ADICHUNCHANAGIRI UNIVERSITY

VISION

Education for all with Value Systems of Empathy, Enrichment, Equity, Excellence, Empowerment, Entrepreneurship, and Enlightenment to Serve the Society.

MISSION

- **Empowering** Change through Education, Research, and Community Involvement
- **Education** to all for Self-Reliance, Socio-Economic Change to develop an Inclusive Society with Shared Opportunities & Responsibilities
- **Empathy** towards the Less Fortunate, the Sick, the Suffering & the Disabled
- **Enrichment** to acquire Abundant Knowledge, Requisite Skills & Appropriate Attitude
- **Excellence** for Quality Assurance, Enhancement & Sustenance in Academics and research to produce Graduates of Global Standards
- **Equity** for Fairness & Social Justice by providing Equal Opportunities
- **Empowerment** of Graduates to become Intuitive, Innovative & Inventive
- **Entrepreneurship** is a concept or idea involving the product or service to be delivered or a new technology to be developed
- **Enlightenment** to attain Wisdom & Virtues in Life to think beyond Self

Faculty of Engineering, Management and Technology (BGSIT)

VISION

BGSIT is committed to the cause of creating tomorrow's engineers by providing quality education inculcating ethical values.

MISSION

- Imparting quality technical education by nurturing a conducive learning environment.
- Offering professional training to meet industry requirements.
- Providing education with a moral - cultural base and spiritual touch.

Department of Civil Engineering

VISION

Producing technically competent and Environmental friendly Civil Engineering Professionals to cope with the societal challenges.

MISSION

- Imparting quality education and professional ethics by proficient faculty.
- Providing infrastructure to meet the requirements of curriculum, research and consultancy.
- Motivating towards higher education and entrepreneurship.
- Promoting Interaction with design and construction industries.

SCHEME & SYLLABUS

THE DEGREE OF BACHELOR OF ENGINEERING (BE)

CHOICE BASED CREDIT SYSTEM (CBCS)

Effective from the academic year 2022-23

B G Nagara, Nagamangala Taluk, Mandya District,

Karnataka-571448

ACU/AUTY/ 729/ /2022-23

Date: 25/11/2022

NOTIFICATION

Sub: Regulations of 2022 Scheme and CBCS Curriculum for BE & M.Tech Programs- reg.

Ref: 1. Proceedings of the 12th meeting of CAC held on 09.09.2022
2. Minutes of the 9th meeting of the Board of Management held on 19.05.2022.
3. Notification No. ACU/AUTY/AC-09/101/1/2022-23, dated 10.05.2022.

With reference to the above, the Regulations of 2022 Scheme and Choice Based Credit System (CBCS) for UG and PG (All Programs) was notified (Ref.3). Further, in accordance with the resolutions of the Boards of Studies - Faculty of Engineering, Management & Technology BGS Institute of Technology Committee of Academic Council and Board of Management as referred above; it was decided to approve the Regulations 2022 scheme and Choice Based Credit System (CBCS) for UG and PG programs by the University.

These Regulations of 2022 scheme and CBCS Curriculum shall be effective for students admitted to BE & M.Tech course from the academic year 2022-23 onwards.

By order,

Dr. C.K. Subbaraya
Registrar
Adichunchanagiri University
B.G.Nagara-571448

Copy to:

1. PS to the Hon'ble Visitor, His Excellency, the Governor of Karnataka
2. PS to the Hon'ble Chancellor
3. OSD to the Vice-Chancellor
4. Secretary, Ministry of Higher Education, Government of Karnataka
5. PS to the Registrar (Evaluation), ACU
6. Dean, Research, ACU
7. Dean, Academics and Accreditations, ACU
8. Principal, BGSIT, B.G.Nagara-571448, Nagamangala (Tq), Mandya (Dist)
9. Office Copy

Adichunchanagiri University, BG Nagara
REGULATIONS GOVERNING
THE DEGREE OF BACHELOR OF ENGINEERING (BE) UNDER CHOICE BASED CREDIT SYSTEM (CBCS)
Effective from the academic year 2022-23
Definitions of Keywords

The following are the definitions/descriptions that have been followed for the different terms used in the Regulations of BE Programme:

1) **Programme:** It is an educational programme in a particular stream/ branch of Engineering/branch of specialization leading to award of Degree. It involves events/activities, comprising of lectures/ tutorials/ laboratory work/ field work, outreach activities/ project work/ vocational training/ viva/ seminars/ internship/ assignments/ presentations/ self-study etc., or a combination of some of these.
2) **Branch:** Means specialization or discipline of BE Degree Programme, such as Civil Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science &Engineering and Information Science & Engineering, Artificial Intelligence and Machine Learning.
3) **Register Number:** It is the unique identification number assigned to all the admitted students of the University.
4) **Semester:** Refers to one of the two sessions of an academic year (vide: serial number 5), each session being of sixteen weeks duration (with working days greater than or equal to ninety).The odd semester may be scheduled from August and even semester from February of the academic year.
5) **Academic Year:** Refers to the sessions of two consecutive semesters (odd followed by an even) including periods of vacation.
6) **Course:** Refers to usually referred to as 'papers' and is a component of a programme. All courses need not carry the same weightage (credit). The courses should define course objectives and course outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/project work/ vocational training/ viva/ seminars/ term papers/assignments/ presentations/ self-study, etc., or a combination of some of these.

7) **Credit:** Refers to a unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of lecture or two hours of laboratory/ practical courses/ tutorials/ fieldwork per week, etc.
8) **Audit Courses:** Means knowledge/ skill enhancing courses without the benefit of a grade (vide: serial number 18) or credit for a course.
9) **Choice Based Credit System (CBCS):** Refers to customizing the course work, through Core, Elective and Soft skill courses, to provide necessary support for the students to achieve their goals.
10) **Course Registration:** Refers to formal registration for the courses of a semester (Credits) by every student under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Institution to maintain proper record.
11) **Course Evaluation:** Means Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE) to constitute the major evaluations prescribed for each course. CIE and SEE to carry 50% and 50% respectively, to enable each course to be evaluated for 100 marks, irrespective of its Credits.
12) **Continuous Internal Evaluation (CIE):** Refers to evaluation of students' achievement in the learning process. CIE shall be by the Course Instructor and includes tests and any one of the following, homework, problem solving, group discussion, quiz, mini-project and seminar throughout the Semester, with weightage for the different components being fixed as per the BOS.
13) **Semester End Examination (SEE):** Refers to examination conducted at the University level covering the entire course syllabus. For this purpose, syllabi to be modularized and SEE questions to be set from each module, with a choice confined to the concerned module only. SEE is also termed as University examination.
14) **First Attempt:** Refers to a student who has completed all formalities and has become eligible to attend the SEE and has attended at least one head of passing, such attempt shall be considered as first attempt.
15) **Make up Examination:** It is the examination conducted to the failed / rejected courses after Even Semester as specified by the calendar of events of the University.

16) **Credit Based System (CBS)**: Refers to quantification of course work, after a student completes teaching – learning process, followed by passing in both CIE and SEE. Under CBCS, the requirement for awarding degree is prescribed in terms of total number of credits to be earned by the students.

17) **Credit Representation:** Refers to Credit values for different academic activities considered, as per the Table-1. Credits for seminar, project phases, project viva–voce and internship shall be as specified in the Scheme of Teaching and Examination (Annexure -1).

Table-1: Credit Values

Theory/ Lectures (L) (hours/week/ Semester)	Tutorials (T) (hours/week/ Semester)	Laboratory/Practical (P) /practical train-ing(hours/week/Se mester)	Credits (L:T:P)	Total Credits
4	0	0	4:0:0	4
3	0	0	3:0:0	3
2	2	0	2:1:0	3
2	0	2	2:0:1	3
2	2	2	2:1:1	4
0	0	6	0:0:3	3

NOTE: Activities like study tour and participation in guest lectures not to carry Credits.

18) **Letter Grade:** It is an index of the performance of students in a said Course. Grades are denoted by letters S, A, B, C, D, E and F.

19) **Grading:** Grade refers to qualitative measure of achievement of a student in each course, based on the percentage of marks secured in (CIE plus SEE). Grading is done by Absolute Grading [Refer: 22BE6.0]. The rubrics attached to letter grades are as follows: S – Outstanding, A – Excellent, B – Very Good, C – Good, D – Above Average, E – Average and F – Fail.

