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. CSE (Artificial Intelligence and Machine Learning)

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

B.TECH. CSE
(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

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 COMPUTER SCIENCE AND ENGINEERING

VISION AND MISSION

VISION

The vision of the Department of Computer Science and engineering is to impart quality education, inculcate professionalism and enhance the problem solving skills of the students in the domain of Computer Science and Engineering with a focus to make them industry ready, involve in possible areas of research, to pursue and have continual professional growth.

MISSION

- To equip the students with strong fundamental concepts, analytical capability, programming and problem solving skills.
- To create an academic environment conducive for higher learning through faculty training, self learning, sound academic practices and research endeavors.
- To provide opportunities in order to promote organizational and leadership skills in students through various co-curricular and extra – curricular activities
- To make the students industry ready and to enhance their employability through training and internships.
- To improve department industry collaboration through interaction including participation in professional society activities, guest lecturers and industrial visit.

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

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

the 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.

19.1.3 Award of Qualifications under Multiple Exit Scheme

1. **Certificate**: Awarded after successful completion of the first year, subject to earning the minimum prescribed first-year credits as per respective curriculum along with a **3-credit Skill Based Course**.
2. **Diploma**: Awarded after successful completion of the second year, subject to earning the minimum prescribed cumulative credits as per the respective curriculum (e.g., 44 credits from the first year + 42 credits from the second year) along with **6 credits of Skill Based Courses**.

19.1.4 Conditions Governing Exit

1. The multiple exit facility is intended strictly for **genuine and exceptional circumstances**, such as prolonged illness, or securing an employment opportunity necessitating a temporary withdrawal from the programme.
2. Students opting for a temporary exit after the first or second year must obtain **prior approval from the Registrar through the Dean (Academics)**, based on the recommendation of the respective Head of the Department.

19.1.5 Expectation of Programme Continuity

While the option for multiple exits exists, it is generally expected that students admitted to a B.Tech. programme shall pursue their studies continuously until completion of the final degree requirements.

19.2. Entry Option:

Students seeking re-entry into the programme (multi-entry) must submit an application through the proper channel at the beginning of the odd semester. Admission shall be subject to fulfilment of institutional guidelines, credit mapping, and availability of seats.

19.3. Credits Requirement for the Certifications:

Name of the Certificate Programme	Required
Certificate (Level 4.5 as per NEP 2020)	40* - 45
Diploma (Level 5 as per NEP 2020)	80* - 87

* The minimum number of credits that a student must earn (as per the respective curriculum) in order to get the above certification program.

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:

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
1.	Artificial Intelligence and Machine Learning	Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg.	CSE
2.	Block Chain		CSE
3.	Cyber Security		IT
4.	Data Science		CSE
5.	Internet of Things (IoT)		ECE

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
6.	Virtual & Augmented Reality	Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	CSE
7.	Sensor Technology	Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electrical and Electronics Engg.	IT
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.

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
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
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	EIE

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
		Civil Engineering Biotechnology Electronics and Communication Engg.	
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
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.	Life Sciences

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
		Electronics and Communication Engg.	

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. ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

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 1161	Communicative English Foundation	1	1	0	2
2.	BSC	MAE 1161	Mathematics for Computer Science	3	1	0	4
3.	ESC	GEE 1106	Basic Electrical and Electronics Engineering	3	0	0	3
4.	ESC	GEE 1161	Computer Programming	3	0	0	3
5.	ESC	GEE 1101	Engineering Graphics	2	0	2	3
6.	ESC	CSE 1161	Introduction to Web Technologies	3	0	2	4
7.	ESC	GEE 1162	Computer Programming Laboratory	0	0	2	1
8.	MNC	GEE 1105	Environmental Sciences (MNC – I) *	2	0	0	0
			Credits				**20**

II – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	HSC	CSE 1261	Full Stack Front-end Development	3	0	2	4
2.	BSC	PHE 1182	Physics for Computer Science and Engineering	3	0	2	4
3.	PCC	CSE 1262	Database Management Systems	3	0	2	4
4.	PCC	CSE 1263	Data Structures	3	0	2	4
5.	PCC	CSE 1264	Introduction to Artificial Intelligence	3	0	0	3
6.	HSC	ENE 1261	Advanced Communicative English	2	0	0	2
7.	HSC	GEE 1205	Universal Human Values (Humanities - I)	2	0	0	2
			Credits				**23**

SEMESTER I

ENE 1161	COMMUNICATIVE ENGLISH FOUNDATION	L	T	P	C
SDG: 4		1	1	0	2

COURSE OBJECTIVES:

COB1: To develop the ability to engage in basic spoken and written interactions by introducing oneself, participating in short conversations, and interpreting everyday texts.

COB2: To enable learners to describe people, places, and preferences in personal and academic settings using appropriate vocabulary

COB3: To strengthen communicative clarity in expressing actions and events through context-based use of verbs in speech and writing.

COB4: To build competence in delivering structured responses, short presentations, and written reports with coherence and appropriate use of connectors.

COB5: To apply structured sentence construction skills in describing routines, distinguishing facts from opinions, and participating in group discussions and paragraph writing tasks.

MODULE I INTRODUCTION TO EVERYDAY COMMUNICATION CONTEXTS **L: 3 T: 3 P: 0**

Introducing oneself and others in academic and social settings- participating in short conversations - Exercises on Homophones and Homonyms- Reading brief texts such as notices, schedules, and messages- drafting short written messages, emails, and descriptions related to daily activities- Pronouns

MODULE II DESCRIPTIONS AND PREFERENCES **L: 3 T: 3 P: 0**

Describing people, places, and events in structured speaking tasks- stating preferences, interests, and habits in personal conversations- Interpreting visual information- reading reports and product descriptions for key descriptive elements- listening for specific details in conversations – Adjectives.

MODULE III EXPRESSING ACTIONS AND EVENTS IN CONTEXT **L: 3 T: 3 P: 0**

Understanding Verbs and Their Forms, Different Types of Verbs (Action Verbs, Linking Verbs, Auxiliary Verbs), Regular vs. Irregular Verbs, The Agreement of Subject and Verb (Ensuring Correct Subject-Verb Concord), Listening to Authentic Contexts for Verb Use, Speaking Fluently with Accurate Verb Application, Strengthening Writing through Correction Tasks- Improving Interactive Communication through Role Plays.

MODULE IV EXTENDED EXPRESSION IN CONVERSATION AND WRITING **L: 3 T: 3 P: 0**

Short Presentations- responding to questions using complete and coherent statements- reading and responding to short opinion-based texts -writing short work reports- using conjunctions in guided tasks to support logical flow in writing-Conjunctions-Prepositions.

MODULE V INTRODUCTION TO SENTENCE CONSTRUCTION **L: 3 T: 3 P: 0**

Describing General Routines and Daily Practices, Factual Description vs. Opinion- Talking about present, past and future- Paragraph Writing-Focus Group Discussions

L – 15 ; T – 15; P – 0; Total Hours:30

TEXT BOOKS:

1. George Yule, “The Study of Language”, 4th Edition, Cambridge University Press, 2010. ISBN: 978-0521121080.
2. Raymond Murphy, “English Grammar in Use”, 5th Edition, Cambridge University Press, 2019. ISBN: 978-1108586627.

REFERENCES:

1. Cambridge English Grammar Reference URL:https://dictionary.cambridge.org/grammar/
2. Oxford Learner's Dictionary URL: https://www.oxfordlearnersdictionaries.com/

COURSE OUTCOMES:

CO1: Demonstrate the ability to introduce oneself, engage in short conversations, and interpret everyday written and spoken texts.

CO2: Use appropriate vocabulary to describe people, places, events, and preferences in both oral and written communication.

