27	Grid Integration of Renewable Energy Systems	3	0	0	3
8.	EEEX 28	Electric Power Quality	3	0	0	3
9.	EEEX 29	Converters, Applications and Design	3	0	0	3

Control Systems and Signal Processing

Sl. No.	Course Code	Course Title	L	T	P	C
1.	EEEX 35	Advanced Control Theory	3	0	0	3
2.	EEEX 36	Signals and Systems	3	0	0	3
3.	EEEX 37	Image and Video Processing	3	0	0	3
4.	EEEX 38	Bio Instrumentation and Signal Analysis	3	0	0	3

Renewable Energy and Electric Vehicles

Sl. No.	Course Code	Course Title	L	T	P	C
1.	EEEX 44	Solar Energy Technology	3	0	0	3
2.	EEEX 45	Energy Devices for Electric Vehicles	3	0	0	3
3.	EEEX 46	Design of Electric Vehicle Charging System	3	0	0	3
4.	EEEX 47	HEV / xEV Motor Drives and Controllers	3	0	0	3

Interdisciplinary Applications

Sl. No.	Course Code	Course Title	L	T	P	C
1.	EEEX 52	Evolutionary computing	3	0	0	3
2.	EEEX 53	Python for Electrical Engineers	2	0	2	3
3.	EEEX 54	Industrial IoT	3	0	0	3
4.	EEEX 55	IoT for Electrical Engineers	3	0	0	3
5.	EEEX 56	Sensors and Transducers for Bio-Medical Application	3	0	0	3
6.	EEEX 57	Artificial Intelligence and Machine Learning in Electrical Engineering	3	0	0	3
7.	EEEX 58	Principles of Robotics	3	0	0	3
8.	EEEX 59	Network Analysis and Synthesis	3	0	0	3
9.	EEEX 60	Digital Electrical Control System for Modern Buildings	3	0	0	3
10.	EEEX 61	Deep Learning for Electrical Engineers	3	0	0	3

Electronics and Embedded Systems

Sl. No.	Course Code	Course Title	L	T	P	C
1.	EEEX 67	ARM architecture and Programming	3	0	0	3
2.	EEEX 68	Communication Engineering	3	0	0	3
3.	EEEX 69	Digital Signal Processing	3	0	0	3

SEMESTER I

ENE 1181	ENGLISH FOR ENGINEERS	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

COB1: To develop students' listening skills through exposure to diverse media and enhance comprehension and contextual understanding.

COB2: To enable students to speak effectively in a range of informal and formal contexts.

COB3: To make them analyze academic and technical texts using structured reading techniques.

COB4: To enable them to produce organized, purposeful writing for academic and technical use.

COB5: To equip students with appropriate use of grammar, and technical and academic vocabulary.

MODULE I **L: 10**

L: Listening to short audio-formal & informal conversations - Select episodes from *Learn English Podcasts*, British Council

S: Self Introduction - Present, Past, and Future framework (suggested by Harvard Business Review)

R: Process of reading: Skimming & Scanning, SQ3R

W: Technical Writing- Developing hints, Paragraph Writing (technical)

Grammar & Vocabulary: Prefixes & Suffixes, Articles, Present tense, Prepositions, Subject – Verb Agreement

MODULE II **L: 10**

L: Listening to podcasts - 1. "The impact of online abuse" from *Tech Life,* BBC sounds, 2. How can AI support designers? from*Technology Podcast*.

S:Telephonic conversations (Enquiring& Complaining)

R: Reading long technical texts - Comprehension passages - Select articles from *IEEE Spectrum*, *Techcrunch.com*

W: Jumbled sentences, Process description– Interpretation of Flow chart,Bar chart, Dialogue writing

Grammar & Vocabulary: Transition words, Past tense, Conjunctions, Wh /Yes or No questions, Modal verbs

MODULE III **L: 9**

L: Listening to TED / INK Talks - 1. “The next computer? Your glasses” - ShahramIzadi (TED Talk) 2. “The Society is our Lab” - Sanjay Podder (INK Talk)

S:Extempore-One minute presentation

R: Reading biography (Extracts from ‘Profiles’, The Hindu, Sunday Edition) / Autobiography / Fiction & Note- making

W: Letter seeking permission for Industrial Visit / symposium, Letter of invitation

Grammar & Vocabulary: Homonyms, Degrees of comparison, Future tense

L: 8

MODULE IV

L: Listening to debates & discussions - 1. “Hydrogen vs Battery: The Future of Our Transport”, ”2. “Saudi Arabia’s Economic Shift to Green Energy” from *The Gen-Z Debate* Podcast.

S: Group presentation on general topics

R: Reading magazines and articles (extracts from ‘Sci-Tech’, The Hindu, Sunday Edition)

W: Report writing (Industrial visit report), Argumentative writing

Grammar & Vocabulary: Active, Passive & Impersonal passive voice, Phrasal verbs

L: 8

MODULE V

L: Listening to famous speeches - 1. “Commencement Address at Stanford University” by Steve Jobs 2. “The Voice of Women” by Tejaswini Manogna

S: Debates on Contemporary issues (Agreeing & Disagreeing)

R: Blogs - Articles on Technology, Workforce and Industries from *Deloitte Insights*

W: Book Reviews, Product reviews: Select reviews from “theverge.com”

Grammar & Vocabulary: If clauses, Idioms & Phrases

L: 45 ; Total Hours: 45

TEXT BOOKS:

1. Course material by the Department of English

REFERENCES:

Books:

1) Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2011.
2) Dutt, P. Kiranmai & Rajeevan, Geeta. *Basic Communication Skills*. Foundation Books, 2013
3) Firth, Matt, Sowton, Chris, et al. *Academic English: An Integrated Skills Course for EAP*. Cambridge University Press, Cambridge, 2012.
4) Perry, Carol Rosenblum. *The Fine Art of Technical Writing*. Create Space Independent Publishing Platform, New Delhi, 2011.
5) Raman, Meenakshi & Sharma, Sangeeta. *Professional English*. Oxford University Press, First Edition, 2018.
6) *Using English: A Coursebook for Undergraduate Engineers and Technologists*. Orient Black Swan Limited, Hyderabad, 2015.

Podcasts:

1) BBC Sounds - Tech Life - available episodes. (n.d.). BBChttps://www.bbc.co.uk/sounds/brand/p01plr2p
2) Podcasts | LearnEnglish. (n.d.). LearnEnglish.https://learnenglish.britishcouncil.org/general-english/audio-series/podcasts
3) Podcasts from The Verge | The Verge.https://www.theverge.com/podcasts
4) *Saudi Arabia's economic shift to green energy*. (2022, July 29). Spotify. https://open.spotify.com/episode/2vjpyVMPjxEswgPxiSoG25
5) Technology Podcast. (n.d.). Thoughtworks.https://www.thoughtworks.com/en-in/insights/podcasts/technology-podcasts
6) *The Gen-Z debate*. (n.d.). Spotify. https://open.spotify.com/show/0ngu1Iheqit2yGWl7c575T

Reviews:

1) Reviews. (2001, May 24). The Verge. https://www.theverge.com/reviews

Famous Speeches:

1) Stanford. (2008, March 8). *Steve Jobs' 2005 Stanford Commencement Address* [Video]. YouTube.https://www.youtube.com/watch?v=UF8uR6Z6KLc
2) *TejaswiniManogna: The Voice of Women*. (2025, May 25). Spotify. https://open.spotify.com/episode/3s4v8SzuDQgKpf0tCEuZQP

Ted / Ink Talks:

1) Izadi, S. (n.d.). *The next computer? Your glasses* [Video]. TED Talks.https://www.ted.com/talks/shahram_izadi_the_next_computer_your_glasses
2) *The society is our lab - INK Talks.*(2021, December 20). INK Talks. https://inktalks.com/talks/the-society-is-our-lab/

Others (Websites & Articles for Reading Skills)

1) Business insights, analysis & perspectives | Deloitte Insights. (n.d.). Deloitte Insights. https://www2.deloitte.com/us/en/insights.html
2) Datta, S. (n.d.). Latest The Hindu Profiles News, Photos, Latest News Headlines about The Hindu Profiles-The Hindu. The Hindu. https://www.thehindu.com/topic/the-hindu-profiles/
3) IEEE Spectrum.https://spectrum.ieee.org/
4) Mukunth, V. (n.d.). Sci-Tech News | latest technological developments. The Hindu.https://www.thehindu.com/sci-tech/
5) TechCrunch. | Startup and technology news.https://techcrunch.com/
6) Wojnicki, A. (2022, August 2). *A simple way to introduce yourself*. Harvard Business Review. https://hbr.org/2022/08/a-simple-way-to-introduce-yourself

COURSE OUTCOMES:

On completion of the course, students will be able to

CO1: Comprehend and interpret a variety of English audio sources.

CO2: Perform effectively in self-introductions, discussions, debates, and collaborative speaking activities.

CO3: Extract relevant information and evaluate content from technical and academic texts using reading strategies.

CO4: Construct academic and technical documents with clarity and coherence.

CO5: Use appropriate vocabulary and grammar in oral and written tasks.

Board of Studies (BoS):
18th BoS of the Department of English held on 04.06.2025

Academic Council:
24th AC held on 26.08.2025.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement:

The course equips the students with relevant academic and technical communication skills to gain quality employment and entrepreneurial opportunities.

MAE 1181	MATRICES AND DIFFERENTIAL CALCULUS	L	T	P	C
SDG: 4		3	1	0	4

COURSE OBJECTIVES:

COB1: To introduce eigenvalues and eigenvectors of a matrix.

COB2: To demonstrate the application of differential calculus.

COB3: To bring into the light of functions of several variables and its applications.