20) **Grade Point (GP):** Refers to a numerical weightage allotted to each letter grade on a 10- point scale as under:

Letter Grade and corresponding Grade Points on a typical 10 – Point scale							
Letter Grade	S	A	B	C	D	E	F
Grade Point	10	09	08	07	06	05	00

21) **Passing Standards:** Refers to passing a course only when getting GP greater than or equal to 04 (as per serial number 18).

22) **Credit Point:** It is the product of grade point (GP) and number of credits for a Course i.e.,
Credit Point (CrP) = GP ×Credits for the Course

23) **Semester Grade Point Average (SGPA):** Refers to a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various Courses of a semester and the total course credits taken during that semester. [Refer:22BE6.0]

24) **Cumulative Grade Point Average (CGPA):** Refers to a measure of overall cumulative performance of a student overall semesters. The CGPA is the ratio of total credit points earned by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places. [Refer: 22BE6.0]

25) **Transcript or Grade Card or Certificate:** Refers to a certificate showing the grades earned by a student. A grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the programme details (Course code, title, number of credits, grades secured) along with SGPA of that semester and CGPA earned till that semester.

26) **University:** Adichunchanagiri University (ACU), BG Nagara.

Adichunchanagiri University, BG Nagara
Regulations Governing the Degree of Bachelor of Engineering (BE)
Under Choice Based Credit System (CBCS)
(With effective from the academic year 2022-23)

22BE 1.0	Title, Duration and Credits of the Programme of Study
22BE 1.1	The programme of study shall be called the Degree of Bachelor of Engineering abbreviated as BE (Subject of Specialization).
22BE 1.2	The programme to which students are admitted to I Semester of the programme shall be of four academic years duration divided into eight semesters and each semester is of 16 weeks duration. The programme to which students are admitted to III Semester of the programme under lateral entry shall be of three academic year duration divided into six semesters and each semester is of 16 weeks duration. The programme (conducted during evening) to which students are admitted to III semester of the programme under lateral entry shall be of three academic year duration divided into six semesters and each semester is of 16 weeks duration. The deficit Contact hours of the programme, conducted during evening on all working days, shall be compensated on all Sundays (except on general holidays).
22BE 1.3	The calendar of events in respect of the programme of study shall be notified by the University in advance.
22BE 1.4	The University examination in all programmes of study shall be conducted at the end of each semester for all the eight semesters.
22BE 1.5	**Maximum Duration for Programme Completion:** a) i. Students admitted to I Year BE shall complete the programme within a period of Eight academic years from the date of first admission, failing which they have to discontinue the course. ii. Students admitted to II Year BE under lateral entry scheme shall complete the programme within a period of Six academic years from the date of first admission, failing which he/she has to discon- tinue the Course. b) i. A student who has not obtained the eligibility for III Semester even after three academic years from the date of admission to I Semester shall discontinue the programme or get readmitted to I Semester of I Year BE with a new University Seat Number.

22BE 1.5	ii. A student (under lateral entry scheme) who has not obtained the eligibility for V Semester even after three academic years from the date of admission to III Semester shall discontinue the Programme or get readmitted to III Semester of II Year BE with a new University Seat Number.
22BE 1.6	**Prescribed number of Credits for the Programme:** (a) The number of credits to be completed by students admitted to I year Semester of BE programme shall be 166. (b) The number of credits to be completed by students admitted to III Semester of BE Programme under lateral entry scheme shall be 126.
22BE 1.7	**Definition of credits** 1 hour Lecture(L) per week per semester=1 credit 2 hour Tutorial(T) per week per semester=1 credit 2 hour Practical/Practical Training/Laboratory/Drawing (P) per week per semester=1 credit
22BE 2.0	Eligibility for Admission (As per the Government orders issued from time to time)
22BE 2.1	Admission to I Year/ I Semester Bachelor Degree in Engineering shall be open to the students who have passed the II PUC/ XII Standard/ Equivalent Examination with English as one of the Languages and obtained a Minimum of 45% of Marks in aggregate in Physics and Mathematics along with Chemistry / Bio-Technology / Biology / Electronics / Computer. In case of SC/ST, Category-1 and OBC (2A, 2B, 3A and 3B) category students from Karnataka (Karnataka candidates), the minimum marks for eligibility shall be 40%. With regard to the qualification earned from foreign countries, Equivalence Certificate from the Association of Indian Universities is Mandatory for admission to BE programme. In case of any dispute about the equivalence in qualification earned from foreign countries, the decision of the Equivalence Committee shall be the final in establishing the eligibility of the student. Admission to II Year/ III Semester Bachelor Degree in Engineering (Lateral Entry) shall be open to the Diploma holders and B.Sc. graduates.

	(i) Diploma Holders (a) Must have passed diploma or equivalent examination as recognized by University and secured not less than forty five percentage (45%) marks in the final year examination (fifth and sixth semesters) in the appropriate branch of engineering. In case of SC/ST and OBC students from Karnataka, the minimum marks for eligibility shall be forty percent (40%). (b) Those candidates who have completed Diploma from other than Karnataka State shall provide the Equivalence/ Eligibility Certificate from the Director of Technical Education, Karnataka. **(ii) B.Sc. Graduates** Must have passed B.Sc. degree from a recognized University under the UGC or equivalent qualification as recognized by University and secured not less than forty five percentage (45%) marks in aggregate (considering the marks of all six semesters). In case of SC/ ST and OBC students from Karnataka (Karnataka candidates) the minimum marks for eligibility shall be forty percent (40%). Candidates must have studied Mathematics as subject of study at XII Standard.
22BE 2.2	**(i) Diploma Holders for the programme conducted during evening:** A candidate who has passed diploma examination or equivalent examination and obtained an aggregate minimum of 45% marks taken together in all the subjects of the final year (fifth and sixth semesters) diploma exanimation is eligible to BE Courses, and 40% of marks in case of SC/ST and backward classes of Karnataka candidates. In addition to this, a candidate after passing the diploma, must have minimum of two years full-time professional experience as on first September of the year of admission, in a registered firm/company/ industry/ educational / Government / Autonomous organizations in the branch of Engineering/ Technology, in which the candidates hold a diploma, and in which admission is sought by him/her. Further that employment shall be in an establishment situated within the 100 km from the place of the institution to which the candidate is seeking admission. Professional experience refers to the experience earned as an employee on regular basis in, (a) Government, Government Undertaking, Public Sector Undertaking, Corporation or,

22BE 2.2 (continued)	(b) In a private company registered under the Directorate of Industries and Commerce or the Directorate of Small Scale Industries or, (c) Government, Government recognized Institutions as technical staff. Provided that the period of apprenticeship undergone shall also be treated as professional experience, if sponsored by the Board of Apprenticeship Training, Southern Region, Chennai or by Government, Government undertakings and Public Sector undertakings. Further, those candidates who have completed Diploma from other than Karnataka state shall provide the Equivalence/ Eligibility Certificate from the Director of Technical Education, Karnataka.
22BE 2.3	Those students, who have passed a qualifying examination other than the PUC II examination of the Pre-University Education Board of Karnataka, have to obtain Eligibility Certificate for seeking admission to BE Degree Programme from Adichunchanagiri University, BG Nagara.
22BE 3.0	**Courses**
22BE 3.1	There shall be the following types of Courses: a) Humanities and Social Sciences (HSS) including Management. These are mandatory for all disciplines. b) Basic Sciences (BS): Physics, Chemistry and Mathematics. These are mandatory for all disciplines. c) Engineering Sciences (ES): Materials, Drawing, and Basics of Electrical/ Electronics/ Instrumentation/ Civil/ Mechanical/ Computer Engineering. These are mandatory for all disciplines. d) Professional Subjects (PS) - Core: These are the Professional Core (PC) courses, relevant to the chosen specialization/ branch. The core Courses are to be compulsorily studied by a student and are mandatory to complete them to fulfil the requirements of a programme. e) Professional Subjects (PS) - Elective: These are the Professional Electives (PE), relevant to the chosen specialization/ branch and can be chosen from the pool of papers. It shall be supportive to the discipline providing extended scope/enabling an exposure to some other discipline /domain and nurturing student proficiency skills. f) Open Subjects - Electives (OE): These are from other technical areas and/ or from emerging fields. g) Mini Project and Main Project: Carried out at the Institution or at an Industry. h) Seminar: Deliverable at the Institution under the supervision of a Faculty.