CO3: Express actions and events accurately using context-appropriate verb forms in structured speaking and writing tasks.

CO4: Present ideas and responses clearly in short presentations, written reports, and structured discussions using logical connectors.

CO5: Construct meaningful sentences and short paragraphs to describe routines, express opinions, and participate effectively in group discussions.

Board of Studies (BoS):
18th BoS of the Department of English held on 21.08.2025

Academic Council:
24th AC held on 26.08.2025.

	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO9	PO10	PO1	PO12	PSO1	PSO2
CO1	3	3	2	1	2	–	–	–	1	1	2	2	3	2
CO2	3	3	2	2	2	–	–	–	2	2	2	2	3	2
CO3	3	3	3	2	2	–	–	–	1	1	2	2	3	2
CO4	3	3	2	2	2	–	–	–	1	1	2	2	2	2
CO5	3	3	2	2	2	–	–	–	1	1	2	2	2	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: The development of grammatical accuracy, vocabulary precision and effective sentence construction skills enhances students' communication abilities, advancing quality education and fostering lifelong learning opportunities.

MAE 1161	MATHEMATICS FOR COMPUTER SCIENCE	L	T	P	C
SDG: 4		3	1	0	4

COURSE OBJECTIVES:

COB1: To introduce the concepts of number systems, relations and functions.

COB2: To introduce matrix techniques of system of linear equations, eigenvalues, eigenvectors and Cayley Hamilton theorem in practical problems.

COB3: To develop ability in the concepts of limits, continuity, and differentiation for single variable functions.

COB4: To gain the ability to perform and apply the integral techniques.

COB5: To familiarize problem solving techniques using Numerical methods in computer science.

MODULE I NUMBER SYSTEM, SETS AND FUNCTIONS 9+3

Number system – Types of Number Systems – Extended Euclidean Algorithm (without proof) – Fermat's Little Theorem (without proof) – Conversions between Number Systems – Fundamentals of Set Theory – Set Operations – Relations – Types of Relations – Functions – Types of Functions.

MODULE II MATRICES 9+3

Rank of a Matrix – System of linear equations – Linear Transformations – Types of Linear Transformations (Rotations, reflections, scaling) – Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem (without proof).

MODULE III DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Maxima and Minima of functions of one variable.

MODULE IV INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions

- Improper integrals.

MODULE V NUMERICAL METHODS 9+3

Solutions of algebraic and transcendental equations – Regula Falsi Mathod – Fixed point iteration method – Newton Raphson's method – Solutions of system of linear equations – Gauss Elimination Method - Gauss Jordan method – Gauss Jacobi Method – Gauss Seidel method – Power method.

L –45; T-15; TOTAL HOURS – 60

TEXT BOOKS:

1. Eric Lehman, F. Thomson Leighton & Albert R. Meyer, "Mathematics for Computer Science", 12th Media Services, 2017. ISBN: 978-9888407064
2. Grewal B.S, "Higher Engineering Mathematics" (44th edition), Khanna Publishers, New Delhi, 2017.
3. Kreyszig E, "Advanced Engineering Mathematics", 10th edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2015.

REFERENCES:

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 8th Edition, McGraw-Hill Education, 2019. ISBN: 978-1259676512
2. David C Lay, "Linear Algebra and its Applications", 5th Edition , Pearson 2010.
3. Veerarajan T, "Engineering Mathematics" (5th edition) Tata McGraw Hill Publishing Co. New Delhi, 2012.
4. Jain R.K & Iyengar S.R.K, "Advanced Engineering Mathematics", Narosa Publishers, 5th edition, 2016.
5. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th edition, Cengage Learning, 2011.
6. Venkataraman M.K, "Engineering Mathematics", Volume I, 2ndedition, National Publishing Co., Chennai, 2003.

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

CO1: understand different types of number systems and their transformations, also the concepts of relations and functions.

CO2: use the matrix techniques to compute solution of system of linear equations, eigenvalues and eigenvectors of a given matrix.

CO3: compute derivatives and apply them to analyze functions, including

optimization.

CO4: evaluate definite and indefinite integrals.

CO5: implement numerical techniques to solve equations.

Board of Studies (BoS) :

18th BOS of Mathematics and Actuarial Science held on 23.08.2025

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															
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 opportunities for all.

Learning of various mathematical tools will lead to knowledge of applications in computer science.

GEE 1106	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
SDG: 7		3	0	0	3

COURSE OBJECTIVES:

COB1: To introduce the fundamentals of DC circuits, including laws, components, and basic analysis techniques.

COB2: To provide an understanding of fundamental concepts on single phase and three phase AC circuits.

COB3: To impart knowledge about the construction, operation, and applications of various electrical machines.

COB4: To familiarize students with diode, its characteristics, and applications.

COB5: To familiarize students power devices their characteristics, and applications.

MODULE I DC CIRCUITS L: 9

Voltage, Current, Power, Energy –Ohm's Law-Kirchhoff's Laws – Series and parallel circuits - Voltage Division and Current Division Rule - Source transformation - Mesh analysis & Nodal analysis – simple problems.

MODULE II AC CIRCUITS L: 9

Sinusoidal voltage – RMS, average, peak value, peak factor and form factor – single phase RL, RC and RLC circuits – Phasor representation – Power and power factor – Resonance in RLC circuits-Q factor-Simple problems – 3 phase balanced circuits– star and delta connections.

MODULE III ELECTRICAL MACHINES L: 9

Construction, principle of operation, Basic Equations and applications - D.C. Generators, D.C. Motors, Single Phase Transformer, three phase induction motors, BLDC motor.

MODULE IV DIODES AND THEIR APPLICATIONS L: 9

PN Junction diodes – Construction, VI Characteristics - Rectifiers: Half wave, Full wave - clippers, clampers - Zener Diode as Voltage regulator- Load and line regulation- Diode protection circuits- Light Emitting Diode

MODULE V BIPOLAR JUNCTION TRANSISTORS AND POWER DEVICES L: 9

BJT - Common Emitter, Common Base and Common Collector configurations-

Construction, VI Characteristics, BJT as switch and amplifier- Signal and Power devices - SCR, Triac - Construction, VI Characteristics- Charging circuit, UPS, SMPS, Fan Regulator.

L – 45; T – 0; P – 0; Total Hours: 45

TEXT BOOKS:

1. D P Kothari and I J Nagrath, “Basic Electrical Engineering”, McGraw Hill Education, 4th Edition, 2019.
2. S. Salivahanan, N. Suresh kumar and A. Vallavaraj, “Electronic Devices and Circuits”, McGraw Hill Education (India) Pvt. Ltd., 5th Edition 2022.
3. B. L. Theraja and A. K. Theraja, *A Textbook of Electrical Technology, Vol. II: AC and DC Machines*, 24th edition, New Delhi, India: S. Chand & Co., 2022.
4. Sudhakar A and Shyam Mohan SP, “Circuits and Networks Analysis and Synthesis”, McGrawHill, 2015.

REFERENCES:

1. Edward Hughes, “Electrical and Electronics Technology”, 12th Edition, Pearson India, 2016.
2. Cotton H, “Electrical Technology”, CBS Publishers, 7th Edition, 2007.
3. Jacob Millman& Christos C. Halkias, SatyapratabaJit “Electronic Devices and Circuits” McGraw Hill Education, 4th Edition, 2021.
4. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th edition, Boston, MA, USA: Pearson, 2015.

COURSE OUTCOMES: The students will be able to:

CO1: solve basic DC electrical circuits using fundamental laws.

CO2: compute the electrical parameters in single-phase and three-phase AC circuits.

CO3: compare the operating principles and performance characteristics of Electrical machines.

CO4: analyse the configuration and operation of LT switchgear components and earthing systems.