COB4: To develop the use of ODE solvable techniques necessary for engineering applications.

COB5: To familiarize in solving partial differential equation of first, second and higher orders.

MODULE I MATRICES **9+3**

Characteristic equation – Eigenvalues and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem (without proof) – Orthogonal matrices – Orthogonal transformations of a real symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE II DIFFERENTIAL CALCULUS **9+3**

Curvature – Cartesian and polar coordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Envelopes – Evolute as envelope of normals.

MODULE III FUNCTION OF SEVERAL VARIABLES **9+3**

Functions of two variables – Partial derivatives – Total differential – Differential of implicit functions – Jacobian – Taylor's series expansion for two variables– Maxima and minima – Constrained maxima and minima by Lagrange's multiplier method.

MODULE IV ORDINARY DIFFERENTIAL EQUATIONS **9+3**

Linear differential equations of higher order with constant and variable coefficients – Simultaneous first order linear equations with constant coefficients – Variable coefficients for Euler's type – Equations reducible to homogenous form – Method of variation of parameters.

MODULE V PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

L – 45; T – 15; TOTAL HOURS – 60

TEXT BOOKS:

1. Ramana B.V, "Higher Engineering Mathematics" Tata McGraw Hill Publishing Co. New Delhi, 2017.
2. B. S. Grewal, "Higher Engineering Mathematics", 45th Edition, Khanna Publishers, New Delhi, 2024.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Pvt Ltd., 2011 (reprint 2024).

REFERENCES:

1. T. Veerarajan, "Engineering Mathematics", 6th Edition, Tata McGraw Hill Publishing Co., New Delhi, 2018.
2. Jain R. K & Iyengar S. R. K, "Advanced Engineering Mathematics", 5th Edition, Narosa Publishers, 2016.
3. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage Learning, 2011.
4. Dennis G. Zill and Warren S. Wright, "Advanced Engineering Mathematics", 7th Edition, Jones & Bartlett (IWAA), Sudbury, 2012.
5. Venkataraman M. K., "Engineering Mathematics", Volume I, 2nd Edition, National Publishing Co., Chennai, 2003.

COURSE OUTCOMES: At the end of the course students will be able to

CO1: use the matrix techniques to compute eigenvalues and eigenvectors of a given matrix.

CO2: apply differential calculus in engineering problems.

CO3: differentiate the functions with more than one variable and their applications.

CO4: solve the differential equations with constant and variable coefficients.

CO5: form and solve the partial differential equations.

Board of Studies (BOS):
17th BOS of Department of Mathematics and Actuarial Science held on 23.06.2025

Academic Council:
24th AC held on 26.08.2025.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	2	1													
CO 2	3	1													
CO 3	3	1													
CO 4	3	2													
CO 5	3	2													

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4 – Quality Education: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.

Learning various mathematical tools will lead to knowledge of applications in Engineering problems.

PHE 1181	ENIGINEERING PHYSICS	L	T	P	C
SDG: 4		3	0	2	4

COURSE OBJECTIVES:

COB1: To understand the importance of mechanics and properties of matter.

COB2: To familiarize the concepts of electromagnetic waves.

COB3: To introduce the fundamentals of optics and lasers to students

COB4:.To analyze the acoustics of buildings and applications of ultrasonics.

COB5: To correlate the quantum mechanics principles and its impact in its application

MODULE I PROPERTIES OF MATTER AND MECHANICS **L- 9 T- 0 P- 0**

Elasticity – Hooke’s Law-Elastic Moduli-Stress-strain diagram – Factors affecting elasticity – Poisson’s ratio - Twisting couple on a wire – Shaft – Torsion pendulum – Bending moment - Depression on a cantilever – Young’s modulus by cantilever Uniform and non-uniform bending – I Shape Girders-Viscosity. M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – compound pendulum –Introduction to nonlinear oscillations.

MODULE II ELECTROMAGNETIC WAVES **L- 9 T - 0 P - 0**

Nature of electromagnetic waves- Properties of EM waves-Coulomb’s law, Gauss’s law and applications, Electrostatic potential–Biot-Savart Law and its Applications, Ampere’s circuital Law – Applications- Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations – free space - Concept of displacement current- Various types of waves in EM- spectrum -Applications of EM waves.

MODULE III OPTICS AND LASERS L- 9 T - 0 P- 0

Refractive index-refraction through different media-diffraction (Fresnel and Fraunhofer) and polarization –double refraction–Nicol prism- Interference-Air Wedge – Michelson's Interferometer – Determination of wavelength of light and thickness of thin transparent sheet-Characteristics of Laser – Spontaneous and Stimulated Emissions – Einstein's Coefficients - Population inversion – Pumping Mechanism – Laser Action – Types of Laser: Nd:YAG laser –CO_2 laser and semiconductor laser - Applications : Laser Materials Processing – Holography-Medical applications.

MODULE IV ACOUSTICS & ULTRASONICS L-9 T-0 P-0

Basic requirement for the acoustically good halls - Reverberation and time of reverberation – Sabine's formula for reverberation time - Absorption coefficient and its measurement - Factors affecting the architectural acoustics and their remedy-Sound absorbing materials - Introduction to Ultrasonics - Properties - Production methods – Magnetostriction Oscillator method- Piezoelectric Oscillator method – Detection of Ultrasonics –Thermal method – Piezoelectric method – Kundt's tube method – Applications of Ultrasonics – Acoustic Grating – SONAR – Depth of sea – Velocity of blood flow - Ultrasonic Flaw detector.

MODULE V QUANTUM PHYSICS L-9 T-0 P-0

Black body radiation – Planck's theory of radiation – Deduction of Wien's displacement law and Rayleigh – Jean's law from Planck's theory –– Dual nature of matter – de-Broglie wavelength – Theory of Compton's effect – Davison and Germer experiment- Schrodinger wave equation – Time independent and time dependent wave equation-Physical significance of wave function –– Particle in one dimensional box – Introduction to Quantum computing

PRACTICALS **P : 30**

List of Experiments

1. Determination of rigidity modulus of the given wire using Torsional pendulum.
2. Determination of acceleration due to gravity using compound pendulum.
3. Determination of Young's modulus of the beam by uniform / non-uniform bending method.
4. Determination of Young's modulus of the beam by cantilever method.
5. To determine the frequency of an electrically maintained tuning fork using a vibration generator. (Melde's experiment)
6. Determination of thickness of a thin wire / sheet using Air Wedge method.
7. Determination wavelength of spectral lines of mercury source using spectrometer grating method.
8. Determination of wavelength of laser light using semiconductor laser diffraction.
9. Determination of angle of divergence of a laser beam using semiconductor diode laser and He-Ne laser.
10. Determination of particle size of lycopodium powder using semiconductor laser.
11. Determination of Planck's constant using photoelectric effect.
12. Determination of velocity of ultrasonic waves in the liquid using ultrasonic interferometer.
13. Determination of velocity of ultrasonic waves by acoustic grating.
14. Determination of field along the axis of the coil. (Biot-Sawart Law).
15. Verification Ampère's Circuital Law using a long straight current-carrying conductor and measurement of the magnetic field around it.

L – 45; P – 30 ; TOTAL HOURS – 75

TEXT BOOKS:

1. Richard Wolfson, "Essential University Physics", Pearson (2011)
2. Dale Ewen, Neill Schurter, P.E. Gundersen, "Applied Physics", Pearson

(2005)

REFERENCES:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education, 2017.
2. Brij Lal and N. Subramanyam, Properties of Matter, S.Chand & Co, 2003.
3. Brij Lal and N.Subramanyam, Optics and Spectorscopy, S.Chand & Co.,2003.
4. Serway R.A. and Jewett, J.W., Physics for Scientists and Engineers with Modern Physics, Brooks/cole Publishing Co., 2010.
5. Tipler P.A. and Mosca, G.P., Physics for Scientists and Engineers with Modern Physics, W.H. Freeman, 2007.
6. Markert J.T., Ohanian. H. and Ohanian, M., Physics for Engineers and Scientists, W.W. Norton & Co., 2007.

COURSE OUTCOMES:

CO1: grasp the importance of mechanics and the principles of elastic behaviour of materials & apply them to analyze the various substances based on elasticity.

CO2: apply the fundamental principles governing the electromagnetic waves and their impact in technology.

CO3: comprehend the importance & principles of optics and learn the science of lasers and its applications.

CO4: assimilate the ideas of acoustical requirements of buildings, understand principles and generation of ultrasonics and their applications.

CO5: get acquainted with the topics concerning principles of quantum mechanics and correlate the relevance in real time application in devices.

Board of Studies (BoS) :
15th Meeting of BOS held on 18/07/2025

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12	PSO1	PSO2
CO1	H	H	M	L	M	M	M	M	M	L	L	H	M	M
CO2	H	H	M	M	M	M	M	M	M	L	L	H	M	M
CO3	H	H	M	L	H	M	M	M	M	L	L	H	M	M
CO4	H	H	M	M	M	M	M	M	M	L	L	H	M	M
CO5	H	H	M	L	H	M	M	M	M	L	L	H	M	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Statement:

The modules and topics mentioned in this course are designed to ensure all-inclusive and thorough education with equity to all persons and promote learning opportunities at all times.

GEE 1101	ENGINEERING GRAPHICS	L	T	P	C
SDG: 9		2	0	2	3

COURSE OBJECTIVES:

COB1: To develop basic skills in engineering drawing and orthographic projection using BIS standards, covering projections of points, lines, and planes in different quadrants.

COB2: To visualize and construct orthographic projections of regular solids.

COB3: To impart the ability to generate sectional views and determine the true shape of sections, by enhancing interpretation of internal features.