22BE 3.1	i) Internship: Preferably at an industry/R & D organization/IT company/ Government organization of significant repute for a specified period mentioned in the Scheme of Teaching and Examination. j) Mandatory Courses (MC): These courses are mandatory, without the benefit of a grade or credit, for students admitted to BE programme. A pass in each mandatory course is required to qualify for Degree award from the University. k) Audit Courses (AC): Knowledge/ skill enhancement courses without the benefit of a grade or credit for a course. i) The Audit Course/s (other than the Course/s considered for completing the prescribed programme credits) can be any Course offered by the programme to which the student is admitted to other programmes offered in the institution, where
22BE 3.1 (continued)	the student is studying. ii) The students who are interested in audit courses can register for one audit course at a time during III to VIII Semesters. Students, who have opted for audit courses and considered on par with students registered for credit courses, have to satisfy the attendance and CIE requirements. However, they need not have to appear for SEE. iii) Registration for any audit course, in writing, shall be completed at the beginning of semesters. The Institution should intimate the Registrar (Evaluation) about the registration at the beginning of the semester and obtain a formal approval for inclusion of the audit Course/s in the Grade cards/ Transcripts issued to the students.
22BE 3.2	The minimum number of students registered to any Elective offered by the Departments shall be not less than fifteen.
22BE3.3	A student shall exercise his option in respect of Elective Courses and register for the same at the beginning of the concerned semester. The student may be permitted to opt for a change of Elective Course within 15 days from the date of commencement of the semester as per the calendar of the University.
22BE3.4	**Course Registration:** Every student shall register for the Courses of a semester (Credits) under the supervision of a Faculty Advisor (also called Mentor, Counsellor etc.) in each Semester for the Institution to maintain proper record.
22BE4.0	**Internship/Professional Practice/Practical Examinations/Project work**

22BE4.1	1) The Department/college shall nominate staff member/s to facilitate, guide and supervise students under Internship/ Professional Practice/Practical Examinations/Project work. 2) The Internship shall be completed during the period specified for four weeks during the vacation of VI and VII semesters and/or VII and VIII Semester 3) The internship can be carried out in any industry/R & D Organization/Research Institute/Educational institute of repute. 4) The students shall report the progress of the Internship/ Professional Practice/Practical Examinations/Project work to the guide at regular intervals and seek his/her advice. 5) After the completion of Internship/Professional Practice/Practical Examinations/Project work, students shall submit a report with completion and attendance certificates to the Head of the Department with the approval of guides. 6) There will be 50 marks for CIE (Seminar: 25 & Internship Report: 25) and 50 marks for Viva–voce conducted during SEE with two Internal Examiners. The minimum requirement of CIE marks shall be 50% of the maximum marks. [To be read along with 22BE8.6] 7) The guide shall award the marks for Seminar /Viva-voce on Internship/Professional Practice/Practical Examinations/Project work Report after evaluation. He/she will also be the internal examiner for Viva–voce conducted during SEE. 8) Viva-voce on Internship/Professional Practice/Practical Examinations/Project work shall be conducted at the college with two internal Examiners. The Examiners shall jointly award the Viva-voce marks. 9) The students are permitted to carry out the internship anywhere in India or abroad. The University will not provide any kind of financial assistance to any student for carrying out the Internship.
22BE4.2	**Failing to undergo Internship:** Internship is one of the head of passing. Completion of internship is mandatory. If any student fails to undergo /complete the internship, he/she shall be considered as failed in that Course and shall not be permitted to appear for SEE in that Course. However, student shall appear for SEE after satisfying the conditions prescribed for Internship. The reappearance shall be considered as an attempt.
22BE5.0	**Seminar and Project Work**

<table>
<tr><td>22BE 5.1</td><td>Seminar: Seminar is one of the head of passing:
i) Each candidate shall deliver Seminar as per the Scheme of Teaching and Examination on the topics chosen from the relevant fields with latest topics for about 20 minutes.
ii) The Head of the Department shall make arrangements for conducting seminars through concerned faculty members of the Department. The committee constituted for the purpose by the Head of the Department shall award the CIE marks for the seminar. The committee shall consist of three faculties from the Department and the senior most acting as the Chairman/Chairperson. [To be read along with 22BE8.6].</td></tr>
<tr><td>22BE 5.2</td><td>Project Work: Project (Mini and Main)Work is one of the head of passing:
Mini Project work and Main Project work shall preferably be batch wise, the strength of each batch shall not exceed maximum of four students (minimum of 2).</td></tr>
<tr><td>22BE 5.3</td><td>Viva-voce examination in Mini Project work and Main Project work shall be conductedBatch-wise.</td></tr>
<tr><td>22BE 6.0</td><td>Computation of SGPA and CGPA</td></tr>
<tr><td>22BE 6.1</td><td>i) The University adopts absolute grading system wherein the marks are converted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester.
ii) The grading system with the letter grades and the assigned range of marks under absolute grading system are as given below:
<table>
<tr><td>Level</td><td>Outstanding</td><td>Excellent</td><td>Very Good</td><td>Good</td><td>Above Average</td><td>Average</td><td>Fail</td></tr>
<tr><td>Letter Grade</td><td>S</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>Grade Points</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>0</td></tr>
<tr><td rowspan="2">Percentage of Marks Scored in a Course</td><td>≥ 90</td><td><90≥80</td><td><80≥70</td><td><70≥60</td><td><60≥45</td><td><45≥40</td><td><40</td></tr>
<tr><td>(90-100)</td><td>(80-89)</td><td>(70-79)</td><td>(60-69)</td><td>(45-59)</td><td>(40-44)</td><td>(0-39)</td></tr>
</table></td></tr>
</table>

22BE 6.1

iii) A student obtaining Grade 'F' in a course shall be considered failed and is required to reappear in subsequent SEE. Whatever the letter grade secured by the student during his / her reappearance shall be retained. The failed student shall take make up examina- tions as per the calendar of events issued by the university.

22BE 6.2

Computation of SGPA and CGPA (as per UGC Guidelines)

The following procedures shall be used to compute the SGPA and CGPA respectively:

i) The SGPA is the ratio of sum of the product of the number of credits with the grade points secured by a student in all the courses taken by him/her and the sum of the number of credits of all the courses undergone by a student, i.e.,

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

ii) The CGPA is also calculated in the same manner taking into account all the Courses undergone by a student over all the semesters of a programme, i.e.,

$$CGPA = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA Computation of SGPA

Level				
Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point = (Credit × Grade)**
Course 1	4	B	08	4 × 08 = 32
Course 2	4	D	06	4 × 06 = 24
Course 3	4	C	07	4 × 07 = 28
Course 4	3	S	10	3 × 10 = 30
Course 5	3	E	04	3 × 04 = 12
Course 6	3	D	06	3 × 06 = 18
Course 7	2	A	09	2 × 09 = 18
Course 8	2	D	06	2 × 06 = 12
Total	25	--	--	174
Thus, **SGPA= 174/25 = 6.96**				

Illustration No.2				
Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point = (Credit × Grade)**
Course 1	4	B	08	4 × 08 = 32
Course 2	4	D	06	4 × 06 = 24
Course 3	4	C	07	4 × 07 = 28
Course 4	3	S	10	3 × 10 = 30
Course 5	3	F	00	3 × 00 = 00
Course 6	3	D	06	3 × 06 = 18
Course 7	2	A	09	2 × 09 = 18
Course 8	2	D	06	2 × 06 = 12
Total	25	--	--	162
Thus, SGPA= 162/25 = 6.48				

If a Student secures letter grade C during reappearance then the SGPA is Calculated as shown below.