CO5: interpret device characteristics and its basic applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PSO1	PSO2
CO1	3	3	2	2	1							2	2
CO2	3	3	2	2	1							2	2
CO3	3	2	3	1	1							2	2
CO4	3	3	2	1	2							2	2
CO5	3	2	3	2	3							2	2

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

SDG 7 – Affordable and Clean Energy

Statement:

The course introduces DC and AC circuit analysis, electrical machines which are essential in renewable energy systems, power distribution, and sustainable industrial automation. It includes semiconductor devices and digital electronics, which are critical in energy-efficient electronic systems and smart grid technologies. It also Promotes awareness of energy consumption, power factor, and efficiency, aligning with the goal of clean energy usage.

GEE 1161	COMPUTER PROGRAMMING	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: To introduce the students to the fundamental concepts of programming and Python syntax through basic operations and data types.

COB2: To develop logical thinking by implementing decision-making and iterative control structures using conditional and looping statements.

COB3: To provide students with a deeper understanding of Python's built-in data structures like lists, tuples, sets and dictionaries for efficient data organization and manipulation.

COB4: To introduce students to the principles of Object-Oriented Programming and enable them to model real-world problems using classes, objects and key OOP concepts such as inheritance, encapsulation, abstraction, and polymorphism.

COB5: To familiarize students with file handling and exception management in Python and to introduce the concepts of modular programming using imports, modules and packages.

MODULE I INTRODUCTION L:9 T:0 P: 0

Definition: Software, Programming, Programming Language, Syntax, Why Python?, First Program: Hello World, Variable & Data Types, Input Output Basics, Type Conversions, Operators: Arithmetic, Logical, Comparison, Assignment, Operator Precedence

MODULE II CONTROL STRUCTURES AND FUNCTIONS L: 9 T:0 P: 0

Conditional Statements: If, Else, Else-If (Elif), Loops: For Loop, While Loop, Lists and Strings, String Manipulation: Case Conversion Methods, Counting and Searching Methods, String Formatting, Functions: Defining and Calling Functions, Parameters and Arguments, Return Statements, Local and Global Scope, Default Arguments, Keyword Arguments, Lambda Functions, Recursive Functions

MODULE III PYTHON DATA STRUCTURES L: 9 T:0 P: 0

Lists: Creation, Accessing and Modifying Elements, Traversing Lists, Nested Lists, Copying Lists, Sorting and Merging Lists, Tuples: Definition and Usage, Operations on

Tuples, Tuple Unpacking, Nested Tuples, Immutability, Sets: Creating Sets, Operations on Sets, Membership Tests, Set Methods and Use-cases, Dictionaries: Creating and Updating Dictionaries, Accessing and Manipulating Key-Value Pairs, Nested Dictionaries, Iterating through Dictionaries, List Comprehensions: Syntax, Applications, Creating Efficient and Readable List Operations

MODULE IV INTRODUCTION TO OBJECT ORIENTED PROGRAMMING **L: 9 T:0 P: 0**

Object Oriented Programming: Basics, Real-life Object Modeling, Organizing Descriptions, Classes, Defining Classes, Objects and Attributes: Instance Attributes, Class Attributes, Instance Methods, Class Methods, Static Methods, Encapsulation: Access Modifiers, Private Attributes, Getters and Setters, Modeling Classes, Inheritance: Understanding Inheritance, Implementing Class Hierarchies, Abstraction: Abstract Classes and Methods, Abstract Base Classes, Implementations, Polymorphism: Operator Overloading, Function Polymorphism, Method Overriding, Method Overloading

MODULE V FILE HANDLING AND EXCEPTION HANDLING **L: 9 T:0 P: 0**

File Handling: Reading, Writing, and Appending Files, Performing File System Operations, Error Handling in File Operations, Exception Handling: Understanding Exceptions, Types of Errors, Handling Exceptions with try-except blocks, Raising Custom Exceptions, Imports and Modules: Importing Libraries, Creating and Managing Modules, Packages: Creating, Managing, and Working with Packages, Using Third-Party Libraries

L – 45; T – 0; P – 0; Total Hours: 45

TEXT BOOKS:

1. John M. Zelle, “Python Programming: An Introduction to Computer Science”, 3rd Edition, Franklin, Beedle & Associates, 2016. ISBN: 978-1-59028-275-5.
2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming”, 5th Edition, O’Reilly Media, 2013. ISBN: 978-1449355739.
3. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming”, 5th Edition, O’Reilly Media, 2013. ISBN: 978-1449355739.

REFERENCES:

1. NPTEL Course – "Programming in Python" , IIT Madras https://nptel.ac.in/courses/106106182
2. Python Official Documentation – The Python Tutorial. https://docs.python.org/3/tutorial

COURSE OUTCOMES:

CO1: Understand the fundamentals of programming, including variables, data types, and operators, and be able to apply them in real-world scenarios.

CO2: Develop problem-solving skills using conditional statements, loops, and functions.

CO3: Gain proficiency in handling strings and working with data structures like lists, tuples, sets, and dictionaries.

CO4: Master object-oriented programming concepts such as encapsulation, inheritance, abstraction, and polymorphism, including method overloading and overriding.

CO5: Learn to debug effectively and handle errors and exceptions to create robust programs.

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	PO11	PO 12	PSO1	PSO 2
CO1	3	2	2	1	3	-	-	-	-	1	1	2	2	2
CO2	3	3	3	2	3	-	-	-	-	2	1	2	3	2
CO3	3	2	2	2	3	-	-	-	-	2	1	2	3	2
CO4	3	2	3	2	3	-	-	-	-	2	2	2	3	3
CO5	2	3	2	3	3	-	-	-	-	2	2	3	2	3

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

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

Statement: The application of programming logic, structured problem-solving, and modern coding practices equips students to build efficient, scalable solutions, driving innovation in technology that supports sustainable industrialization.

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.

CSE 1161	INTRODUCTION TO WEB	L	T	P	C
SDG: 9	TECHNOLOGIES	3	0	2	4

COURSE OBJECTIVES:

COB1: To get familiar with HTML and CSS syntax for creating well-structured and styled web content, along with debugging techniques for efficient development.

COB2: To learn and implement responsive web design principles using Bootstrap, Flexbox, media queries, Grid layout, and CSS animations for mobile-friendly layouts.

COB3: To understand the basics of JavaScript programming, including variables, operators, conditionals, loops and functions to add logic and interactivity to web pages.

COB4: To explore and apply DOM manipulation techniques to dynamically update web content and styles based on user interactions and inputs.

COB5: To gain knowledge of modern web technologies such as Fetch API and JSON for handling asynchronous data and interacting with web servers.