COB4: To introduce isometric projections by creating isometric views of regular solids and frustums using isometric axes and scale.

COB5: To familiarize with the basics of Computer-Aided Drafting and Design (CADD), and to draw orthographic projection views of simple machine parts.

MODULE I	INTRODUCTION TO ENGINEERING DRAWING AND ORTHOGRAPHIC PROJECTION OF POINTS, STRAIGHT LINE AND PLANES	L: 08	T: 0	P: 10

Drawing instruments, dimensioning, BIS conventions, types of lines, simple geometric constructions -Scale - Orthographic projection – first angle, second angle, third angle and fourth angle projections - Orthographic projection of points in all quadrants - Projection of straight lines inclined to both reference planes in first quadrant - Projection of plane lamina inclined to both reference planes in first quadrant.

MODULE II	ORTHOGRAPHIC PROJECTION OF REGULAR SOLIDS	L: 06	T: 0	P: 06

Orthographic projections of solids in first quadrant: Axis inclined to one reference plane -prism, pyramid, cone, and cylinder only– change of position method.

MODULE III	SECTIONAL VIEWS OF RIGHT REGULAR SOLIDS	L: 05	T: 0	P: 04

Section of solids: prism, pyramid, cone and cylinder– sectional view – true shape of section- cutting simple position solids – section plane inclined to one reference plane only.

MODULE IV ISOMETRIC PROJECTIONS **L: 05 T: 0 P: 04**

Principle of isometric projection: isometric scale – isometric axes- isometric projection and view of prism, pyramid, cylinder, cone, frustums and combination of simple solids.

MODULE V OVERVIEW OF COMPUTER GRAPHICS AND CADD **L: 06 T: 0 P: 06**

Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software such as: The menu system, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), drawing area, dialog boxes and windows, shortcut menus, command line, status bar, zoom as used in CAD, select and erase objects. - Sketching orthographic views of simple solids and machine parts as per first angle projection

L – 30; T – 0; P – 30; Total Hours: 60

TEXT BOOKS:

1. N.D. Bhatt, “Engineering Drawing”, Charotar Publishing house, 54th Edtion, 2023.
2. Venugopal. K, and V. Prabhu Raja, “Engineering Graphics”, New Age International (P) Ltd., Publication, Chennai, Edition 15th, 2018.

REFERENCES:

1. K.V. Natarajan, “A text book of Engineering Graphics”, Dhanalakshmi publishers, Chennai, 31st Edition, 2018.
2. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publication, 2017.
3. Jeyapoovan, T., “Engineering Graphics using AutoCAD”, Vikas Publishing House Pvt. Ltd., New Delhi, 7th Edition 2014.
4. AutoCAD Software Theory and User Manuals
5. Engineering graphics You tube Lecture videos link: https://www.youtube.com/user/BSAUNIV/videos
6. Alternative NPTEL / SWAYAM course: (1.) Prof. Nihar Ranjan Patra of IIT Kanpur on Engineering Graphics and (2.) Prof. Rajaram Lakkaraju of IIT KGP on Engineering Drawing and Computer Graphics

COURSE OUTCOMES: After completion of the course, the students should be able to

CO1: Apply BIS standards and conventions to create basic engineering drawings, including projections of points, lines, and planes in various quadrants.

CO2: Construct orthographic projections of regular solids with axes inclined

to one reference plane using appropriate methods.

CO3: Interpret and draw sectional views of solids and determine the true shape of sections for given cutting plane conditions.

CO4: Create isometric projections and views of regular solids and frustums using isometric principles and scale.

CO5: Use CAD software tools to generate accurate orthographic views of simple machine parts following first-angle projection standards.

Board of Studies (BoS):
25th BoS of Mechanical held on 09.07.2025.

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	1						1			1	
CO2	2	1	1						1			1	
CO3	2	1	1						1			1	
CO4	2	1	1						1			1	
CO5	2	1	1		2				1			1	

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Understanding various industrial standards for technical drawing and applying orthographic projections to represent simple solids support the development of innovative designs, contributing to sustainable industrialization.

GEE 1102	DESIGN THINKING	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: To impart the basics of design thinking and train the students in identifying the opportunity to develop innovative solutions for problem faced by the society

COB2: To introduce the tools of empathy and inculcate the problem definition phase of design thinking

COB3: To acquaint the idea generation methods used for solving engineering problems

COB4: To develop the culture of making prototype from design concepts

COB5: To familiarize the role of innovation and patents in engineering

MODULE I INTRODUCTION TO DESIGN THINKING **L: 09 T: 0 P: 0**

Importance of design in engineering – Evolution of products – Difference between product, process, system and software – Origin and relevance of design thinking – Stages of design thinking - Customer centric design - Development of user persona – Opportunity and problem identification.

MODULE II PROBLEM DEFINITION **L: 10 T: 0 P: 0**

Empathy: Tools and methods, empathy map, customer journey mapping – Define: Tools used in define phase, 5-WHY method, fish bone diagram, importance of problem framing, Point Of View (POV) statement. Case studies for empathy and problem definition.

MODULE III IDEATION **L: 09 T: 0 P: 0**

Idea generation: Tools and methods – Bench marking, Brainstorming, idea affinity maps, 6-3-5 method, Mind mapping, SCAMPER, Co-design - Case studies on ideation.

MODULE IV PROTOTYPING AND TESTING **L: 09 T: 0 P: 0**

Types of prototypes: Prototype fidelity, Evolutionary vs Throwaway prototypes,

Minimum Viable Prototype, Sketch models, Story boards, Digital prototypes, working prototypes, 3D printed prototypes – User testing with prototypes – Test the design feasibility, capability and usability - Value proposition canvas.

MODULE V INNOVATION **L: 08 T: 0 P: 0**

Creativity and innovation – Role of innovation in Engineering – incremental innovation – Break through innovation - scientific approach to driving innovation – Intellectual property rights – Startups - case studies on innovative products and startups.

L – 45; T – 0; P – 0; Total Hours: 45

TEXT BOOKS:

1. Tim Brown, “Change by Design”, HarperCollins, 2019.
2. Nigel Cross, “Design Thinking”, Berg Publishers, 2011.

REFERENCES:

1. Tom Kelley, “The Art of Innovation”, Profile Books Ltd, London, 2016
2. E. Balagurusamy, “Design Thinking”, McGraw Hill, First Edition, 2024
3. Clive L. Dym, Patrick Little, and Elizabeth J. Orwin, “Engineering Design: A Project Based Introduction”, 4th Edition, Wiley, 2014.
4. Cliff Matthews, “Case Studies in Engineering Design”, John Wiley & Sons Pvt. Ltd, New York, 1998.
5. Eppinger, S. and Ulrich, K., “Product design and development”. McGraw-Hill, 7th Edition 2020.

COURSE OUTCOMES: On completion of the course, students should be able to

COB1: Explain the basic concepts of design thinking and identify the opportunity for developing innovative solutions for the problem faced by the society

COB2: Empathize to collect customer needs and write problem statement based on design thinking principles

COB3: Generate innovative ideas for solving engineering problems using the tools and methods of design thinking

COB4: Develop and test simple prototypes to verify design viability

COB5: Apply innovative approaches to engineering problems and provide design solutions

Board of Studies (BoS):
25th BoS of Mechanical held on 09.07.2025.

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1			3								1	3	
CO2		1	3	1	3				3			3	
CO3			3		3				3			3	
CO4			3		3				3			3	
CO5			3									3	

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 9: Industry, Innovation & Infrastructure.

The holistic understanding of Engineering design, Design thinking, Prototypes and Creativity and innovation.
Our industries and infrastructure must be upgraded to meet future challenges. In order to achieve this, we must promote innovative, sustainable technologies while also ensuring equal and universal access to information and financial markets.

GEE 1103	DIGITAL MANUFACTURING AND	L	T	P	C
SDG: 8, 9	FABRICATION LABORATORY	0	0	2	1

COURSE OBJECTIVES:

COB1: To familiarize with the plumbing and sanitary fixtures in a building.

COB2: To understand the materials used in construction, its functions and the structural elements in buildings.

COB3: To provide hands-on experience in fundamental manufacturing processes, including various welding techniques and traditional foundry operations, enabling students to understand material joining and shaping.

COB4: To introduce modern manufacturing technologies like additive manufacturing (3D printing) fostering diverse fabrication methods.

COB5: To provide hands-on experience on basic electrical wiring systems and to ensure safe and effective electrical installations.

COB6: To introduce the active and passive electronic components, wire up simple electronic circuits and test them.

LIST OF EXPERIMENTS:

CIVIL ENGINEERING PRACTICE:

1. Plumbing: Components and tools used in residential plumbing work – Plumbing layout of a typical building – Types of pipes and connection details – plumbing arrangement for washroom and kitchen.

2. Masonry and Concrete: Materials for cement mortar and concrete – Types of wall materials and their arrangement.

3. Steel rebar for construction – Types and properties.

4. Building Frame: Elements of building frame – Typical Load transfer arrangement – Model Making: Foundation, beam and Column.

MECHANICAL ENGINEERING PRACTICE:

1. Introduction to various weld joints. Fabrication of a simple structures using Lap / Fillet Joints using Arc Welding – Gas cutting (Demo)

2. Foundry operations such as sand mold preparation for simple Engineering components.

3. Group exercises in 3D Printers.
4. Joints using Drilling – Study exercise.

ELECTRICAL ENGINEERING PRACTICE:

1. Domestic Wiring
2. Staircase Wiring
3. Measurement of Earth Resistance

ELECTRONICS ENGINEERING PRACTICE:

1. Identifications and symbolic representation of active and passive electronic components
2. Soldering and tracing of electronic circuits and checking its continuity
3. Design and testing of electronic circuits using active and passive electronic components.