Illustration No. 2(a)

Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point = (Credit × Grade)**
Course 5	3	C	07	3 × 07 = 21
Total Credit Points = Credit Points of first Attempt + Credit Points of subsequent attempt =162 + 21 = 183				
Total credits of the semester = 25				
Thus, **SGPA= 183/25=7.32**				

Illustration No.3

Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point = (Credit × Grade)**
Course 1	4	B	08	4 × 08 = 32
Course 2	4	D	06	4 × 06 = 24
Course 3	4	C	07	4 × 07 = 28
Course 4	3	S	10	3 × 10 = 30
Course 5	3	A	09	3 × 09 = 27
Course 6	3	D	06	3 × 06 = 18
Course 7	2	A	09	2 × 09 = 18
Course 8	2	D	06	2 × 06 = 12
Total	25	--	--	189
Thus, **SGPA= 189/25 = 7.56**				

$$CGPA\,(\text{for illustrations 2 \& 3}) = \frac{25 \times 7.32 + 25 \times 7.56}{50} = 7.44$$

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Credits of the semester	24	24	27	27	24	24	24	26
SGPA	7.00	8.50	9.20	6.86	8.18	7.73	8.68	9.40

Thus CGPA

$$= \frac{24 \times 7.00 + 24 \times 8.50 + 27 \times 9.20 + 27 \times 6.86 + 24 \times 8.18 + 24 \times 7.73 + 24 \times 8.68 + 26 \times 9.40}{200} = 8.2$$

	Grade Card: Based on the secured letter grades, grade points, SGPA and CGPA, a grade card for each semester and a consolidated grade card indicating the performance in all semesters shall be issued.
22BE 7.0	Conversions of Grades into Percentage and Declaration of Class
22BE 7.1	Conversion formula for the conversion of CGPA into Percentage is given below: Percentage of marks secured, P = [CGPA Earned – 0.75] × 10 **Illustration for a CGPA of 8.20:** P = [8.2 – 0.75] × 10 = 74.5%
22BE 7.2	**Class Declaration:** After the conversion of final CGPA into percentage of marks (P), a graduating student is declared to have passed in (i) First Class with Distinction (FCD) if P ≥ 70% (ii) First Class (FC) if P ≥ 60% but <70% and (iii) Second Class (SC) if P < 60%.
22BE 8.0	**Continuous Internal Evaluation**
22BE 8.1	For each theory and practical paper, the CIE marks shall be 50. For Technical Seminar, the CIE marks shall be 50. For Internship/ Professional Practice, the CIE marks shall be 50. For Project Phase –I and Project Seminar and Project phase –II, the CIE shall be 100 respectively.
22BE 8.2	In case of theory, the CIE marks in each theory course shall be the sum of marks prescribed for test and assignment. Marks prescribed for test shall be 40 and that for assignment is 10. The CIE marks for test in a theory course shall be based on three tests generally conducted at the end of **fifth, tenth and fourteenth** week of each semester. Each test shall be conducted for a maximum of 40 marks and the final marks shall be the average of two best tests among the three tests. The remaining 10 marks shall be awarded based on the evaluation of Assignments/ Unit tests/written quizzes that support to cover some of the course/programme outcomes. Final CIE marks awarded shall be the sum of these two out of maximum of 50 marks. For English – I, English – II, Constitution of India, Environmental Studies and other audit courses CIE is conducted for 50 marks. The candidates shall write the Internal Assessment Tests and Assignments/Unit- Tests/ written quizzes in Blue Books which shall be preserved by the Principal / Head of the Department for at least two years after the announcement of University results and shall be made available for verification.

22BE 8.3	In the case of a Practical, the CIE marks shall be based on the laboratory records(40 marks on continuous evaluation based on conduct of experiment, viva and report writing) and one practical test (10 Marks) to be conducted at the end of the semester.
22BE 8.4	(i) The CIE marks for I Year Computer Aided Engineering / Drawing: a) 40 marks for class work (sketching and Computer Aided Engineering Drawing). b) 10 marks for test conducted in the same pattern as that of SEE. (ii) The CIE marks for other Drawings/ Design Drawings offered by various branches shall be based on the evaluation of the sheets and one test in the ratio 40:10. (iii) The CIE marks awarded for field work (like surveying Practice) shall be based on the evaluation of the associated field work and one test in the ratio 40:10.
22BE 8.5	The CIE marks in the case of projects and seminars in the final year shall be based on the evaluation at the end of VIII Semester by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the project / seminar guide.
22BE 8.6	i) Minimum CIE marks for all theory courses shall be 40% of the maximum marks prescribed for continuous internal evaluation. ii) Minimum requirement of CIE marks for Practical / Mini-Project / Internship / Technical Seminar / Project work Phase 2 shall be 50% of the maximum marks. iii) Minimum requirement of CIE marks for Technical Seminar shall be 40% of the maximum marks. iv) Minimum CIE marks for Project work Phase 1 shall be 50% of the maximum marks v) Minimum CIE marks for Additional Mathematics shall be 40% of the maximum marks prescribed for Continuous Internal Evaluation.
22BE 8.7	i) Students failing to secure the minimum percentage of CIE marks of any course/s shall not be eligible for the SEE conducted by the university and they shall be considered as fail in that course/s. However they can appear for University Examinations conducted in other courses of the same semester and backlog course/s if any. ii) Students who satisfied the attendance requirement but not the CIE requirements are permitted to register afresh and appear for SEE after satisfying CIE requirements in same course/s (with or

	without satisfying the attendance requirement) when offered during subsequent semester/s. iii) If any student fails to secure a minimum of 40% of the maximum CIE marks in seminar / fails to deliver the seminar, he/she shall be considered as failed in that course and shall not be eligible for the award of degree. However, the student shall become eligible for the award of degree after satisfying the requirements prescribed for seminar during the subsequent semester/s.
22BE 8.8	CIE marks of those students, who come under 22BE8.7, shall be sent separately to the Registrar (Evaluation).
22BE 8.9	If a student remains absent for all the CIE tests conducted, the CIE Marks shall be marked as AB for the courses against the Register Number of the student in the marks sheet submitted to the University by the Principal of the College.
22BE 8.10	Improvement of CIE marks shall not be allowed in: a. Theory Courses where the student has already secured the minimum required marks. b. Laboratory / Workshop / Seminar / Internship / Project where the student has already secured the minimum required marks.
22BE 8.11	The final list, incorporating corrections (if any) of CIE marks awarded to the students in the Theory/Practical/Internship/Project work/ Seminar, shall be displayed on the notice board of the college before the closure of the semester and a certified copy of the same shall be sent by the Principal to the University Examination Section within the stipulated date. Every page of the CIE marks sheet shall bear the signatures of the concerned Teacher/Teachers, Head of the Department and Principal.
22BE 8.12	Any corrections or overwriting of CIE marks shall bear the signature(s) of concerned Teacher(s) and in such cases the Head of the Department shall indicate the number of corrections on every sheet and attest it with his/her signature.
22BE 8.13	CIE marks shall reach the University before the commencement of examination as per the notification issued from the office of the Registrar (Evaluation) from time to time. After the submission of CIE marks to the University, any request under any circumstances for change of CIE marks may be considered with a valid reason.
22BE 9.0	Eligibility for Passing and Award of Degree (To be read along with 22BE4.2, 5.1,5.2, 8.6 and8.7)

22BE 9.1	a) For a pass in a theory Course/Drawing, the student shall secure minimum of 35% of the maximum marks prescribed in the University examination and in total 40% of the maximum marks (i.e., prescribed for SEE and CIE) including the CIE marks secured by the student. b) The minimum passing letter grade in a course is 'E'. c) For a pass in a Practical/Internship/Project (Mini & Main) /Viva-voce examination, a Student shall secure a minimum of 40% of the maximum marks prescribed for the University Examination. The minimum passing grade in a course is 'E'.
22BE 9.2	1) A student who obtain any grade from 'S' to 'E' shall be considered as passed. 2) If a student secures 'F' grade in any of the head of passing (22BE 4.2, 22BE 5.1, 22BE 5.2 and 22BE 11.2), he/she has to reappear in that head in the Make-up Examination and further if 'F' is secured, then he/she has to reappear for the SEE. 3) A student will be declared successful at the end of programme, when he/she has none of the courses remaining with 'F' grade and shall have CGPA of greater than or equal to 5.00.
	4) In case, the CGPA falls below 5.00 at the end of the programme, the student shall be permitted to appear again for SEE in full or part of the previous semester courses by rejecting the performance for required number of course/s (other than seminar, project and practical) and times, subject to the provision of 22BE 1.5, to make up CGPA equal to or greater than 5.0. The student should reject the SEE results of the previous attempt and obtain written permission from the Registrar (Evaluation) to reappear in the subsequent SEE.
22BE 9.3	The student who do not satisfy the provision 22BE 9.2 (1) and the student who remain absent for the University examinations shall be deemed to have failed in that course/s. He/she has to reappear for the University examination in the subsequent examinations. The CIE marks awarded to the student at first attempt in the concerned theory Course/s will be carried forward. Revised CIE marks are considered only in cases under the provisions of 22BE8.7.
22BE 9.4	Student who passes a course of a semester as per 22BE 9.1 and has earned CGPA equal to or greater than 5.00 shall not be allowed to appear for any individual Course/s again, unless they opt for rejection of results of entire semester as per 22BE 9.5.