MODULE I HTML/CSS BASICS L: 9 T:0 P: 6

Importance of Web/Frontend, Fundamentals: Syntax, Debugging, Tweaking Code, Getting Started with HTML and CSS, HTML Elements: Headings, Paragraphs, Buttons, Images, Containers, Lists, CSS Rulesets: Units, Padding, Margins, Box Model, Selectors: Class, ID, Type, Specificity, Block vs. Inline Elements, Inheritance, Cascading

MODULE II BOOTSTRAP AND FLEXBOX L: 9 T:0 P: 6

Bootstrap Grid System, Container Components, Row Implementation, Column Structure, Display Properties, Flex Utilities, Sizing Utilities, Spacing Utilities, Color Systems, UI Components (Navbar, Buttons), Dynamic Elements (Carousel), Media Integration, Flexbox, Flex Container Properties, Flex-wrap Mechanics, Flex-direction Applications, Alignment Properties (Align-items, Align-self), Justify-content, Responsive Design Principles

MODULE III CSS MEDIA QUERIES, LAYOUT & ANIMATIONS **L: 9 T:0 P: 6**

Media Query Fundamentals, Media Types Implementation, Media Feature Detection, Logical Operators in CSS, Layout Sizing Properties, Width and Height Manipulation, Minimum/Maximum Constraints, Overflow Control, CSS Grid System, Grid Layout Implementation, CSS Transition Properties, Transform Functions, Animation Keyframes, Animation Properties, Animation Timing

MODULE IV JAVASCRIPT BASICS AND DOM MANIPULATION **L: 9 T:0 P: 6**

JavaScript Language Basics, Data Type Systems, Variable Declaration, Operators and Expressions, Control Structures, Conditional Statements, Loop Implementations, Function Declaration, Parameter Passing, Document Object Model, DOM Hierarchy, Element Selection Methods, Node Properties, Text Content Manipulation, Attribute Modification, Style Property Access

MODULE V EVENTS AND HTTP REQUESTS **L: 9 T:0 P: 6**

Form Structure, Input Element Types, Form Control Components (Textarea, Select), Form Validation, Event Model, Event Listener Registration, Event Propagation, Event Object Properties, Asynchronous JavaScript, Callbacks, Scheduler Functions, HTTP Communication, Fetch API Implementation, JSON Data Structure, JSON Parsing and Serialization

PRACTICALS:

1. Build Portfolio website using HTML, CSS and Bootstrap
2. Build a Todos Application Website by implementing the storage mechanisms
3. Build a Food munch website by using Bootstrap grid system
4. Build a simple Bookmark Maker using HTML Form Elements
5. Build a Speed typing test application with random quotation using fetch
6. Build a Library Management page to search the books using fetch
7. Build a Word cloud page using random function
8. Build a Wikipedia Search Application using fetch URL
9. Build a chatbot page by dynamically creating the elements
10. Build a Movie Reviews Page using HTML Form Elements

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

TEXT BOOKS:

1. Jon Duckett, “HTML and CSS: Design and Build Websites”, Illustrated Edition, John Wiley & Sons (Wiley), 2011. ISBN: 978-1118008188.
2. David Flanagan, “JavaScript: The Definitive Guide: Master the World’s Most-Used Programming Language”, 7th Edition, O’Reilly Media, 2020. ISBN: 978-1491952023.
3. Ben Frain, “Responsive Web Design with HTML5 and CSS”, 4th Edition, Packt Publishing, 2022. ISBN: 978-1803242712.

REFERENCES:

1. NPTEL Course – HTML, CSS and JavaScript for Web Developers, IIT Madras. https://nptel.ac.in/courses/106106156
2. Mozilla Developer Network (MDN) – HTML, CSS, JS, DOM Documentation. https://developer.mozilla.org/en-US/

COURSE OUTCOMES:

CO1: Understand the role and importance of web and frontend development, including foundational syntax, debugging techniques, and building structured content with HTML and CSS.

CO2: Gain proficiency in creating responsive, mobile-friendly layouts using Bootstrap, Flexbox, media queries, and advanced CSS properties like Grid and animations.

CO3: Learn JavaScript basics, including variables, operators, conditionals, loops, and functions, to build interactive web pages.

CO4: Explore DOM manipulation techniques to dynamically update web content and styles, and handle user input using forms, events, and event listeners.

CO5: Use modern web technologies such as Fetch API and JSON to manage data and interact with web servers.

Board of Studies (BoS):	**Academic Council:**
25th BoS of CSE held on 07.07.2025	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	2	2	2	1	3	-	-	-	-	2	1	2	2	2
CO2	2	2	3	1	3	-	2	-	-	2	1	2	2	3
CO3	3	2	2	2	3	-	-	-	-	2	1	2	3	2
CO4	2	3	3	2	3	-	-	-	-	3	2	2	3	3
CO5	2	3	3	2	3	-	-	-	-	2	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.

Statement:

The application of web standards, responsive design principles, and modern frontend technologies enables students to develop user-centric digital interfaces, fostering innovation in digital solutions that contribute to sustainable industrialization.

GEE 1162	**COMPUTER PROGRAMMING**	**L**	**T**	**P**	**C**
SDG:9	**LABORATORY**	**0**	**0**	**2**	**1**

COURSE OBJECTIVES:

COB1: To introduce basic Python syntax and data types, focusing on type conversions, arithmetic operations, and input/output handling.

COB2: To develop logical and decision-making skills using conditional statements and control structures for solving real-world problems.

COB3: To enable manipulation of strings, lists, and sets, including operations such as insertion, deletion, sorting, searching, and pattern generation.

COB4: To apply object-oriented programming concepts in Python, incorporating classes, objects, access control, and property decorators for encapsulation.

COB5: To implement file handling and exception management using read/write operations, word counting, and try-except blocks for robust programming.

Exercises **L – 0; T – 0; P – 30; Total Hours: 30**

1. Convert kilometers (float) to meters (integer).
2. Find the greatest among two numbers.
3. Given a temperature, check if it is between 15 and 40:
    a. Print "Can go for a walk" if true.
    b. Print "Cannot go for a walk" otherwise.
4. Print a Hollow Diamond pattern.
5. Convert uppercase letters to lowercase and vice versa in a given word.
6. Implement a list manipulation program supporting insert, append, pop, remove, sort, and print operations.
7. Find the Nth term in the Fibonacci series recursively.
8. Reverse the letters in words of a given sentence.
9. Perform set operations:
    a. Check if one set is a superset of another.
    b. Check if one set is a subset of another
    c. Check if two sets are disjoint

10. A player has collected a few colored balls which have a number on them. To calculate the score, we have to group the colored balls picked by the user and sum up the numbers on them. Write a program to create a dictionary, grouping of colored balls and the corresponding total score.
15. Implement a Banking class where attributes are private and can only be accessed or modified through getter and setter methods using property decorators
16. Write a program to read a file, count the occurrences of each word, and handle any file-related exceptions using try-except blocks.

L – 0; T – 0; P – 30; Total Hours: 30

COURSE OUTCOMES:

CO1: Apply basic programming constructs to solve real-world problems using Python.

CO2: Implement control structures, functions, and recursion to develop structured solutions.

CO3: Work with Python's built-in data structures such as lists, sets, and dictionaries for data processing.

CO4: Demonstrate file handling techniques and manage exceptions effectively in programs.

CO5: Apply object-oriented principles to implement encapsulation and data hiding using Python.

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	PO11	PO 12	PSO1	PSO2
CO1	3	3	2	1	2	-	-	-	1	1	2	2	3	2
CO2	3	3	2	2	2	-	-	-	2	2	2	2	3	2
CO3	3	3	3	2	2	-	-	-	1	1	2	2	3	2
CO4	3	3	2	2	2	-	-	-	1	1	2	2	2	2
CO5	3	3	2	2	2	-	-	-	1	1	2	2	2	3

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

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

Statement:

The application of programming logic, structured problem-solving, and modern coding practices equips students to build efficient, scalable solutions, driving innovation in technology that supports sustainable industrialization.

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

CSE 1261 FULLSTACK FRONT-END DEVELOPMENT L T P C

SDG: 9 3 0 2 4

COURSE OBJECTIVES:

COB1: To introduce modern JavaScript concepts including scope, hoisting, ES6 features, and error handling for writing efficient and modular code.

COB2: To develop the ability to implement asynchronous programming using callbacks, promises, and async/await for building responsive web applications.

COB3: To enable the creation of interactive user interfaces using React components, props, state management, and lifecycle methods.

COB4: To apply advanced React techniques such as hooks, routing, and global state management with Context API and reducers.

COB5: To implement secure authentication flows using JWT and integrate RESTful APIs for robust client-server communication.