L – 0; T – 0; P – 30; Total Hours:30

TEXT BOOKS

1. S.Gowri and T.Jeyapoovan, “Engineering Practices Lab Manual – Civil, Mechanical, Electrical, Electronics included”, Vikas Publishing, 5th Edition, 2019.

REFERENCES:

1. SubhransuSekhar Dash &K.Vijayakumar, “Electrical Engineering Practice Lab Manual”, Vijay Nicole Imprints Private Ltd., First Edition, 2013.
2. Raghbir Singh Khandpur, “Printed Circuit Boards: Design, Fabrication, and Assembly”, Tata McGraw-Hill Education, 2005.

COURSE OUTCOMES: After completion of the course, students should be able to

CO1: To recognize the materials used in construction, its functions, and load transfer arrangement of structural elements in a residential building.

CO2: To identify the plumbing and sanitary fixtures, and its arrangement in a residential building.

CO3: Identify and differentiate various weld joint types and demonstrate

proficiency in fabricating simple structures using arc welding for lap and fillet joints.

CO4: Demonstrate an understanding of additive manufacturing principles and applications.

CO5: Identify active and passive electronic components and Wire up simple electronic circuits, solder the components and test.

CO6: Apply electrical wiring diagrams to construct domestic and staircase wiring systems

Board of Studies (BoS):
25th BoS of Mechanical held on 09.07.2025.

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3				3				2				
CO2	3				3				2				
CO3	3				3				2				
CO4	3				3				2				
CO5	3				3				2				
CO6	3				3				2				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Equips individuals with practical skills like welding, basic wiring, and electronic circuit for a stable and sustainable livelihood.

Develops essential infrastructure maintenance skills such as plumbing, and masonry, for resilient and functional buildings and sanitation systems.

GEE 1104	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
SDG: 4		2	0	2	3

COURSE OBJECTIVES:

COB1: To introduce the basic concepts of computing systems, software, hardware, and programming language evolution.

COB2: To equip students with problem-solving skills using algorithms, flowcharts, and design strategies.

COB3: To enable students to write structured C programs using variables, operators, control structures, and modular programming with functions.

COB4: To gain skills to work with arrays, strings, structures, and unions for solving data manipulation problems.

COB5: To provide an understanding of pointers, memory access, file operations, and advanced C programming constructs.

MODULE I COMPUTATIONAL THINKING AND PROBLEM SOLVING **7**

Fundamental of Computing System-History of computing – Hardware – Software – Languages – Machine - Assembly - High-level - Language Translators – Compiler – Interpreter - Linker - Loader – Program Execution – Design - Flowchart – Algorithm – Design techniques - Divide and conquer- Brute Force – Greedy algorithms - Dynamic Programming.

MODULE II FUNDAMENTALS OF PROGRAMMING USING C **8**

Introduction to C Programming-Structure of C Program- Applications of C language- Data Types - Variables - Constants - Keywords - Operators: Precedence and Associativity – Expressions - Input and Output operations – Decision making – Branching – Looping statements.

MODULE III ARRAYS AND FUNCTIONS **8**

Arrays – One dimensional array - Two and multidimensional array – Strings - String operations – Functions - Category of Functions – Call by value – Call by reference – Recursion - Structures - Unions.

MODULE IV POINTERS AND FILE MANAGEMENT 7

Pointers - Pointer Arithmetic - Pointers and Arrays - Pointers and Strings - Pointers and Functions - File Handling – File Operations - Command Line Arguments - Preprocessor Directives - Enumerated Data Types and Typedef.

PRACTICALS 15

1. I/O statements and operators
2. Decision Making statements
3. Looping statements
4. Single and Two dimensional Arrays
5. String Operations
6. Functions: call, return, passing parameters by (value, reference), passing arrays to function
7. Recursion
8. Structures and Unions
9. Pointers
10. File operations in C using standard I/O functions

L – 30; P- 15;Total Hours – 45

TEXT BOOKS:

1. E. Balagurusamy, *Programming in ANSI C*, 9th edition. New Delhi, India: McGraw-Hill Education India, ISBN-13: 978-9355326720, 2024.
2. Y. Kanetkar, “Let Us C: Authenticate guide to C Programming Language”, 20th edition. New Delhi, India: BPB Publications, ISBN-13 978-9355515513, 2024.
3. Thomas H. Cormen, Charles E. Leiserson , Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 4th edition, ISBN-13: 9780262046305, 2022.
4. Nell Dale and John Lewis, “Computer Science Illuminated”, 7th edition, Jones and Bartlett Learning , ISBN-13:9781284155617, 2020.

REFERENCES:

1. Kernighan, B.W and Ritchie,D.M, “The C Programming language”, 2nd Edition, Pearson Education, ISBN-13:9789332549449, 2015.
2. Ashok. N. kamthane, “Computer Programming”, 1st Edition, Pearson Education, ISBN-13: 9788131704486, 2007.

COURSE OUTCOMES: The students who complete this course will be able to

CO1: Describe the fundamental components of a computing system, evolution of programming languages, and program execution process..

CO2: Develop algorithms and flowcharts using standard problem-solving strategies such as divide and conquer, greedy, brute force, and dynamic programming.

CO3: Write programs in C using basic syntax, data types, operators, control structures, and functions including recursion.

CO4: Implement arrays, strings, structures, and unions to solve real-world programming problems.

CO5: Apply the concepts of pointers, file handling, command-line arguments, and preprocessor directives for efficient C programming.

Board of Studies (BoS) : 25th BoS of CSE held on 07.07.2025

Academic Council: 24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	1	1	1	-	-	-	3	-	2	3	1	1
CO2	3	3	2	2	1	-	-	-	3	-	2	3	2	3
CO3	3	3	3	2	2	-	-	-	3	2	2	2	3	3
CO4	3	3	3	2	2	3	-	-	3	2	2	2	3	3
CO5	3	3	3	2	3	-	-	-	3	2	2	1	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Quality Education focuses on ensuring inclusive and equitable quality education and promoting lifelong learning opportunities.

Statement: Equipping students with essential programming skills in C programming fosters computational thinking, problem-solving abilities, and software development proficiency that are foundational for lifelong learning and future-ready employment in the digital economy.

GEE 1105	ENVIRONMENTAL SCIENCES	L	T	P	C
SDG: 3, 6, 13, 14, 15		2	0	0	0

COURSE OBJECTIVES: To make the student conversant with the

COB1: various natural resources, availability, utilisation and its current scenario.

COB2: diverse ecosystems and its function, importance of biodiversity, its values, threats and conservation.

COB3: types of pollutants and its impacts on the environment and the effects of natural disasters.

COB4: impacts of human population, human health, diseases and immunisation for a sustainable lifestyle.

MODULE I Natural Resources L: 8 T: 0 P: 0

Introduction to Environmental Science - Lithosphere, hydrosphere and atmosphere – Biosphere - Natural Resources: Renewable and non-renewable resources - Natural resources and associated problems: (a) Land resources: soil erosion and desertification (b) Forest resources: deforestation (c) Water resources: conflicts over water, dams: benefits and problems, effects on forest and tribal people, rain water harvesting (d) Mineral resources: environmental effects of extracting and using mineral resources and mining (e) Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture (f) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources.

Case Studies: Case studies in the current scenario in TN/India/across the world

MODULE II Ecosystems and Biodiversity L: 7 T: 0 P: 0

Ecosystems - Concept of an ecosystem and types: Terrestrial Ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem; Aquatic fresh water ecosystems: Ponds and lakes, rivers and streams; Aquatic salt water ecosystems: oceans and estuaries - Food chains, food webs - Energy flow in the ecosystem - Ecological pyramids - Ecological succession - Biodiversity and its conservation: Types: genetic, species and ecosystem diversity - Values of biodiversity - Invasive, endangered, endemic and extinct species - Hot sports of biodiversity and Red Data

book - Threats to biodiversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Case Studies: Case studies in the current scenario in TN/India/across the world

MODULE III Environmental Pollution and Disaster Management L: 8 T: 0 P: 0

Carbon foot prints - greenhouse effect, global warming and ozone layer depletion - Sources, cause, effects and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Nuclear Hazards (g) ill-effects of fireworks and upkeep of clean environment - Types of fire and fire extinguishers - Solid waste Management: types, collection, processing and disposal of urban waste, industrial waste, e-waste and biomedical wastes - Disaster management: flood, drought, cyclone, landslide, avalanche, volcanic eruptions, earthquake and tsunami.

Case Studies: Case studies in the current scenario in TN/India/across the world

MODULE IV Human Population, Health and Social Issues L: 7 T: 0 P: 0

Human Population, Population growth and population explosion - Population pyramid among nations - Human Rights and NHRC - Value Education - Environment and human health: air-borne, water borne, infectious diseases, contagious diseases and immunisation (all types of vaccines), covid-19 and bioweapons - Risks due to chemicals in food and water, endocrine disrupting chemicals, cancer and environment - Sustainable development and SDG - Resettlement and rehabilitation of people - Programme for Family, Women and Child welfare.

Case Studies: Case studies in the current scenario in TN/India/across the world

L – 30; T – 0; P – 0; Total Hours: 30

TEXT BOOKS:

1. Erach Bharucha, Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education for University Grants Commission, Orient Blackswan Pvt. Ltd., Hyderabad, India, 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill Education, India, 2009.
3. Ravikrishnan A, Environmental Science and Engineering, Sri Krishna Publications, Tamil Nadu, India, 2018.

4. Raman Sivakumar, Introduction to Environmental Science and Engineering, McGraw Hill Education, India, 2009.
5. Venugopala Rao P, Principles of Environmental Science and Engineering, Prentice Hall India Learning Private Limited; India, 2006.
6. Anubha Kaushik and Kaushik C.P., Environmental Science and Engineering, New Age International Pvt. Ltd., New Delhi, India, 2009.