22BE 9.5	A student may, at his/her desire, reject the total performance of a semester (including CIE marks) or reject only the result of his/her performance in SEE of a semester. The rejection is permitted only once during the entire programme of study.
22BE 9.6	The student who desires to reject the results of a semester shall reject performance in all the courses of the semester, irrespective of whether the student has passed or failed in any course. However, the rejection of performance of VIII Semester project shall not be permitted.
22BE 9.7	A student, who desires to reject the total performance of a semester including CIE marks, has to take readmission for that semester. Application for approval of readmission shall be sent to the Registrar through the Principal of College within 30 days from the date of the announcement of the results. Readmission to first semester in such cases shall not be considered as fresh admission and therefore the student will continue to have the same Register Number, which was allotted earlier. The Course duration (as per 22BE 1.5) will be counted with reference to old Register Number.
22BE 9.8	The student, who rejects only the results of University examination of a semester, shall be permitted to reappear for University examinations of all the Courses of that semester in the subsequent examinations. However, the CIE marks obtained by the student in the rejected semester shall be retained. Applications for rejection and approval to reappear for University examination shall be sent to the Registrar (Evaluation) through the Principal of the College within 30 days from the date of announcement of the results. If the rejection of results of University examination is of odd semester, the student shall be allowed to take admission to the immediate next even semester. However, if the rejection of results of University examination is of even semester, then the student shall not be allowed to take admission to the next odd semester (as per 22BE 11.2).
22BE 9.9	Students who opt for rejection of results of University examinations are eligible for the award of class and distinction, but are not eligible for the award of ranks.
22BE 9.10	A student shall be declared to have completed the programme of BE degree, provided the student has undergone the stipulated Course work as per the Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 22BE1.6, having CGPA ≥ 5 with none of the registered courses remaining with 'F' grade.

22BE 9.11	Student who find it too difficult to pass a course can drop the course/s after CIE-1 the total number of credits registered even after dropping a course/s shall be at least 20. i) A specific period shall be fixed for dropping courses in a given Semester after the announcement of CIE-I result based on the recommendations of the Mentor in consultation with the course teacher. The same shall be recommended by the concerned Head of the Department. Dropping of courses/s shall not appear in the Grade Card. ii) If core course/s are dropped, such course/s are to be reregistered whenever the course/s are offered. However, if the dropped course/s are electives, then students have an option to reregister either for the same or an equivalent course/s later, depending on the availability of course/s with the consent of the Mentor and approval from the concerned Head of the Department.
22BE 9.12	i) A student shall be permitted to withdraw temporarily from the programme on grounds like, prolonged illness, calamity in the family or any other serious happening. The withdrawal shall be for periods which are integral multiples of a Semester provided:
	a) The student shall present the facts to the college within 6 weeks from the date; he/she has last attended the classes stating fully the reasons for such a withdrawal, together with supporting documents and endorsement of his/her parent or guardian. Further, the Principal has to forward to the University and get the approval. b) The student shall not have any dues to the College. ii) A student availing temporary withdrawal from the programme of study under above provision shall be required to pay such fees and/or charges as may be fixed by the University at the time of reporting to the College to continue the programme. The fees/charges once paid shall not be refunded. iii) A student shall be entitled to avail the temporary withdrawal facility only once during his/her studentship of the programme at the University. The withdrawal period shall be such that the candidate can complete the programme requirement (166 credits for students admitted in I Year and 126 credits for Lateral entry students) within the time limits specified by the University. However, any other permissible concession requested by the concerned student shall have to be at the discretion of the Registrar.
22BE 10.0	**Attendance Requirement**

22BE 10.1	Courses of each semester shall be treated as a separate unit for calculation of the attendance. The candidate has to put in a minimum attendance of 75% in each course with a provision to condone 10% of the attendance by the Dean on the specific recommendations of the Head of the Department where the student is studying, based on medical grounds, participation in University/State/ National/ International level sports and cultural activities, seminars, workshops, paper presentation, etc., of significant value. The supporting documents for condoning the shortage of attendanceare to be submitted along with the specific recommendations.
22BE 10.2	a) The basis for calculation of attendance shall be the period prescribed by the university by its calendar events. b) For course/s having lecture and tutorial hours, attendance shall be with respect to 75% of attendance in lecture hour and 75% of attendance in tutorial hours. If the attendance requirement is not satisfied in any one of them, the candidate shall be considered as not satisfied the attendance condition. Condonation of 10% shall be applied separately to lecture and tutorial hour to make up the deficiency in attendance. Faculties shall also maintain the attendance of students of lecture and tutorial hours separately in the same register or in separate registers. c) In case of late admission, approved by competent authori- ty (ACU), to I Semester/III semester / III semester (lateral entry scheme) of Engineering programme, the attendance shall be reckoned from the date of admission to the programme.
22BE 10.3	The Course Instructor/ Mentor/College shall inform the students as well as their parents about the attendance status periodically. Students who are facing the shortage of Attendance be mentored to make up the shortage.
22BE 10.4	A candidate, who does not satisfy the attendance requirement (in one or more courses) as mentioned in 22BE10.1 shall not be eligible to appear for the SEE & Make up examinations of that semester and shall not be permitted to take admission to next higher semester. The candidate shall be required to repeat that semester during the subsequent year.
22BE 10.5	The detained list shall be sent to Registrar (Evaluation) one week prior to the commencement of the examination. The detained students should obtain permission from Principal, for readmission to the semester concerned as a repeater.

22BE 11.0	**Vertical Progression (Promotion / Eligibility to higher Semesters)**
22BE 11.1	There shall be no restriction for promotion from an odd semester to the next even Semester provided the student has fulfilled the attendance requirement.
22BE 11.2	A student shall be declared failed if the candidate i) Fail to satisfy the condition 22BE 9.1. ii) Absent himself / herself to the university examinations. iii) Is held guilty of examination malpractice and for any other reasons and declared the performance of any course/s null and void by a competent authority. iv) Has not satisfied the CIE requirements of any credit course/s v) Has not registered for the SEE even after satisfying the attendance and CIE requirements.
22BE 11.3	A) Vertical Progression in case of students admitted to I Year. a) A student with CGPA ≥ 5 at the end of first academic year and having no 'F' grade or having any number of 'F' grades in the two semesters of I Year of the program shall be eligible to move to II Year. i) A student with CGPA ≥ 5 at the end of second academic year and having any number of 'F' grades in the four semesters of I & II Year of the program shall be eligible to move to III Year. ii) A student with CGPA ≥ 5 at the end of third academic year and has earned all the prescribed credits of I Year and having any number of 'F' grades in the four semesters of II & III Year of the program shall be eligible to move to IV Year. b) A student shall also be eligible for the first time, with a warning to move higher odd semester if he/she has failed to secure a minimum CGPA = 5 at the end of any academic year. c) For the award of degree a CGPA ≥ 5 at the end of program shall be mandatory. B) Vertical progression in case of students admitted to II Year (Lateral entry) a) A student with CGPA ≥ 5 at the end of second academic year and having no 'F' grade or having any number of 'F' in the two semesters of II Year of the program shall be eligible to move to III Year. i) A student with CGPA ≥ 5 at the end of third academic year and having no 'F' grade or having any number of 'F' grades in the four semesters of II & III Year of the program shall be eligible to move to IV Year.