MODULE I MODERN JAVASCRIPT L:9 T: 0 P: 6

Scope: Global Scope, Function Scope, Block Scope. Hoisting: Variable Hoisting, Function Hoisting. 'this' Keyword and Context. Error Handling: try/catch/finally. Array Methods. String Methods. Object Methods (keys, values, entries).

MODULE II JAVASCRIPT ESSENTIALS L: 9 T: 0 P: 6

ES6 Features: JavaScript Classes, Arrow Functions, Lexical Scope, Template Literals, Destructuring Syntax, Spread Syntax.

MODULE III ASYNCHRONOUS JAVASCRIPT L: 9 T:0 P: 6

Asynchronous Programming Basics. Callback Functions. Callback Hell and Management. Timer Functions (setTimeout, setInterval). Promises: Creating Promises, Consuming Promises, Promise Chaining, Promise.all. Async/Await Syntax. Async/Await Error Handling. Practical API Request Implementation.

MODULE IV REACT FUNDAMENTALS L: 9 T:0 P: 6

Introduction to React. Virtual DOM Concepts. JSX Syntax and Usage. React Developer Tools. Types of Components: Functional Components, Class Components, Props

Communication. Hooks Overview, State Management using useState() hook. Component Lifecycle Overview: Mounting Phase, Updating Phase, Unmounting Phase. Side Effects Management using useEffect Hook, Cleanup Functions. Handling User Interactions. Event Handling Techniques. Conditional Rendering. Form Handling (Controlled and Uncontrolled Components). Dynamic Lists. Keys for Dynamic Content.

MODULE V ROUTING, CONTEXT AND AUTHENTICATION L: 9 T:0 P: 6

React Hooks: use Hook, useReducer Hook usage and implementation. Creating Custom Hooks. Application Routing with React Router: Route Setup and Implementation, Navigation Components, Route Parameters, Nested Routes, useParams() hook, Advanced State Management: Context API for Global State, Reducer Patterns in React. Client-Server Communication. Authentication Flow with JWT: Protected Routes, Token Management. Security Best Practices.

PRACTICALS:

1. Build a Quick Commerce Application (Zepto Clone)
    a. Login/Logout Page
    b. Products Page
    c. Product Details Page
    d. Cart Page
2. Build a Task Management Application(Trello Clone)
    a. Login/Signup Page
    b. Task Dashboard
    c. Task Details Page
    d. Add/Edit Task Page
3. Build a Emoji Game using Lists and keys
4. Build a Blog List by using React Router
5. Build a cowinDashboard Page using Third Party Packages
6. Get the popular github repos by using API Requests

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

TEXT BOOKS:

1. Jon Duckett, “HTML and CSS: Design and Build Websites”, Illustrated Edition, John Wiley & Sons, 2011. ISBN: 978-1118008188.
2. David Flanagan, “JavaScript: The Definitive Guide: Master the World’s Most-Used Programming Language”, 7th Edition, O’Reilly Media, 2020. ISBN: 978-1491952023.

3. Alex Banks & Eve Porcello, “Learning React: Modern Patterns for Developing React Apps”, 2nd Edition, O’Reilly Media, 2020. ISBN: 978-1492051725.

REFERENCES:

1. Mozilla Developer Network (MDN) – JavaScript, React, HTML, CSS Documentation https://developer.mozilla.org/en-US

COURSE OUTCOMES:

CO1: Master modern JavaScript concepts including scope, hoisting, and ES6 features for building interactive web applications.

CO2: Implement asynchronous programming techniques using callbacks, promises, and async/await to create responsive frontend applications.

CO3: Build functional user interfaces with React, leveraging components, props, state, and lifecycle methods.

CO4: Develop complex React applications using hooks, routing, and global state management solutions.

CO5: Create secure frontend applications with proper authentication flows and API integration.

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

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	3	2	3	2	3	–	–	–	–	2	2	2	3	2
CO2	3	3	3	2	3	–	–	–	–	2	2	2	3	3
CO3	3	2	3	2	3	–	–	–	2	2	2	3	3	3
CO4	3	3	3	2	3	–	–	–	2	2	2	3	2	3
CO5	2	3	3	2	3	–	–	–	2	2	2	3	2	3
CO6	3	3	3	2	3	–	–	–	2	3	2	3	2	3

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

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

Statement:

The application of modern JavaScript features, asynchronous programming techniques, and React-based architecture enables the development of scalable, secure, and responsive web applications. These practices promote innovation in digital technologies and contribute to sustainable industrialization by enhancing the design and deployment of robust, user-centric digital infrastructures.

PHE 1182	PHYSICS FOR COMPUTER SCIENCE AND ENGINEERING	L	T	P	C
SDG: 4		3	0	2	4

COURSE OBJECTIVES:

COB1: To provide a comprehensive foundation in Optics and Lasers

COB2: To equip with an understanding of fundamental principles of quantum mechanics.

COB3: To introduce the core theory of solids based on quantum concepts.

COB4: To pursue the theory of physics of semiconductors

COB5: To foster ideas related to the semiconductor physics being used as principles in the devices.

MODULE I ELECTROMAGNETIC WAVES L-9 T-0 P-3

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 II OPTICS AND LASERS L-9 T-0 P-3

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 III INTRODUCTION TO QUANTUM PHYSICS L:9 T:0 P: 3

Black body radiation –Energy spectrum of 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 - Compton effect(theory and experiment)-Schroedinger wave equation – Time independent and time dependent wave equation – Physical significance of wave function -Particle in one dimensional box –Bloch theorem-Kronig-Penney model-origin of band gap.

MODULE IV THEORY OF SEMICONDUCTOR PHYSICS L: 9 T:0 P: 3

Classification of materials as conductors, insulators and semiconductors - Elemental and compound semiconductors – Direct and Indirect band gap semiconductors - Intrinsic semiconductors: Intrinsic carrier concentration (derivation) – Fermi energy – Variation of Fermi energy level with temperature – Band gap determination – Extrinsic semiconductors – Carrier concentration in n-type and p-type semiconductor (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Theory & Experiment- applications of Hall effect.

MODULE V INTRODUCTION TO SEMICONDUCTOR DEVICES L-9 T-0 P-3

Semiconductors: N and P type (Qualitative), PN junction diode under forward and reverse bias –– Zener diode, Schottky diode – Tunnel diode –bipolar junction transistor (BJT) – Junction Field Effect Transistor(JFET)- metal-oxide-semiconductor field effect transistor (MOSFET)-CMOS-LED-Homojunctions and Heterojunctions-photodetectors-phototransistor-PiN photodiode and Avalanche photodiode-responsivity and quantum efficiency-signal-to-noise ratio.

L – 45; T – 0; P – 15; Total Hours: 60

TEXT BOOKS:

1. ouglas Giancoli, "Physics for Scientists & Engineers with Modern Physics", Pearson (2008)
2. Serway R.A. and Jewett, J.W., Physics for Scientists and Engineers with Modern Physics, Brooks/cole Publishing Co., 2010.
3. Tipler P.A. and Mosca, G.P., Physics for Scientists and Engineers with Modern Physics, W.H. Freeman, 2007.
4. Markert J.T., Ohanian. H. and Ohanian, M., Physics for Engineers and

Scientists, W.W
. Norton & Co., 2007.

REFERENCES:

1. David J. Griffiths, Introduction to Quantum Mechanics, 3 rd Edition, Cambridge University Press, 2024.
2. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2013.
3. William D. Callister and David.G. Rethwisch, “Fundamentals of Materials Science and Engineering”, Wiley (2022).