REFERENCES:

1. Masters G.M., Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi, 1997.
2. Henry J.G. and Heike G.W., Environmental Science and Engineering, Prentice Hall International Inc., New Jersy, 1996.
3. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. Boston, USA, 2016.
4. Waste to Resources: A Waste Management Handbook, The Energy and Resources Institute, 2014.
5. https://www.teriin.org/article/e-waste-management-india-challenges-and-opportunities.
6. https://green.harvard.edu/tools-resources/how/6-ways-minimize-your-e-waste.
7. https://www.aiims.edu/en/departments-and-centers/central-facilities/265-biomedical/7346-bio-medical-waste-management.html.
8. https://tspcb.cgg.gov.in/Shared%20Documents/Guidelines%20for%20Management%20of%20Healthcare%20Waste%20Waste%20Management%20Rules,%202016%20by%20Health%20Care%20Facilities.pdf.

COURSE OUTCOMES: The student will be able to

CO1: analyse the current scenario of various natural resources and their depletion and suggest remedies to curb the exploitation.

CO2: identify food chains and web and its function in the environment, assess the impacts on the biodiversity and propose solutions to conserve it.

CO3: analyse the types and impacts of pollutants in the environment and propose suitable methods to alleviate the pollutants and the natural disasters.

CO4: assess on the impact of human population and the health related issues and immunisation practices and sustainable developments for

a healthy life.

Board of Studies (BoS):
14th BoS of Chemistry held on 17.07.2025

Academic Council:
24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 3: Good Health and Well-Being	Ensure healthy lives and promote well-being for all at all ages
SDG 6: Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
SDG 13: Climate Action	Take urgent action to combat climate change and its impacts
SDG 14: Life Below Water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
SDG 15: Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Statement:

Natural resources, land and water ecosystems, biodiversity and its degradation, pollution and its management to have a sustainable environment.

SEMESTER II

MAE 1282	TRANSFORMS AND ITS APPLICATIONS	L	T	P	C
SDG: 4		3	1	0	4

COURSE OBJECTIVES:

COB1: To develop the knowledge of expressing the function as a series and applications of Fourier series.

COB2: To acquire the knowledge of boundary value problems.

COB3: To introduce techniques and engineering applications of Laplace Transforms.

COB4: To know the Fourier transform techniques.

COB5: To acquaint with Z -Transform techniques for discrete time systems.

MODULE I FOURIER SERIES 9+3

Introduction to Fourier Series – Dirichlet's conditions – General Fourier series – Half range Fourier series –Root mean square value – Parseval's identity – Harmonic analysis.

MODULE II BOUNDARY VALUE PROBLEMS 9+3

Classification of second order linear partial differential equations – Solutions of one dimensional wave and heat equations – Steady state solution of twodimensional heat equation – Fourier series solutions in Cartesian coordinates.

MODULE III LAPLACE TRANSFORM 9+3

Introduction to Laplace transform – Existence of Laplace transform – Properties of Laplace transforms – Initial & Final value theorems – Laplace transform of periodic functions – Inverse Laplace transform – Convolution theorem – Solution of ordinary differential equations – Applications.

MODULE IV FOURIER TRANSFORM 9+3

Fourier integral theorem (without proof) – Fourier transform pair – Fourier sine and cosine transform – Fourier inverse transform – Properties – Convolution theorem – Parseval's identity.

MODULE V Z – TRANSFORM **9+3**

Introduction to Z-transform – Properties of Z-transform – Inverse Z-transform – Convolution theorem – Formation of difference equations – Solving difference equations using Z-transform.

L –45; T–15; TOTAL HOURS – 60

TEXT BOOKS:

1. Ramana B.V, “Higher Engineering Mathematics” Tata McGraw Hill Publishing Co. New Delhi, 2017.
2. B. S. Grewal, “Higher Engineering Mathematics”, 45th Edition, Khanna Publishers, New Delhi, 2024.
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, John Wiley and Sons (Asia) Pvt Ltd., 2011 (reprint 2024).

REFERENCES:

1. T. Veerarajan, “Engineering Mathematics (for Semester III)”, 3rd Edition, Tata McGraw Hill Publishing Co. New Delhi, 2012.
2. R. K. Jain and S. R. K. Iyengar, “Advanced Engineering Mathematics”, 5th Edition, Narosa Publishers, 2016.
3. Peter V. O'Neil, “Advanced Engineering Mathematics”, 7th Edition, Cengage Learning, 2011.
4. Dennis G. Zill and Warren S. Wright, “Advanced Engineering Mathematics”, 7th Edition, Jones & Bartlett (IWAA), Sudbury, 2012.
5. Alan Jeffrey, “Advanced Engineering Mathematics”, 3rd Edition, Academic Press, USA, 2001(2002).

COURSE OUTCOMES: At the end of the course students will be able to

CO1: derive a Fourier series of a given periodic function by evaluating Fourier coefficients.

CO2: solve boundary value problems.

CO3: use Laplace transforms techniques to solve ordinary differential equations.

CO4: apply Fourier transform to evaluate the integrals.

CO5: solve difference equations using Z-transform.

Board Of Studies (BOS):

17th BOS of Department of Mathematics and Actuarial Science held on 23.06.2025

Academic Council:

24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1													
CO2	3	2													
CO3	3	2													
CO4	2	1													
CO5	2	1													

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4 – Quality Education: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.

Learning various mathematical tools will lead to knowledge of applications in engineering problems.

CHE1181	CHEMISTRY FOR ENGINEERING APPLICATIONS	L	T	P	C
SDG: 6, 9		3	0	2	4

COURSE OBJECTIVES: To make the students conversant with

COB1: the basic water quality parameters and the current scenario in terms of TDS, TSS, DO, hardness, alkalinity and their treatment.

COB2: Preparation, properties and applications of various polymers and composites

COB3: Types of corrosion, corrosion rate and control methods

COB4: Metals, nonmetals, alloys and their property and applications

COB5: Different types of sensors, working principle and applications.

MODULE I WATER TECHNOLOGY **L: 9 T: 0 P: 0**

Sources of water - Types of impurities in water: Physical, chemical and biological impurities - Specifications of water for domestic use (recommended by BIS and WHO) - Water Quality Parameters: Physical Characteristics - Colour, Turbidity (Turbidimetry and nephelometry), Taste and Odour (dissolved gases), Total Dissolved Solids (TDS), Total Suspended Solids (TSS) and Chemical Characteristics: Hardness - types and estimation (EDTA method), boiler problems, Acidity and Alkalinity (types) and pH correction, DO, BOD, COD - Water softening: Internal Conditioning (Carbonate, Phosphate, Calgon and colloidal conditioning) and External Conditioning (Ion-exchange process) - Desalination: Reverse Osmosis - Purification using nano and biomaterials - Domestic water treatment (Physical Processes: Screening, Aeration, Coagulation, Sedimentation, Filtration, Disinfection (UV treatment, bleaching powder and breakpoint chlorination)) - Heavy metals in water: Arsenic, Lead, Fluoride, Mercury in water, effects and removal.

MODULE II POLYMERS FOR ENGINEERING APPLICATIONS **L: 9 T: 0 P: 0**

Classification based on source, structure and intermolecular forces (elastomers, fibers, resins, plastics (thermoplastics and thermosetting plastics)) - Society of the Plastics Industry (SPI) Codes - Glass Transition Temperature and its significance - Preparation, properties and applications of: Commodity Polymers: Polyethene (LDPE, HDPE), PVC and PMMA - Engineering Polymers: polycarbonate, Teflon, bakelite, ABS Co-polymer

(Terpolymer) - Conducting polymers (Polyaniline) – Light emitting polymers (Polypyrrole (PPy)) - Biopolymers (PLA) - Dielectric polymers (Polyimide) - Foams (polyurethane) - Polymer blends and alloys (Definition and example) - Compounding and moulding techniques: Types (Injection Moulding and blow Moulding) - Polymers in sensors, self-cleaning and healing polymers (windows).

MODULE III CORROSION AND ITS PREVENTION **L: 9 T: 0 P: 0**

Types of corrosion - dry and wet corrosion - Electrochemical corrosion: galvanic corrosion, differential aeration corrosion and types - Rate of corrosion (weight loss method) - Factors affecting corrosion and determination - Prevention of corrosion: choice of materials and design - Corrosion inhibitors - anodic, cathodic, vapour phase and nano inhibitors - Sacrificial anodic protection and Impressed Current Cathodic Protection - Electroplating and electrolesss plating of PCB.

MODULE IV METALS, ALLOYS, METAL OXIDES AND COMPOSITES **L: 9 T: 0 P: 0**

Metals: copper, iron, aluminium - electrical conductivity and thermal conductivity, electrical wiring, components - phase changing materials heat sink - Alloys: steel (carbon alloy), brass and bronze (copper alloys), titanium alloys, solder (Pb and Sn) and lead-free solder - strength, hardness, and corrosion resistance - Metal oxides and mixed metal oxides: semiconductor, hardness and strength, catalysts, ceramics, clay based insulating materials - Composites: metal matrix composites, metal ceramics composites, metal fiber composites - strength and weight reduction, Fibre reinforced plastics (FRP).

MODULE V SENSORS **L: 9 T: 0 P: 0**

Sensors: Introduction and types - Principle, working and applications of Electrochemical sensors: MEMS and NEMS – Biosensors: construction, working and classification, Advantages - Biochips and genomics - Touch sensor (oximeter and glucometer) - Toxic gas sensor (H_2S and CO (septic tank)) - Smoke sensor - humidity sensor - temperature sensor - alcohol sensor (breathalyser).