22BE 11.3	b) A student shall also be eligible for the first time, with a warning to move higher odd semester if he/she has failed to secure a minimum CGPA = 5 at the end of any academic year. The mandatory non-credit courses Additional Mathematics prescribed at II Year, to lateral entry diploma holders admitted to third Semester of BE programs, shall compulsorily be registered during the respective Semesters to complete all the formalities of the course and appear for the CIE. For the award of degree a CGPA ≥ 5 at the end of program shall be mandatory. C) Vertical Progression in case B.Sc. students admitted to II Year (Lateral Entry)
22BE 11.3 (continued)	a) A student with CGPA ≥ 5 at the end of second academic year and having no 'F' grade or having any number of 'F' grades in the two semesters of II Year of the program shall be eligible to move to III Year. i) A student with CGPA ≥ 5 at the end of third academic year and having no 'F' grade or having any number of 'F' grades in the four semesters of II & III Year of the program shall be eligible to move to IV Year. b) A student shall also be eligible for the first time, with a warning to move higher odd semester if he/she has failed to secure a minimum CGPA = 5 at the end of any academic year. Lateral entrant students from B.Sc. stream shall clear the non-credit courses Computer Aided Engineering Drawing and Elements of Civil Engineering & Mechanics of the I Year Engineering Program. These courses shall not be considered for vertical progression from II Year to III Year. These courses shall be completed before eighth Semester. c) For the award of degree a CGPA ≥ 5 at the end of program shall be mandatory.
22BE 11.4	1) Noncompliance of CGPA ≥ 5 at the end of an academic year. i) In case the CGPA falls below 5 at the end of an academic year for the second time during the subsequent academic year the student shall not be permitted for the next higher odd Semester. ii) In case of 22BE 11.4 (1) (i), the students are permitted to appear again for SEE in full or part of the corresponding previous course/s by rejecting the performance of them (other than internship, technical seminar, project (mini & main) and laboratories) for any number of times subject to the provision of 22BE 1.5 to make up the CGPA equal to or greater than 5 for enrolment to next higher odd semester or for the award of degree.

	iii) The student should reject the SEE result of the previous attempt and obtain written permission from the Registrar (Evaluation) to reappear in the subsequent SEE. 2) Noncompliance of Mini Project: a) The mini project shall be considered as a head of passing and shall be considered for the award of degree, those who do not take up/complete the mini project shall be declared as failed and shall have to complete the same during subsequent university examination after satisfying the mini project requirement, also mini project shall be considered for eligibility to VII Semester. 3. Noncompliance of Internship: a) All the students admitted to III year of BE shall have to undergo mandatory internship of four weeks during the vacation of VI and VII semesters and/or VII and VIII Semester. A university examination shall be conducted during VIII Semester and the prescribed credits shall be included with the credits of VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those who do not take up / complete the internship shall be declared as fail and shall have to complete the same during subsequent University Examination after satisfying the internship requirement.
22BE 12.0	**Award of Prizes, Medals and Ranks**
22BE 12.1	For the award of Prizes and Medals, the conditions stipulated by the donor shall be considered subject to the provisions of the statutes framed by the University for such awards.
22BE 12.2	1) For award of rank in a specialization of Bachelor of Engineering, the CGPA secured by the students from III to VIII Semesters is considered. 2) A student shall be eligible for a rank at the time of award of degree of Bachelor of Engineering, provided the student, a)(i) Has passed I to VIII Semester in all the credit courses in first attempt only in case of candidates admitted I Year. (ii) Has passed III to VIII Semester in all the credit courses in first attempt only in case of candidates admitted under lateral entry scheme. (iii) Has completed all the prescribed Audit/Mandatory Courses. b) Is not a repeater in any semester because of rejection of result of a semester/ shortage of attendance etc. c) Has completed all the semesters without any break/discontinuity. d) Has completed all the semesters (I to VIII/III to VIII) in ACU constituent college only.

22BE 12.2	e) Has not been transferred from any other University. 3) The total number of ranks awarded shall be in the ratio of 10% of the total candidates for each course and up to a maximum of 10 ranks only in a discipline.
22BE 12.3	Ranks are awarded based on the merit of the students as determined CGPA. If two or more students get the same CGPA, the tie shall be resolved by considering the number of times a student has obtained higher SGPA. If it is not resolved even at this stage, the number of times a student has obtained higher grades like S, A, B etc., shall be taken into account to decide the order of the rank.
22BE 13.0	**Transfers of Students**
22BE 13.1	Transfer of students from one college to another college affiliated to other universities, within Karnataka State shall be permitted only at the beginning of third, fifth, and seventh semesters, subject to availability of seats within the permitted intake in the College and subject to the prior approval of the University. Further, the students must have passed in all the Courses of I and II Semesters for admission to III semester and all the Courses of I to IV Semesters for admission to V Semester and all the Courses of I to VI Semesters for admission to VII semester. The students seeking admission shall have to, i) Apply for establishment of equivalence with prescribed fees as notified by the ACU and obtain No Objection Certificate (NOC) for admission from the University before commencement of term as notified by ACU. ii) Produce NOC for admission from both the colleges before commencement of term as notified by ACU. iii) Complete additional Course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of Engineering, Technology & Management, on establishing equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criterion prescribed for promotion, class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of Degree.

22BE 13.2	Transfer of students within the college from one branch to another branch at the start of III Semester shall be permitted with the approval of the Registrar, ACU subject to the Provisions made by the Government of Karnataka and AICTE on this behalf. Guidelines for change of branch are: i) Branch change at the college level shall be carried out by the Principal of the college. ii) Facility of branch change at the II Year (III Semester) level shall be available only to meritorious students and shall not to be considered as a matter of right. iii) Branch change is permitted at II Year (III Semester) only. iv) For the purpose of branch change, the "prescribed intake" shall be the intake prescribed by AICTE for the previous academic session when the students were admitted at I Semester level. Subsequent variations in intake shall have no bearings on the students eligible for branch change. v) Branch change is permitted, if strength in any Branch is not falling below 40% of the prescribed intake. vi) Branch change can be made against clear vacancy in a particular branch vacancy (V) being defined as: $V = I - (Reg. + Rep.)$ Where I = The prescribed Intake for the branch. Reg. = No. of regular students who become eligible to be promoted to III Semester. Rep. = No. of students from previous batches who become eligible to join III Semester (along with regular students). vii) Branch change shall be strictly according to the Merit list prepared by the college on the basis of total marks obtained by a student in I Year University Examinations. viii) Change of branch should be completed within 30 days of announcement of I& II Semester (I Year) results. ix) Consolidated list showing the branch change as per above guidelines be sent to the University.
22BE 13.3	The University may prescribe fee for administrative purpose, which shall be notified from time to time, for transfer from one discipline to another discipline (change of branch within the College).
22BE 14.0	**Applicability and Power to Modify**
22BE 14.1	The regulations governing the Degree of Bachelor of Engineering of Adichunchanagiri University shall be a binding on all concerned.

22BE 14.2	i) Notwithstanding anything contained in the foregoing, the University shall have the power to issue directions/ orders to address any difficulty. ii) Nothing in the foregoing may be construed as limiting the power of the University to amend, modify or repeal any or all of the above.
22BE 15	**Convocation Ceremony**
22BE 15.1	There shall be an annual Convocation Ceremony in the University for the award of the Degree subject to if he/she has: i) Fulfilled Degree requirements in terms of earned credits (166 or 126 in case of lateral entry). ii) Satisfactorily completed mandatory courses. iii) Normal practice and disciplinary action pending against the student.

Program Outcomes as defined by NBA (PO)

Engineering Graduates will be able to:

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

BGS Institute of Technology
Scheme for First Semester B.E (Physics Cycle)

Sl. No	Course Code	Title of the Course	Teaching Department	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	22MAT11	Engineering Mathematics – I	Mathematics	3	2	0	5	3	50	50	100	4
2	22PHY12	Applied Physics	BS	3	1	0	4	3	50	50	100	3
3	22CIV13	Civil Engineering & Mechanics	CV	2	2	0	4	3	50	50	100	3
4	22ELE14	Basics of Electrical Engineering	ECE	3	0	0	3	3	50	50	100	3
5	22CED15	Computer Aided Engineering Drawing	ME	2	0	2	4	3	50	50	100	3
6	22PHYL16	Applied Physics Lab	BS	0	0	2	2	3	50	50	100	1
7	22ELEL17	Basic Electrical Engineering Lab	ECE	0	0	2	2	3	50	50	100	1
8	22AEC18	Communicative English-I	HRD	1	0	0	1	1	50	50	100	1
9	22 BIO19	Biology for Engineers	Humanities	0	--	2	2	2	50	50	100	1
									450	450	900	
TOTAL CREDITS& CONTACT HOURS							**31**					**20**
TOTAL CREDITS OF I SEMESTER							**31**					**20**

Scheme for First Semester B.E (Chemistry Cycle)

Sl. No	Course Code	Title of the Course	Teaching Department	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	22MAT11	Engineering Mathematics – I	Mathematics	3	2	0	5	3	50	50	100	4
2	22CHE12	Applied Chemistry	BS	3	1	0	4	3	50	50	100	3
3	22 PCL13	Programming in C Language	CSE	3	1	0	4	3	50	50	100	3
4	22ELN14	Basic Electronics	ECE	3	0	0	3	3	50	50	100	3
5	22 EME15	Elements of Mechanical Engineering	ME	2	2	0	4	3	50	50	100	3
6	22CHEL16	Applied Chemistry Lab	BS	0	0	2	2	3	50	50	100	1
7	22CPL17	Computer Programming Laboratory	CSE	0	1	2	3	3	50	50	100	1
8	22AEC18	Communicative English-I	HRD	1	0	0	1	1	50	50	100	1
9	22 DS19	Data Science	CSE	0	--	2	2	1	50	50	100	1
									450	450	900	
TOTAL CREDITS& CONTACT HOURS							**31**					**20**
TOTAL CREDITS OF I SEMESTER												**20**

SEE for Data Science and Biology for Engineers is conducted with one internal from Parent Department and one from other Department.