List of Experiments

1. Determination of field along the axis of the coil. (Biot-Sawart Law)
2. Verification of Ampère’s Circuital Law using a long straight current-carrying conductor and measurement of the magnetic field around it.
3. Determination of thickness of a thin wire / sheet using Air Wedge method.
4. Determination wavelength of spectral lines of mercury source using spectrometer grating method.
5. Determination of wavelength of laser light using semiconductor laser diffraction.
6. Determination of angle of divergence of a laser beam using semiconductor diode laser and He-Ne laser.
7. Determination of particle size of lycopodium powder using semiconductor laser.
8. Determination of Planck’s constant using photoelectric effect.
9. Determination of band gap of semiconductor.
10. Determination of Hall coefficient using Hall effect.
11. I-V characteristics of solar cells.
12. Forward and reverse bias characteristics of PN junction diode.

COURSE OUTCOMES:

CO1: demonstrate a thorough understanding of the fundamental principles of optics and lasers

CO2: understand the basic concepts of quantum physics.

CO3: analyze the quantum concepts and apply it to the theory of solids.

CO4: understand the fundamental concepts of semiconductor physics.

CO5: apply the principles of semiconductor physics in the working of semiconductor devices.

Board of Studies (BoS):
15th BOS meeting of Department of Physics 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	PO1 1	PO 12	PSO1	PSO2
CO1	3	3	2	1	2	2	2	2	2	1	1	3	2	2
CO2	3	3	2	2	2	2	2	2	2	1	1	3	2	2
CO3	3	3	2	1	3	2	2	2	2	1	1	3	2	2
CO4	3	3	2	2	2	2	2	2	2	1	1	3	2	2
CO5	3	3	2	1	3	2	2	2	2	1	1	3	2	2

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

SDG 4: 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

CSE 1262	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
SDG: 9		3	0	2	4

COURSE OBJECTIVES:

COB1: Understand core DBMS concepts, data models, ER modeling, and ACID properties.

COB2: Perform basic SQL operations for data definition and manipulation.

COB3: Apply advanced SQL techniques like joins, subqueries, and functions.

COB4: Normalize database schemas and manage transactions effectively.

COB5: Use MongoDB for NoSQL data modeling and perform advanced document queries.

MODULE I INTRODUCTION TO DATABASE SYSTEMS **L:9 T: 0 P: 6**

Database Fundamentals - DBMS Types-Relational vs Non - Relational Databases - Database Approach Benefits - ACID Properties - Data Models - Schemas and Instances - DBMS Components - Database Environment - Entity Relationship Model - ER Diagram Notation - ER Design Refinement - ER to Relational Mapping - Relationship Types - Implementation Strategies.

MODULE II SQL FUNDAMENTALS **L:9 T: 0 P: 6**

Constraints and Schemas - Unary Operations: SELECT - Set Theory Operations - SQL Basics - Table Creation and Modification - Data Manipulation - WHERE Clause - Primary and Foreign Keys - Multi-table Queries.

MODULE III ADVANCED SQL AND QUERY OPERATIONS **L: 9 T: 0 P: 6**

Comparison and Logical Operators - Pattern Matching with LIKE - Operator Precedence - IN and BETWEEN Operators - Result Ordering - LIMIT and OFFSET - Set Operations - SQL Functions - CASE Expressions - Expression Usage in Queries - Join Types - Aggregation Functions - Alias Usage - GROUP BY Implementation - HAVING Usage - View Creation and Management – Subqueries - Query Processing and Optimization.

MODULE IV DATABASE NORMALIZATION AND TRANSACTION PROCESSING **L: 9 T: 0 P: 6**

Schema Refinement - Functional Dependencies - Normalization: Normalization -1 NF - 2 NF - 3 NF - Boyce-Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form - Domain Key Normal Form – Denormalization - Transaction Management - Concurrency Control.

MODULE V INTRODUCTION TO NOSQL DATABASES AND MONGODB **L: 9 T:0 P: 6**

NoSQL Database Concepts - Collections vs Tables - Documents vs Records – Fields - Schema Flexibility - Setting up MongoDB and Creating a Database - CRUD Operations in MongoDB - Querying: Projection - Conditional Operators - Ordering Results – Pagination - Logical Operators - Nested Documents - Array Field - Basic Array Queries - Array Operators - $elemMatch - Grouping & Aggregate functions - Comparison of SQL vs NoSQL.

PRACTICALS

List of Experiments

1. Creating, altering and dropping tables with integrity constraints using DDL commands.
2. Retrieving and modifying data from a database using DML Statements.
3. Retrieving data from the database using IN, BETWEEN, LIKE, ORDER BY,GROUP BY and HAVING clauses.
4. Use of scalar and aggregate functions.
5. Retrieving data from a database using Join operations(Inner and Outer Joins).
6. Using sub queries for retrieving data.
7. Use of trigger in data manipulation
8. Design and Develop a NOSQL Database

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

TEXT BOOKS:

1. Ramez Elmasri & Shamkant B. Navathe, “Fundamentals of Database Systems”, 7th Edition, Pearson Education, 2016. ISBN: 978-0133970777.
2. Abraham Silberschatz, Henry F. Korth & S. Sudarshan, “Database System Concepts”, 7th Edition, McGraw-Hill Education, 2019. ISBN: 978-0078022159.

3. Kristina Chodorow, “MongoDB: The Definitive Guide”, 2nd Edition, O’Reilly Media, 2013. ISBN: 978-1449344680.

REFERENCES:

1. NPTEL Course – Database Management System, Prof. P. P. Chakrabarti, IIT Kharagpur https://nptel.ac.in/courses/106105175.

COURSE OUTCOMES:

CO1: Understand the principles of relational databases, including database design, ACID properties, and their applications.

CO2: Perform essential SQL operations such as creating, inserting, selecting, updating, and deleting records in a database.

CO3: Utilize advanced SQL techniques, including joins, subqueries, indexes, and views, to optimize database performance.

CO4: Apply database normalization techniques to organize data efficiently, eliminate redundancy, and ensure integrity.

CO5: Execute advanced database operations like truncate, drop, stored procedures, and triggers, and develop hands-on proficiency in NoSQL using MongoDB for real-world database design and querying.

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	PO11	PO 12	PSO1	PSO2
CO1	3	2	2	1	3	–	–	–	–	2	2	2	3	2
CO2	3	3	3	2	3	–	–	–	–	2	2	2	3	2
CO3	3	3	3	2	3	–	–	–	2	2	2	2	3	3
CO4	3	2	3	2	3	–	–	–	–	2	2	2	3	2
CO5	2	3	3	2	3	–	–	–	2	2	2	3	3	3

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

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

Statement: To comprehend and evaluate the role of database management systems, with an emphasis on how to organize, maintain and retrieve information from a DBMS efficiently, and effectively in information technology applications within organizations.

CSE 1263	DATA STRUCTURES	L	T	P	C
SDG: 9		3	0	2	4

COURSE OBJECTIVES:

COB1: To introduce the fundamental concepts of data structures, recursion, and complexity analysis using arrays and memory representation.

COB2: To develop knowledge of basic and advanced sorting and searching algorithms for efficient problem-solving.

COB3: To explore the implementation of linear data structures like linked lists and strings and their practical applications.

COB4: To understand stack and queue structures and apply them to expression evaluation, recursion handling, and scheduling.

COB5: To provide insight into non-linear data structures such as trees, heaps, and graphs, and their use in solving complex problems.

MODULE I BASIC DATA STRUCTURES AND COMPLEXITY ANALYSIS **L: 9 T: 0 P: 6**

Introduction, Basic Terminology, Data Structures, Algorithms, Asymptotic Notations, Time and Space Complexity Analysis, Linear Arrays, Representation of Linear Arrays in Memory, Traversing Linear Arrays, Searching, Advanced Array Applications: Prefix Sum, Sliding Window, Two-Pointer Techniques, Multidimensional Arrays, Pointers, Recursion Fundamentals, Recursive Algorithms and Applications, Towers of Hanoi.