PRACTICALS

1. Estimation of hardness in water sample.
2. Estimation of the alkalinity of water sample.
3. Estimation of dissolved oxygen in water sample.

4. Removal of hardness from the water sample by carbonate and phosphate conditioning.
5. Determination of total suspended solids by evaporation method
6. Preparation of polymers - polylactic acid, epoxy resin, PMMA
7. Moulding - Demo
8. Corrosion (acid, base and salt) and control (anodic and cathodic inhibitors)
9. Rate of corrosion (weight loss method)
10. Electroplating of copper on iron nail and determination of plating rate
11. Estimation of metals in alloys (precipitation method)
12. Synthesis of mixed metal oxides/ceramics/FRP
13. Glucose detection and alcohol sensing

L - 45; T - 0; P - 30; Total Hours: 75

TEXT BOOKS:

1. P.C. Jain and Monica Jain, Engineering Chemistry, 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., Delhi, 2025 (ISBN: 978-93-5216-213-0).
2. A. Ravikrishnan, Engineering Chemistry, Sri Krishna Hitech Publishing Company, 2018.
3. K. Sesha Maheswaramma, Engineering Chemistry, Pearson India, 2015 (ISBN: 9789332541573).
4. Rajender Singh, Introduction to Basic Manufacturing Process and Workshop Technology, New Age International Pvt. Ltd., 2006 (ISBN:9788122418460, 8122418465).
5. John Vetelino and Aravind Reghu, Introduction to Sensors, CRC Press, 2011 (ISBN: 9781439808528).

REFERENCES:

1. Clair N Sawyer, Perry L McCarty and Gene F Parkin, Chemistry for Environmental engineering and science, McGraw-Hill, Year: 2003 (ISBN: 9780072480665).
2. Mackenzie L. Davis, Michigan State University and David A. Cornwell, Introduction to Environmental Engineering, V Edition, McGraw-Hill, 2013 (ISBN 9780073401140).
3. Fred W. Billmeyer, Textbook of polymer science, John Wiley & Sons, Year: 1984 (ISBN: 9780471031963).
4. Vasant R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar, Polymer Science, V Edition, New Age International Publishers, 2024 (ISBN: 9789389802580)
5. Mars Fontana, Corrosion Engineering, III Edition, McGraw-Hill India, 1986 (ISBN: 9780070607446)
6. David F. Tver and Roger W. Bolz, Encyclopedic Dictionary of Industrial Technology: Materials, Processes and Equipment, Springer US, Year: 1984 (ISBN: 978146159676)
7. John Martin, Materials for engineering, CRC Press, 2006 (ISBN: 9780849387807).
8. Ali A. Ensafi, Electrochemical Biosensors, Elsevier, 2019 (ISBN: 9780128164914).
9. Brian R. Eggins, Chemical Sensors and Biosensors, John Wiley & Sons, Ltd., 2002.

COURSE OUTCOMES: The students will be able to

CO1: Determine hardness, alkalinity, dissolved oxygen, TSS associated with any water and suggest the treatment processes as per water quality.

CO2: Choose the polymers based on properties and application and the method of preparation.

CO3: Identify the type of corrosion and suggest the methods to control it.

CO4: Choose the materials from metals, meta oxides, alloys and composites based on their property and application.

CO5: categorize the sensors based on its applications to real time situation.

Board of Studies (BoS):
14th BoS of Chemistry held on 17.07.2025

Academic Council:
24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 6: Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
SDG 9: Industry, Innovation & Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement:

Water quality parameters and its treatment methods ensures the availability of clean drinking water, Polymeric and composite materials, metals and alloys as well as sensor systems for sustainable design and industrialization

GEE 1202 BASIC ELECTRIC AND MAGNETIC CIRCUITS L T P C

SDG: 4,7,9 3 0 0 3

COURSE OBJECTIVES:

COB1: To develop proficiency in solving DC and AC circuits using fundamental laws and systematic techniques.

COB2: To familiarize with important network theorems and their application in simplifying complex circuits.

COB3: To interpret the behavior of electric circuits under transient conditions using Laplace transform methods and assess time-domain responses in RL, RC, and RLC circuits.

COB4: To study the principles of magnetic and magnetically coupled circuits, including the computation of magnetic parameters and understanding of electromagnetic interactions.

COB5: To explore the operation of three-phase systems, analyze load conditions, and apply power measurement techniques in practical scenarios.

MODULE I FUNDAMENTALS OF ELECTRIC CIRCUITS L: 12

Fundamentals concepts of R, L and C elements- Independent and dependent sources - Ohm's Law -Kirchhoff 's Laws – DC Circuits – Resistors in series and parallel circuits - Star - delta transformation- A.C Circuits – Average and RMS Value – Complex Impedance – Phasor diagram - Real and Reactive Power, Power Factor-Mesh current and node voltage methods of analysis D.C and A.C Circuits – Resonance – Analog Operations: Addition, Multiplication and Function response of electric circuits.

MODULE II NETWORK THEOREMS L:9

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Millman's theorem, Compensation theorem, Reciprocity theorem, Tellegen's theorem – Application of theorems to solve DC and AC circuits – Dual networks.

MODULE III TRANSIENT ANALYSIS L: 6

Transient response of RL, RC and RLC circuits using Laplace transform with DC and AC excitations considering zero and non-zero initial conditions - system response – Natural and forced response.

MODULE IV MAGNETIC CIRCUITS AND COUPLEDCIRCUITS **L: 12**

Definition of magnetic quantities: permeability, flux, flux density, magnetic field intensity, reluctance, retentivity – Series and parallel magnetic circuits – Analogies between electric and magnetic circuits – Magnetic circuit computations – Hysteresis and eddy current losses – Magnetically coupled circuits: self and mutual inductances – Dot convention – Analysis of coupled circuits: transient and steady-state behavior of coupled inductors under AC excitation.

MODULE V THREE PHASE CIRCUITS **L:6**

Generation of three-phase voltages – Star and delta connections – Relationship between line and phase quantities – Balanced and unbalanced three-phase loads – Measurement and calculation of three-phase power using wattmeter methods.

L – 45; T – 0; P – 0; Total Hours:45

TEXT BOOKS:

1. William Hayt and Jack Kemmerly and Jamie Phillips and Steven Durbin, Engineering Circuit Analysis ,10th Edition, McGraw Hill, 2023.
2. Sudhakar A and Shyam Mohan SP, “Circuits and Networks Analysis and Synthesis”, McGrawHill, 2015.

REFERENCES:

1. C. K. Alexander and M. N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, New York, NY, USA: McGraw Hill, 2020.
2. J. A. Svoboda and R. C. Dorf, Introduction to Electric Circuits, 10th Edition, New York, NY, USA: Wiley-Blackwell, 2024.
3. Chakrabarti A, “Circuits Theory (Analysis and synthesis), Dhanpat Rai& Sons, New Delhi, 2020

COURSE OUTCOMES: The students will be able to:

CO1: Solve DC and AC circuits using basic laws and analysis techniques.

CO2: Use network theorems to simplify and solve electrical circuits.

CO3: Analyze transients in RL, RC, and RLC circuits using Laplace transforms.

CO4: Evaluate magnetic and coupled circuits and calculate related parameters.

CO5: Analyze three-phase systems and calculate power in various load conditions.

Board of Studies (BoS):
21st BoS of EEE held on 23.06.2025.

Academic Council:
24th AC held on 26.08.2025

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	3	2	1	2						M	M	M
CO2	3	3	2	1	2						M	M	M
CO3	3	3	2	1	2						M	M	M
CO4	3	2	1	1	2						M	M	M
CO5	3	3	2	1	2						M	M	M

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4 – Quality Education

The course imparts fundamental knowledge and analytical skills in electric and magnetic circuits, promoting quality technical education and preparing students for higher learning and practical applications in engineering.

SDG 7 - Affordable and Clean Energy

Understanding electric circuits is critical for designing and analyzing energy-efficient systems, including renewable energy technologies, thus contributing to the development of clean and sustainable energy solutions.

SDG 9 – Industry, Innovation, and Infrastructure

The course lays the groundwork for innovation in electrical systems and supports the development of industrial and infrastructure applications by equipping students with skills needed to design, analyze, and optimize electrical networks.

MEE 1201	ENGINEERING MECHANICS	L	T	P	C
SDG: 9		2	1	2	4

COURSE OBJECTIVES:

COB1: To introduce the basic laws of mechanics, resolution of forces, equilibrium of particles in 2D and 3D force systems.

COB2: To enhance knowledge about moments, supports reactions and equilibrium of rigid bodies

COB3: To educate surface properties such as centroid and moment of inertia

COB4: To impart knowledge on friction and its applications

COB5: To develop knowledge on the laws of motion, work energy principles and impact of bodies

MODULE I FORCE VECTOR AND EQUILIBRIUM OF PARTICLE **L: 06 T: 03 P: 06**

Introduction - Vectorial representation of forces and moments - Laws of Mechanics - Forces in plane and space - - Resolution and Composition of forces- Lame‘s theorem - Equilibrium of a particle in 2D plane - Equilibrium of a particle in 3D.

Practical Experiments:

1. Verification of Triangle Law of Forces
2. Verification of Polygon Law of Forces

MODULE II MOMENT AND EQUILIBRIUM OF RIGID BODY **L: 06 T: 03 P: 06**

Moments and Couples – Moment of a force about a point and about an axis – Equilibrium of Rigid bodies in two dimensions –Examples- Varignon‘s theorem- Free body diagram – Types of supports and their reactions – requirements of stable equilibrium.