1. Course Information

Section	Details
Course Title	Engineering Mathematics -I
Course Code	**22MAT-11**
Program	Common to all branches
Academic Year/Semester	2025-2026 / 1st Semester
Course Type	☐ Core ☐ Elective ☐ Lab ☐✓ **Integrated**
Prerequisite (If any)	Algebra,Trignometry and Elementry Caluclus
Contact Hours per Week	Lecture: 3 Tutorial: 2 Practical: 0 Total: 5
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces students to the fundamental concepts of differential and integral calculus, differential equations, and elementary linear algebra. Emphasis is placed on developing problem-solving skills and applying mathematical tools to science and engineering contexts. By the end of the course, students will be able to analyze and solve mathematical problems effectively, laying a strong foundation for advanced studies and practical applications in their respective disciplines.

2. Course Objectives

This course (**22MAT-11**) will enable students to expert the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	**Apply** calculus techniques to **solve** problems involving polar curves and compute the curvature of a function.	3	PO1, PO2, PO5, PO12
CO2	**Apply** the principles of partial differentiation to calculate the rate of change of multivariate functions, and **solve** problems involving composite functions using the chain rule and the Jacobian matrix.	3	PO1, PO2, PO5, PO12
CO3	**Apply** the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes	4	PO1, PO2, PO5, PO12

CO4	**Identify** the type of first-order ODEs (e.g., separable, linear, exact) and **apply** the appropriate analytical method to find their general and particular solutions.	3	PO1, PO2, PO5, PO12
CO5	**Apply** matrix theory to **solve** systems of linear equations and **compute** eigenvalues and eigenvectors to perform matrix diagonalization.	3	PO1, PO2, PO5, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Differential Calculus-1:** Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof).	**10**	**CO1**
II	**Differential Calculus-2:** Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms- L-Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Jacobians-Simple problems.	**10**	**CO2**
III	**Integral Calculus:** Review of elementary integral calculus. **Multiple integrals:** Evaluation of double and triple integrals. Evaluation of double integrals- change of order of integration. Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems.	**10**	**CO3**
IV	**Ordinary differential equations (ODE's)of first order:** Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's- Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equation only.	**10**	**CO4**
V	**Elementary Linear Algebra:** Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method. Eigen values and eigen vectors- Rayleigh's power method. Diagonalization of a square matrix of order two.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions.

Practical	Title of Experiment / Activity
1	2D plots for Cartesian and polar curves.
2	Finding angle between polar curves, curvature, and radius of curvature of a given curve.
3	Finding partial derivatives and Jacobian.
4	Taylor's Series Expansion and L'Hospital's Rule.
5	Evaluation of improper integrals, Beta and Gamma functions.
6	Solution of first-order ordinary differential equation and plotting the solution curves.
7	Solution of differential equation of oscillations of spring with various load.
8	Numerical solution of system of linear equations, test for consistency and graphical representation of the solution.
9	Solution of system of linear equations using Gauss-Seidel iteration.
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B. S. Grewal	Higher Engineering Mathematics	Khanna Publishers, 45th Edition,2023.
2	E. Kreyszing	Advanced Engineering Mathematics	John Wiley & Sons, 10th Edition (Reprint),2020.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	N. P. Bali and Manish Goyal	A Textbook of Engineering Mathematics	Laxmi Publications 12th Edition, 2020.
2	B.V. Ramana	Higher Engineering Mathematics	McGraw-Hill ,1st Edition, 2017.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test	20
Practical Components	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Mrs. Chaithra S M**	**Name** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Applied Physics
Course Code	22PHY12/22
Program	For all Program
Academic Year/Semester	2025/ 1st / 2nd Semester
Course Type	☐ √ Core ☐ Elective ☐ Lab
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total: 3
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides fundamental insights into modern physics and its applications in engineering. It covers quantum mechanics concepts including blackbody radiation, wave-particle duality, uncertainty principle, and free electron theory. The study of oscillations, damping, resonance, and shock waves builds understanding of wave phenomena. Properties of engineering materials such as elasticity, bending, and torsion are explored. The course introduces laser principles, optical fiber communication, and applications in defence, medicine, and data storage.

2. Course Objectives

1. To recognize the importance and learn basic concepts of physics for engineering applications.
2. To identify the importance of quantum mechanics, lasers, optical fibers for advances in technology.
3. To understand the theoretical models used for the study of physical properties of various materials.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Distinguish between phase and group velocities and apply the quantum theory to understand the electrical conductivity of metals.	2	PO1, PO2
CO2	Discuss the various types of oscillations and their implications; the role of Shock waves in various fields.	2	PO1, PO2
CO3	Recognize the elastic properties of materials for engineering applications.	3	PO1, PO2, PO3
CO4	Analyze suitability of lasers and optical fibers for engineering applications.	4	PO1, PO2
CO5	Compute the carrier concentration in metals and semiconductors.	3	PO1, PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Quantum theory of radiation:** Black body radiation, Planck's law of radiation (Qualitative). Wave-Particle duality, De-Broglie Wavelength Hypothesis, De-Broglie wavelength for electron. Heisenberg's uncertainty principle and its illustration. Application: Non-existence of electrons in the nucleus. **Quantum Free electron theory of metals:** Quantum free electron theory – Assumptions, Fermi Dirac Statistics (qualitative), Fermi level, Fermi energy, Fermi velocity and Fermi factor. Variation of Fermi factor with Energy and temperature, Mention of Expression for density of states. Derive the expression for Fermi energy at absolute zero kelvin. Numerical Problems.	**08**	**CO1**
II	**Oscillations:** Definition of SHM, Derivation of differential equation for SHM, Mechanical simple harmonic oscillators (mass suspended to spring oscillator). Equation of motion for free oscillations, Natural frequency of oscillations. Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance. **Shock waves**: Types of waves, Mach number, Properties of Shock waves, control volume. Construction and working of Reddy shock tube, applications of shock waves. Numerical problems.	**08**	**CO2**
III	**Elasticity:** Basics of elasticity, Hooke's law, Types of elastic moduli, Poisson's ratio. Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (η) in terms of α and β. Relation between Y, η and K. **Bending of Beams:** Neutral surface and Neutral plane, Derivation of expression for bending moment of a beam with circular and rectangular cross section. Single cantilever derivation of expression for Young's modulus. **Torsion of cylinder**: Expression for couple per unit twist of a solid cylinder, Torsional pendulum-Expression for period of oscillation.	**08**	**CO3**
IV	**Lasers**: Interaction of radiation with matter – Induced Absorption – Spontaneous Emission and Stimulated Emission. Expression for energy density of radiation in terms of Einstein's coefficients at thermal equilibrium. Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO_2. Applications of Lasers in defence & medical field. **Optical fibers:** Propagation mechanism, Angle of acceptance and Numerical aperture – their relationship with refractive indices of core and clad. Condition for propagation. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and mention of expression for attenuation coefficient, Discussion of block diagram of point to point communication system. Applications of optical fibers in communication and data storage. Numerical problems.	**08**	**CO4**

V	**Semiconductors:** Classification of Semiconductors, Fermi level in intrinsic and extrinsic semiconductors. Expression for electron concentration in conduction band and Mention the expression for hole concentration in valance band of an intrinsic semiconductor. Expression for conductivity and resistivity of an intrinsic semiconductor in terms of mobility of charge carriers. **Dielectric Materials:** Electric dipole, dipole moment, Dielectric constant, polarization of dielectric materials and types of polarization. Internal field in solids. Expression for Clausius-Mossotti equation. Numerical problems.	**08**	**CO5**