MODULE II SORTING AND SEARCHING TECHNIQUES **L: 9 T: 0 P: 6**

Basic Sorting: Selection Sort, Bubble Sort, Insertion Sort, Advanced Sorting: Merge Sort, Quick Sort, Binary Search and Applications, Searching and Data Modification, Hashing, Hash Tables and Hash Functions.

MODULE III LINEAR DATA STRUCTURES **L: 9 T: 0 P: 6**

Linked List, Representation of Linked List in Memory, Traversing a Linked List, Searching a Linked List, Memory Allocation, Insertion into a Linked List, Deletion from a Linked List, Header Linked Lists, Two-way Lists, Advanced Operations: Reversals, Merging, Flattening, Strings, String Manipulation Techniques

MODULE IV STACKS, QUEUES L: 9 T: 0 P: 6

Stacks, Array Representation of Stacks, Arithmetic Expressions: Infix, Prefix, Postfix, Applications of Stacks, Monotonic Stack and Next Greater Element, Implementation of Recursive Procedures by Stacks, Queues, Implementing Stack using Queue, Implementing Queue using Stack, Linked Representation of Queues, Dequeues, Priority Queues.

MODULE V NON-LINEAR DATA STRUCTURES L: 9 T: 0 P: 6

Binary Trees, Binary Tree Traversals, Applications: Path Sum Calculations, Lowest Common Ancestor, Binary Search Trees, Heaps: Min-Heap, Max-Heap, Priority Queue Implementation, Heap Sort, Huffman's Algorithm, Graph Theory Terminology, Graph Representation, Graph Traversals techniques, BFS, DFS, Cycle Detection, Topological Sorting, Bipartite Graph

PRACTICALS:

List of Experiments

1. Linked List
2. Stack ADT
3. Queue ADT
4. Priority Queue
5. Sorting and Searching
6. Tree Traversal
7. Tree Structure - Binary Tree
8. Binary Tree Structure
9. Graph Traversals (BFS, DFS)
10. Hash Table

L – 45; T- 0; P – 30; Total Hours: 75

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni & Dinesh Mehta, “Fundamentals of Data Structures in C”, 2nd Edition, Universities Press, 2008. ISBN: 978-8173716065.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 4th Edition, Pearson Education, 2012. ISBN: 978-0273752110.
3. Robert Lafore, “Data Structures and Algorithms in Java”, 2nd Edition, Sams Publishing, 2002. ISBN: 978-0672324536.

REFERENCES:

1. NPTEL Course – Data Structures and Algorithms, Prof. Naveen Garg, IIT Delhi https://nptel.ac.in/courses/106102064
2. Geeks for Geeks – Data Structures Self-Paced Course & Documentation https://www.geeksforgeeks.org/data-structures/

COURSE OUTCOMES:

CO1: Understand the foundational concepts of asymptotic analysis and time-space complexity.

CO2: Develop proficiency in recursive algorithms and their applications in solving mathematical and computational problems.

CO3: Gain expertise in linear data structures such as arrays, strings, linked lists, stacks, and queues, and apply them to solve real-world challenges.

CO4: Master non-linear data structures, including trees, heaps, and graphs, along with their traversals and applications in shortest paths, spanning trees, and graph connectivity.

CO5: Implement efficient sorting and searching techniques, and apply advanced data structures such as hashing, tries, and disjoint sets to optimize problem-solving and data organization.

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	PO11	PO 12	PSO1	PSO2
CO1	3	2	3	2	3	–	–	–	–	2	2	2	3	2
CO2	3	3	3	2	3	–	–	–	–	2	2	2	3	2
CO3	3	3	3	2	3	–	–	–	2	2	2	3	3	2
CO4	3	3	3	2	3	–	–	–	2	2	2	3	3	3
CO5	3	3	3	2	3	_	_	_	2	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.

Statement: By learning the concepts of Data Structures, the students are able to apply the data structures to solve real time problems which can improve the productive employment.

CSE 1264	INTRODUCTION TO ARTIFICIAL	L	T	P	C
SDG: 8	INTELLIGENCE	3	0	0	3

COURSE OBJECTIVES:

COB1: Understand core AI concepts, problem-solving techniques, and search strategies through real-world examples.

COB2: Learn AI search strategies, including uninformed and informed methods, heuristics, and simple optimization techniques for effective decision-making.

COB3: Explore Large Language Models (LLMs), their working principles, types, and applications in text generation, along with the AI career landscape.

COB4: Gain insights into AI applications in image, audio, video, and speech generation, including tools, workflows, and model capabilities.

COB5: Apply multimodal AI, low-code/no-code platforms, and prompt engineering techniques to design, deploy, and manage AI agents for real-world solutions

MODULE I INTRODUCTION TO ARTIFICIAL INTELLIGENCE **L:9 T: 0 P: 0**

What is Artificial Intelligence (AI)? – Everyday Examples and Simple Understanding – AI in Daily Life: Smartphones, Shopping, Cars, and Assistants – A Brief History of AI: From Early Ideas to Modern Tools – Applications of AI in Real World – Introduction to AI Models (Basic Overview) – How AI Uses Data to Learn – AI Problem Solving: Simple Examples – What is a Toy Problem? – Real-world Problem Examples (Navigation, Shopping Recommendations) – Understanding the AI Thinking Process –Identifying Problems AI Can Solve.

MODULE II HOW AI THINKS [SIMPLE DECISION MAKING & SEARCH **L: 9 T: 0 P: 0**

What is Search in AI? – Real-Life Examples: Google Maps, Puzzle Solving – Exploring Search Methods: Trying All Options vs. Smart Guessing – Uninformed Search Methods: Breadth First Search (BFS), Depth First Search (DFS), Basic Intuition Only – Informed Search Introduction: Smart Searching Using Hints – Introduction to A* Search (Conceptual Only, No Math) – How AI Improves Guesses: Hill Climbing – Learning from Mistakes: Trial

& Error and Simulated Annealing – Simple Optimization Examples in Daily Life – Understanding Heuristics Using Everyday Analogies (Like Choosing the Best Route or Food).

MODULE III FOUNDATIONS OF LLMs AND AI SYSTEMS L: 9 T:0 P: 0

What are Large Language Models (LLMs)?, Why Learn About AI Models?, How AI Content Generation Works?, Types of AI-Generated Content, Large Language Models (LLMs), Comparing LLMs (OpenAI, Claude, Gemini, etc.), Open-source vs Proprietary Models: Trade-offs, Costs, and Flexibility, Hugging Face Ecosystem, AI Job Landscape and Career Paths

MODULE IV IMAGE, AUDIO, VIDEO & SPEECH APPLICATIONS L: 9 T:0 P: 0

Image Generation Applications: Use Cases, Tools - GPT-4o, Imagen 3, Midjourney, Stable Diffusion 3.5, Adobe Firefly, Audio Generation Applications: Use Cases, Autoregressive Models, Diffusion Models, GAN-Based Audio Synthesis, Tools - ElevenLabs, Suno, Murf AI, PlayHT Video Generation Applications: Use Cases, Text-to-Video Models, Image-to-Video, Video-to-Video Transformation, Tools - Google Veo 2, Runway Gen-3, Kling, etc, Speech-to-Speech Applications