Practical Experiments:

1. Finding the Moment using BCL
2. Determining the Support Reactions in SS Beams

MODULE III PROPERTIES OF SECTIONS **L: T: P: 06 03 06**

First moment of area and the Centroid of sections – T section, I section, Angle section, Hollow section using standard formula – Second moments of plane area – Physical relevance - Standard sections: Rectangle, triangle, circle-composite sections, Hollow section using standard formula –Parallel axis theorem.

Practical Experiments:

1. Centre of Gravity of Plane Lamina
2. Moment of Inertia of I Section (MAT LAB)

MODULE IV FRICTION **L: T: P: 06 03 06**

Introduction to friction- types of friction- Laws of Coulomb friction- Frictional force – simple contact friction –Block friction– ladder friction and rolling resistance.

Practical Experiments:

1. Find the Coefficient of Friction between two surfaces
2. Determination of angle of repose.

MODULE V FORCES IN MOTION **L: T: P: 06 03 06**

Laws of motion – D'Alembert's principle and its applications in plane motion- Work Energy Equation of particles– Impact of elastic bodies.

Practical Experiments:

1. Work Energy Principle. (MAT LAB)
2. Coefficient of Restitution. (MAT LAB)

L – 30; T – 15; P – 30; Total Hours – 75

TEXT BOOKS:

1. Beer, F.P and Johnston Jr. E.R, —Vector Mechanics for Engineers‖, McGraw Hill Education, 12th Edition, 2017.
2. R.K. Bansal., —A Text Book of Engineering Mechanics‖, Laxmi Publications, 6th Edition, 2015.

REFERENCES:

1. Russell C Hibbeler, —Engineering Mechanics: Statics & Dynamics, 14th Edition, Pearson, 2015.
2. Irving H. Shames, —Engineering Mechanics – Statics and Dynamics, 4th Edition, Pearson Education India, 2005.
3. R.S. Khurmi., —A Text Book of Engineering Mechanics, S. Chand Publishing, 22nd Edition, 2019.

COURSE OUTCOMES: After completion of the course, the students should be able to

CO1: Resolve forces, apply the concept of equilibrium to particles, and solve problems.

CO2: Apply the concept of equilibrium to rigid bodies and solve problems.

CO3: Determine the centroid and moment of inertia of the bodies.

CO4: Analyse and evaluate the frictional forces between the bodies.

CO5: Apply the laws of motion in solving dynamics problems

Board of Studies (BoS):
21st BoS of EEE held on 23.06.2025.

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	P10	P11	PSO1	PSO2
CO1	3							3	3			3	
CO2	3							3	3			3	
CO3	3				2			3	3			3	
CO4	3							3	3			3	
CO5	3				2			3	3			3	

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Acquiring problem solving ability and analysing skills on the various topics of engineering mechanics such as equilibrium, centroid, moment of inertia, friction and dynamics will support the development of innovative designs, contributing to sustainable industrialization.

EEE 1201	ELECTRONIC DEVICES	L	T	P	C
SDG: 3, 9		3	0	0	3

COURSE OBJECTIVES:

COB1: To understand the working and uses of diodes and display devices.

COB2: To understand the operation, characteristics, and applications of BJTs, JFETs, and MOSFETs in analog circuits.

COB3: To study the characteristics and applications of operational amplifiers in signal processing and mathematical operations.

COB4: To understand multistage and power amplifiers, waveform generators, and active filter circuits.

COB5: To understand amplifier classification, feedback principles, and oscillator design using various circuit configurations.

MODULE I DIODE FUNDAMENTALS AND APPLICATIONS L:9

PN junction diode – structure, operation and V-I characteristics, diffusion and transition capacitance –Clippers and, Clampers circuits - LED, LCD - LEDs and Photodiodes for emerging display technologies - Rectifiers – Half Wave and Full Wave Rectifier – Zener diode - structure, operation and V-I characteristics – Zener diode as regulator.

MODULE II TRANSISTORS AND APPLICATIONS L:9

Physical behaviour of a BJT – Common Base, Common Emitter and Common Collector configurations, Input and output characteristics, Early effect, Thermal runaway, photo transistors. JFET operation - Drain characteristics, Transfer characteristics, regions of operation - JFET as a switch, Voltage variable resistor and an amplifier- MOSFET- Constructional details- Operation of Enhancement and Depletion type MOSFET, Drain characteristics, Transfer characteristics, MOSFET as a switch, resistor and amplifier.

MODULE III OPERATIONAL AMPLIFIER FUNDAMENTALS AND APPLICATIONS L:9

Operational amplifier - block diagram representation- transfer characteristics of a typical Op Amp circuit- ideal Op Amp characteristics -Non-ideal characteristics- DC characteristics – Input bias Current-Input offset voltage- Input offset current- Thermal drift- AC characteristics- Frequency response- Frequency compensation- common-mode rejection ratio (CMRR) and power supply rejection ratio (PSRR) - Mathematical operations using operational amplifier - inverting amplifier, non-inverting amplifier, summer, subtractor, integrator, differentiator, zero crossing detector - Instrumentation

amplifier.

MODULE IV ADVANCED AMPLIFIER DESIGN AND ANALOG APPLICATIONS **L:9**

Multistage amplifiers- Single tuned amplifiers - Power amplifiers – Class A, Class B, Class C, Class AB and Class E - Comparator - Schmitt Trigger - Multivibrator - Astable and Monostable Multivibrator- Active Filters: I and II order low pass filter.

MODULE V FEEDBACK AMPLIFIERS AND OSCILLATOR USING OPERATIONAL AMPLIFIER **L:9**

Amplifier classification - Feedback concept - Characteristics - effect of feedback on input and output characteristics - Oscillator- Principle - Stability of feedback circuits using Barkhausen criteria - RC oscillator- Wien bridge oscillator and Phase shift oscillator - LC oscillator - Hartley oscillator, Colpitts oscillator - Crystal oscillator.

L – 45; Total Hours : 45

TEXT BOOKS:

1. Robert L. Boylestad Louis N, “Electronic Devices and Circuit Theory”, 11th Edition, Pearson Education, 2015.
2. S. Salivahanan and N Suresh Kumar, “Electronic Devices and Circuits”, 4th Edition, Tata McGraw Hill, 2017.
3. David A. Bell, ”Electronic devices and circuits”, Oxford University higher education, 5th Edition, 2008.

REFERENCES:

1. Thomas L Floyd, “Electronic Devices (Conventional Current Version)”, 10th Edition, Pearson, 2018.
2. Gupta.J.B. “Electronic Devices and Circuits”, 3rd Edition, S.K. Kataria & Sons, New Delhi, 2010, Reprint: 2014.
3. Millman J., C.C. Halkias, Sathyabratha Jit, “Electronic Devices and Circuits”, Tata McGraw-Hill Publishing company limited, 4th Edition, 2015.
4. R. Gayakwad, “Op-Amps and Linear Integrated Circuits”, 4th Edition, Pearson Education, Delhi, 2015.
5. D.R.Choudhury and S. Jain, “Linear Integrated Circuits”, New Age International, New Delhi, 7th Edition, 2025.

COURSE OUTCOMES: The student will be able to:

CO1: explain the working principles of display devices such as LEDs, LCDs, LEDs, and photodiodes.

CO2: analyze the input-output characteristics and modes of operation of BJTs, JFETs and MOSFETs.

CO3: design and implement basic Op-Amp configurations such as inverting,

non-inverting, summing and differential amplifiers.

CO4: analyze the input-output characteristics and performance of various electronic devices and circuits such as amplifiers and waveform shaping circuits.

CO5: use the amplifiers and oscillators.

Board of Studies (BoS): 21st BoS of EEE held on 23.06.2025.

Academic Council: 24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	1	1	-	-	-	-	-	1	2	2
CO2	3	3	2	1	1	-	-	-	-	-	1	2	2
CO3	3	2	3	1	1	-	-	-	-	-	1	2	2
CO4	3	3	2	2	1	-	-	-	-	-	1	2	2
CO5	3	2	3	1	1	-	-	-	-	-	1	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 3: Good health and wellbeing.

Statement:

Understanding of the fundamentals of electron devices can help in designing systems to promote good health and well-being.

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement:

The various industrial standards of technical drawing and the application of orthographic projections to draw simple solids helps to innovate a new design for sustainable industrialization.

EEE 1202	ELECTRONIC DEVICES LABORATORY	L	T	P	C
SDG: 3,8,9,12		0	0	2	1

COURSE OBJECTIVES:

COB1: To understand the fundamental characteristics of semiconductor devices.

COB2: To study the behavior of BJT, JFET, and MOSFET under different biasing conditions.

COB3: To study analog amplifier circuits using OPAMPs.

COB4: To understand waveform generator circuits like multi-vibrators and oscillators using OPAMPs.

COB5: To study simulation skills using software tools like MATLAB, PSPICE, and PSIM for verifying analog circuits.

PRACTICALS:

List of Experiments

The following experiments will be carried out for verification in hardware and simulating in software's such as MATLAB, PSPICE, PSIM etc.,

1. Characteristics of Semiconductor diode, Zener diode and LED.
2. Input- Output Characteristics of BJT.
3. Characteristics of photodiode and phototransistor.
4. Characteristics of Common Emitter Amplifier.
5. Transfer and Drain Characteristics of JFET.
6. Transfer and Drain Characteristics of MOSFET.
7. Determination of gain for inverting and non-inverting amplifier.
8. Implementation of Integrator and differentiator using OPAMP.
9. Implementation of Monostable and Astable Multivibrator Circuit using OPAMP.
10. Design and implementation of RC phase shift oscillator using OPAMP.
11. Design and implementation of Wien's bridge oscillator using OPAMP.
12. Design and Implementation of LC oscillator circuit using OPAMP.

P – 30 ; TOTAL HOURS – 30

TEXT BOOKS:

1. Laboratory Manual

REFERENCES:

1. Thomas L Floyd, "Electronic Devices (Conventional Current Version)", 10th Edition, Pearson, 2018.
2. Gupta. J. B., "Electronic Devices and Circuits", 3rd Edition, S.K. Kataria & Sons, New Delhi, 2010.

3. D. R. Choudhury and S. Jain, “Linear Integrated Circuits”, New Age International, New Delhi, 7th Edition, 2025.

COURSE OUTCOMES: The students will be able to:

CO1: analyze the V-I characteristics of diodes, Zener diodes, and optoelectronic devices like LEDs, photodiodes, and phototransistors.

CO2: examine the input-output and transfer characteristics of BJT, JFET, and MOSFET for different biasing configurations.

CO3: design and implement OPAMP-based amplifier circuits including inverting, non-inverting, integrator, and differentiator configurations.

CO4: analyze OPAMP-based waveform generators such as monostable, astable, multivibrators, and oscillators like RC phase shift, Wien’s bridge and LC.

CO5: simulate analog circuits using tools like MATLAB, PSPICE, and PSIM.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1								1	1
CO2	3	3	2	1					1			1	2
CO3	3	3	2	2					1			1	2
CO4	3	3	3	3					2		1	3	3
CO5	3	3	3	3					M		1	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

Board of Studies (BoS): 21st BoS of EEE held on 23.06.2025.

Academic Council: 24th AC held on 26.08.2025

SDG3: Good health and wellbeing.

Statement: Understanding of the fundamentals of electron devices can help in designing systems to promote good health and wellbeing.

SDG8: Decent work and economic growth

Statement: The learners of this course can get decent work and earn financial benefits and they can work in interdisciplinary areas.

SDG9: Build resilient Infrastructure, to support economic development and human wellbeing with a focus on affordable and equitable access for all.

Statement: The complete understanding of electron devices and components lead to sustainable industrialization and promote economic development.

SDG12: Responsible consumption and production.

Statement: Use of right and energy efficient electric and instrumentation components and devices results is reasonable consumption and production.

GEE 1206	BASIC ELECTRIC & MAGNETIC CIRCUITS LABORATORY	L	T	P	C
SDG: 4,7,9		0	0	2	1

COURSE OBJECTIVES:

COB1: To provide hands-on experience in fundamental electrical circuit theorems.

COB2: To develop circuit simulation skills using MATLAB and validating with experimental results.

COB3: To study and perform transients in RL, RC, and RLC circuits.

COB4: To study the behavior of magnetically coupled circuits and frequency response characteristics.

COB5: To measure three-phase power using two-wattmeter method for balanced and unbalanced loads.

List of Experiments

1. Verification of circuits using Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Superposition theorem.
5. Verification of Maximum power transfer theorem.
6. Verification of Reciprocity theorem.
7. Analysis of frequency response in series and parallel resonant circuits.
8. Analysis of transient response in magnetically coupled RL,RC and RLC circuits under various excitations.
9. Measurement of active and reactive power in three-phase loads using the two wattmeter method.

P-30 ; TOTAL HOURS: 30

COURSE OUTCOMES: The students will be able to :

CO1: conduct and analyze basic electrical circuit experiments using laboratory instruments.

CO2: implement and verify network theorems through simulation and hardware.

CO3: perform transient response in RL, RC, and RLC circuits.

CO4: investigate the behaviour of magnetically coupled circuits and frequency response characteristics**.**

CO5: computethree-phase power using two-wattmeter method for balanced and unbalanced loads.

Board of Studies (BoS):	**Academic Council:**
21st BoS of EEE held on 23.06.2025.	24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	3	1	1					1		3	3	3
CO2	3	3	1	1					1		3	3	3
CO3	3	3	1	1					1		3	3	3
CO4	3	3	1	1					1		3	3	3
CO5	3	3	1	1					1		3	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Quality Education

The course provides fundamental knowledge and hands-on skills in electrical and magnetic circuits, empowering students with quality technical education.

SDG 7: Affordable and Clean Energy

Concepts such as power measurement, resonance, and circuit efficiency are foundational for designing energy-efficient and sustainable electrical systems.

SDG 9: Industry, Innovation, and Infrastructure

Students learn analytical and practical problem-solving skills essential for innovation in electrical infrastructure and modern industry.

GEE 1205	UNIVERSAL HUMAN VALUES	L	T	P	C
		2	0	0	2

SDG: 4, 8, 10, 16 and17

COURSE OBJECTIVES:

The objectives of the course are to

COB1: To enable students to grasp the fundamental concepts and significance of value education, fostering positive behavioral changes that enhance their personal growth and professional conduct.

COB2: To examine core human values, the relationship between the self and the body, and how these values can guide ethical behavior in both personal and professional contexts.

COB3: To promote understanding of the principles of harmony within oneself, relationships, families, and society, and how these contribute to a sustainable and balanced life.

COB4: To provide knowledge and insights into the ethical responsibilities of engineers, the significance of engineering ethics, and the importance of leadership and ethical decision-making in the field.

MODULE I INTRODUCTION TO VALUE EDUCATION L: 8

Value Education - Concept, Importance and Need - components of Value Education, Human Rights and Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity - The Basic Human Aspirations, Method to Fulfil the Basic Human Aspirations - Strategies for Transition towards Value - based Life and Profession

MODULE II HARMONY IN THE HUMAN BEING L: 7

Meaning and Relevance of Harmony in Human Beings - Core Human Values - Application of Universal Human Values - Understanding The Human Being as Co-Existence of Self (‘I’) And Body - The Needs of Body vs. Self - Fulfilling the Needs of the Self and Body - Understanding the Relationship between Body and Self - the Activities of the Self and the Body - The Mind as a Key Factor in Fostering Harmony in Human Beings - The Influence of Scriptures on the Formation of Human Values.

MODULE III HARMONY IN THE FAMILY, SOCIETY AND NATURE **L: 7**

Components of Harmony in the Human Beings – Harmony in The Family: Understanding Values in Human Relationships - Vision for The Universal Human Order – Harmony in Nature: The Four Orders in Nature - Understanding Harmony in The Society.

MODULE IV THE BASICS FOR ETHICAL CONDUCT OF ENGINEERS **L: 8**

Why Engineers Should Learn About Ethics - Significance of Engineering Ethics - Senses of Engineering Ethics - Engineering Code of Ethics - Commitment: The Foundation of Professional Success in Engineering - Leadership in Engineering and Industry - The Ethical Implications of Technology.

L – 30; Total Hours: 30

TEXT BOOKS

1. Anand, R. (2025). Foundation course in universal human values and professional ethics (1st ed.). CBS Publishers & Distributors. ISBN 978-8197982231
2. Maio, G. R. (2016). The psychology of human values. Routledge.
3. Narayan, S. (2015). *Value Education: A Source Book for Teachers and Educators*. Pearson Education India.
4. Kumar, K. (2016). *Human Rights and Value Education*. National Book Trust.
5. Rao, K. S. (2013). *Ethics in Engineering Education: Value-Based Approach*. I.K. International Publishing House.
6. Bhattacharyya, S. (2014). *Education and Value Systems: A Conceptual Approach*. Academic Publishers.
7. Laszlo, E., & Wilbur, J. B. (Eds.). (1971). Human values and the mind of man: Proceedings. Gordon & Breach.

REFERENCE BOOKS

1. Giri, A. K. (Ed.). (2022). Mahatma Gandhi and Sri Aurobindo. Routledge India.

2. Vasudevan, S. (2018). *Universal Human Values: A Guide for Educators and Students*. Chintan Publications.
3. Schwartz, M. S. (2017). *Ethical Decision Making in Engineering*. Wiley-IEEE Press.
4. Sreenivasan, G. (2012). *Engineering Ethics: Concepts and Cases*. Wadsworth Publishing.
5. Chakrabarty, B. (2019). *Harmony in the Human Being: A Philosophical and Practical Approach*. Orient Black Swan.
6. Slote, M. A. (2013). Education and human values: Reconciling talent with an ethics of care. Routledge. https://doi.org/10.4324/9780203116555

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12
CO1		3	3		3	3	3		3		3	3
CO2			3			3	3		3		3	3
CO3	2	2	3			3	3		3		3	3
CO4			3			3	3	3	3		3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Quality Education focuses on value education, which is essential for promoting inclusive and equitable quality education. It emphasizes the development of critical thinking, ethical conduct, and personal growth, all of which are key components of quality education.

SDG 8: Decent Work and Economic Growth highlights the ethical implications of technology that is essential for fostering responsible and ethical behavior in future engineers, and which contributes to decent work and economic growth.

SDG 10: Reduced Inequalities aligns with efforts to reduce inequalities by encouraging ethical behavior, respect for others, and harmonious relationships, which are essential in building inclusive societies.

SDG 16: Peace, Justice, and Strong Institutions promotes peaceful and inclusive societies, access to justice for all, and accountable, effective institutions. It aligns deeply with the principles of value education by emphasizing harmony, ethical conduct, human rights, and social justice.

SDG 17: Partnerships for the Goals integrating ethics into professional education, especially for engineers, students are encouraged to contribute positively to collaborative global efforts in solving complex challenges.

The course syllabus aligns with **SDGs 4, 8, 10, 16 and 17** by focusing on value education, ethics, human rights, harmony, and responsible engineering practices. It contributes to peaceful, just, and inclusive societies through self-awareness, interpersonal harmony, and responsible citizenship aligned with universal human values. These themes are essential for promoting sustainable development, equality, and ethical conduct, which are core elements of the SDGs.