MODULE V MULTIMODAL AI, NO-CODE WORKFLOWS & AGENT DEPLOYMENT L: 9 T:0 P: 0

Multimodal AI Systems: Combining Vision, Language, and Audio, Multimodal Architectures, Low Code / No Code Workflows: Visual Platforms, API Connectors, Tools – Make.com, Zapier, n8n, Bubble, Microsoft Power Automate, Connecting to AI Services, Nodes and Workflow Logic, Prompt Engineering Basics - AI Agents and Architectures: Autonomous Agents, Agent Workflows and Tool Usage, AutoGPT, Agent GPT, Super agent, Lang chain, Model Context Protocol (MCP): Introduction, Protocol Layers, Implementing Prompts and Tools, MCP Server Setup, Claude/OpenAI Integration, Deploying Agents: Firecracker Virtualization, Serverless Deployment

L – 45; T – 0; P – 0; Total Hours: 45

PRACTICALS:

1. Building a Customer Support Voice Agent
2. Building an AI Powered Chatbots
3. Building a Personal Research Assistant
4. Building a Podcast Creator: Generates a podcast with, bg music and bg image with custom voice
5. Create an AI application that generates talking avatar videos from text input.
6. Build an AI-Powered Social Media Manager that generates content ideas, writing posts, creating images, scheduling publications.
7. Building an AI Powered Auto Job Applier

TEXT BOOKS:

1. François Chollet, “Deep Learning with Python”, 2nd Edition, Manning Publications, 2021. ISBN: 978-1617296864.
2. Laurence Moroney, “AI and Machine Learning for Coders”, O’Reilly Media, 2020. ISBN: 978-1492078197.
3. David Foster, “Generative Deep Learning”, 2nd Edition, O’Reilly Media, 2022. ISBN: 978-1098134181.

REFERENCES:

1. .Hugging Face Documentation (Transformers & Diffusers). https://huggingface.co/docs

COURSE OUTCOMES:

CO1: Understand AI fundamentals, problem-solving techniques, and search strategies

CO2: Explain LLM architectures and compare leading models and their applications.

CO3: Use AI tools for image, audio, video, and speech content generation

CO4: Create AI workflows using low-code/no-code platforms and prompt engineering.

CO5: Build and deploy AI agents using modern frameworks and MCP protocols.

Board of Studies (BoS):	**Academic Council:**
25th BoS of CSE held on 07.07.2025	24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12	PSO1	PSO2
CO1	3	3	2	2	2	–	–	–	1	2	2	2	3	2
CO2	2	3	2	2	3	–	–	2	2	2	2	2	3	3
CO3	3	2	3	2	3	–	2	–	1	2	2	2	2	3
CO4	2	2	3	2	3	–	–	–	3	3	3	2	2	3
CO5	3	2	3	2	3	–	–	2	3	3	3	2	2	3

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

Statement: The application of database design principles, structured query techniques, and modern data management technologies empowers students to develop efficient, secure, and adaptable data systems that support economic growth, enhance productivity, and enable equitable access to employment opportunities, fostering sustained and inclusive development.

ENE 1261	**ADVANCED COMMUNICATIVE ENGLISH**	**L**	**T**	**P**	**C**
SDG: 4		**1**	**1**	**0**	**2**

COURSE OBJECTIVES:

COB1: To develop the ability to participate in structured professional conversations and introduce oneself formally using context-appropriate language.

COB2: To enable learners to narrate past experiences and report on completed academic or personal tasks using effective written and spoken communication.

COB3: To equip students to express future goals and plans clearly through discussions, group presentations, and planning documents.

COB4: To strengthen the skills required for composing extended written responses and formal communication using logical transitions and structured formats.

COB5: To build competence in reasoning through options, making decisions, and articulating hypothetical outcomes using conditional language in professional contexts.

MODULE I PROFESSIONAL INTRODUCTIONS AND INFORMATION EXCHANGE **L: 3 T: 3 P: 0**

using present continuous tense to describe ongoing tasks; Listening to podcasts; Delivering short formal-introductions - Drafting professional bios and emails.

MODULE II NARRATING EXPERIENCES AND REPORTING TASKS **L: 3 T: 3 P: 0**

Recounting events, and personal narration using the simple past tense; summarising project work, academic progress, or past experiences; participating in structured storytelling -writing brief reports and reflective summaries based on guided prompts.

MODULE III PLANNING AND PROJECTING IN PROFESSIONAL CONTEXTS **L: 3 T: 3 P: 0**

Expressing future intentions and scheduled activities using the simple future tense; outlining task plans, objectives, and timelines; participating in discussions related to project goals - presenting plans in group tasks; writing presentation outlines -; interpreting future-oriented discussions and planning meetings.

MODULE IV STRUCTURING EXTENDED RESPONSES AND TRANSITIONS L: 3 T: 3 P: 0

Using discourse markers and connectors to link ideas across sentences and paragraphs; constructing extended responses in formal interactions; Preparing progress summaries- case studies- Replying to emails,-response letters, - brief reports-structured interviews .

MODULE V REASONING, DECISION-MAKING, AND REFLECTIVE COMMUNICATION L: 3 T: 3 P: 0

Using conditional expressions in discussing possible outcomes, decisions, and reflections; participating in case-based discussions and scenario responses; constructing arguments and recommendations; listening to talks involving choices and hypothetical situations; writing responses with evaluative and strategic reasoning in academic or professional contexts.

L – 15; T – 15; P – 0; Total Hours: 30

TEXT BOOKS:

1. Eric H. Glendinning & John McEwan, “English for Information Technology”, Pearson Longman, 2007. ISBN: 978-1408220021.
2. T. L. R. Ward, “English for Specific Purposes: Computing”, Macmillan Education, 2003. ISBN: 978-1405012940.

REFERENCES:

1. Martin Hewings, “Advanced Grammar in Use”, 3rd Edition, Cambridge University Press, 2013. ISBN: 978-1107697386.
2. Michael Swan & Bernard Smith, “Learner English: A Teacher's Guide to Interference and Other Problems”, 2nd Edition, Oxford University Press, 2013. ISBN: 978-0521779395.
3. Geoffrey Leech & Jan Svartvik, “A Communicative Grammar of English”, 3rd Edition, Pearson Education, 2002. ISBN: 978-0582506336.

COURSE OUTCOMES:

CO1: Demonstrate the ability to introduce oneself and engage in structured professional conversations using present continuous forms and appropriate formal expressions.

CO2: Deliver coherent oral and written narratives recounting past experiences and completed tasks using the simple past tense in academic and workplace contexts.

CO3: Present future intentions and project plans effectively in group discussions and written outlines using structured language and simple future forms.

CO4: Produce extended responses, summaries, and formal communications with clarity and coherence using discourse markers and logical structuring.

CO5: Use conditional expressions to discuss possible outcomes, justify decisions, and provide reflective responses in case-based academic and professional scenarios.

Board of Studies (BoS):
18th BoS of the Department of English held on 21.08.2025

Academic Council:
24th AC held on 26.08.2025

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

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

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

Statement: The development of grammatical accuracy, vocabulary precision, and effective sentence construction skills enhances students' communication abilities, advancing quality education and fostering lifelong learning opportunities.

GEE 1205	UNIVERSAL HUMAN VALUES	L	T	P	C
SDG: 4, 8, 10, 16 &17		2	0	0	2

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

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

CO1: Comprehend the components, and significance of value education and be able to apply self-exploration techniques for achieving continuous happiness and prosperity in life and profession.

CO2: Internalize an understanding of universal human values and their role in balancing the coexistence of self and body, while recognizing their interdependencies and resolving conflicts between personal goals and societal needs.

CO3: Cultivate an understanding of the significance of harmony within oneself, in interpersonal relationships, and with nature, and develop the ability to articulate its essential role in fostering balance within human relationships, society, and the environment.

CO4: Gain insights into the ethical conduct required for engineers, including understanding engineering ethics, the significance of professional ethics, and applying ethical decision-making in technological advancements and leadership roles.

Board of Studies (BoS) :

7th BoS of SSSH held on 14.07.2025

Academic Council:

24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12
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.