5. CO–PO Mapping Matrix

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

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	R.K. Gaur & S.L. Gupta	Engineering Physics	Dhanpat Rai & Sons, 2024 Edition
2	S.P. Basavaraju	Engineering Physics	Subhas Stores Publications 2018 Edition

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	Halliday, Resnick & Walker	Fundamentals of Physics	John Wiley & Sons 2021 Edition
2	A.S. Vasudeva	Modern Engineering Physics	S. Chand, 9th Edition 2022

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
Semester End Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Dr. Shankara S R**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Civil Engineering and Mechanics
Course Code	22CIV-13/23
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 1st / 2nd Semester
Course Type	☐√ Core ☐ Elective ☐ Lab
Prerequisite (If any)	NIL
Contact Hours per Week	Lecture: 2 Tutorial: 2 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces students to the scope and diverse fields of Civil Engineering, highlighting its role in infrastructural development and societal progress. It provides foundational knowledge of basic civil engineering concepts while emphasizing their practical importance. The course develops students' analytical skills in solving problems related to forces and moments, along with their engineering applications. In addition, students will gain the ability to determine centroids and moments of inertia of various sections and understand their significance in structural analysis and design.

2. Course Objectives

1. To make students to learn scope of various fields of Civil Engineering, basics of civil engineering concepts and importance of infrastructural development.
2. To develop a student's ability to analyse the problems involving Forces and Moments with their applications.
3. To develop a student's ability to find the Centroid and Moment of inertia and their application

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Mention the applications of various fields of civil engineering	2	PO1, PO2, PO3, PO6 PO12
CO2	Compute the resultant of given force system subjected to various loads	3	PO1, PO2, PO3, PO6 PO12
CO3	Compute the reactions developed in trusses	4	PO1, PO2, PO3, PO6 PO12

CO4	Comprehend the action of forces, moments and other loads on system of rigid bodies and compute the reactive forces that develop as a result of the external loads	4	PO1, PO2, PO3, PO12
CO5	Locate the centroid and compute the moment of inertia of regular and build up sections.	3	PO1, PO2, PO3, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering. Role of Civil Engineers in infrastructural development, Effect of the infrastructural facilities on socio-economic development of a country. Classification of Roads, Dams and Bridges	**10**	**CO1**
II	Basic concepts of idealization, particle, continuum and rigid body; force; system of forces; Basic principles – physical independence of forces, Superposition, Transmissibility, Newton‘s law of motion, Resolution and Composition of forces, Law of parallelogram of forces, Polygonal law, Resultant of Concurrent coplanar force system, moment and couple of forces	**10**	**CO2**
III	Analysis of non-Concurrent force system Coplanar on concurrent force system, moment of forces, couple, Varignon‘s theorem, Resultant of Coplanar non concurrent force system. Analysis of Trusses: types of trusses, analysis of truss by method of joints.	**10**	**CO3**
IV	Equilibrium of Forces: Free body diagrams, Lami‘s theorem, Equations of Equilibrium, Equilibrium of concurrent and non-concurrent coplanar force systems. Support Reactions: Types of Loads and Supports, statically determinate and indeterminate beams, Support reaction in beams. Numerical problems on support reactions for statically determinate beams (Point load, uniformly distributed and uniformly varying loads and Moments).	**10**	**CO4**
V	Centroid & Moment of Inertia: Centroid of simple figures from first principle, centroid of composite/built-up sections; moment of inertia: Introduction, second moment of area of plane sections from first principles, Parallel and perpendicular axes theorems, Radius of gyrations, Moment of inertia of composite area and built-up sections. Concept of product of inertia (No Problems).	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R. C. Hibbeler	Engineering Mechanics: Principles of Statics and Dynamics	Pearson/Prentice Hall-2022 Edition.
2	R. K. Bansal	A Textbook of Engineering Mechanics	Laxmi Publications – 2016 Edition.
3.	Andy Ruina; Rudra Pratap	Introduction to Statics and Dynamics	Oxford University Press (preprint) 2015
4	K. Vijaya Kumar Reddy; J. Suresh Kumar	Singer's Engineering Mechanics: Statics and Dynamics	BSP Books (BS Publications) 2024 Edition.
5.	F. P. Beer; E. R. Johnston Jr.	Mechanics for Engineers: Statics and Dynamics	McGraw-Hill-2024 Edition.
6.	Irving H. Shames	Engineering Mechanics (Statics & Dynamics)	Prentice-Hall-2005 Edition.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	F. P. Beer & E. R. Johnston	Vector Mechanics for Engineers, Vol. I: Statics; Vol. II: Dynamics	Tata McGraw Hill 2024 Edition.
2	Andy Ruina & Rudra Pratap	Introduction to Statics and Dynamics	Oxford University Press 2024 Edition.
3	K. Vijay Kumar Reddy & K. Suresh Kumar	Singer's Engineering Mechanics	Pearson / McGraw Hill 2024 Edition.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Dr. Mahalingegowda H R**	**Name:** **Dr. Shruthi R**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Associate Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Basic Electrical Engineering**
Course Code	**22ELE-14/24**
Program	Electronics & Communication Engineering
Academic Year/Semester	2025-26 / 1st / 2nd Semester
Course Type	✓Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge about fundamental concepts of electricity and circuit analysis.
Contact Hours per Week	Lecture: **3** Tutorial: 0 Practical: 0 Total:3
Credits	**3**
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Basic Electrical Engineering introduces the fundamental principles of electrical engineering, providing a strong foundation for all engineering disciplines. It covers the basic laws of electricity, circuit analysis, electrical machines, and power systems. And to analyze DC and AC circuits, understand the operation of transformers, motors, and generators, and gain knowledge of electrical safety and practical applications.

2. Course Objectives

1. To explain Ohm's law and Kirchhoff's laws used for the analysis of DC circuits.
2. To explain fundamentals of AC circuits and the behaviour of R, L and C and their combinations in AC circuits.
3. To discuss three phase balanced circuits.
4. To explain principle of operation, construction and performance of electrical machines such as single-phase transformer, DC machines, synchronous generator and three phase induction motor.
5. To introduce concepts of electrical wiring, circuit protecting devices and earthing.

3. Course Outcomes (COs)

COs	Course Outcome	BTL	POs Mapped
CO1	Explain DC circuits and AC fundamental concepts.	2	PO1, PO2, PO3, PO4 PO12
CO2	Analyze single phase AC circuits with R, L, C and behaviour of three phase AC circuits.	3	PO1, PO2, PO3, PO4 PO12
CO3	Explain the working of single-phase transformer and concepts of electrical wiring circuit protecting devices and earthing.	2	PO1, PO2, PO3, PO4, PO12

CO4	Discuss the principle of operation and construction of DC Machines.	2	PO1, PO2, PO3, PO4, PO12
CO5	Describe the principle of operation and construction of AC Synchronous generators and three phase induction motors	2	PO1, PO2, PO3, PO4, PO12

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	**D.C. Circuits**: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources, Power and Energy. **A.C. Fundamentals**: Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.	**8**	**CO1**
II	**Single Phase Circuits**: Analysis with phasor diagram of circuits with R, L, C, RL, RC, RLC for series configurations, Real power, reactive power, apparent power and power factor. **Three Phase circuits:** Advantages of 3-phase power Circuits, Generation of 3-phase power, Three-phase balanced circuits, voltage and current relations in star and delta connections, Measurement of three phase power using two wattmeter method.	**8**	**CO2**
III	**FUNDAMENTALS OF ELECTROMAGNETISM:** Concepts of Magneto motive force, Reluctance, Flux and flux density, Concept of self-Inductance and mutual Inductance, Coefficient of coupling (only elementary treatment and Simple numerical problems). **TRANSFORMERS:** Principle of operation of single-phase transformer, Constructional features, EMF equation (simple numerical problems).	**8**	**CO3**
IV	**DC Generators**: Principle of operation, Construction of D.C. Generators. Expression for induced emf, Types of D.C. Generators, Relation between induced emf and terminal voltage. **DC motors**: Principle of operation, Back emf, Torque equation, Types of dc motors, Characteristics of dc motors (shunt and series motors only) and Applications.	**8**	**CO4**
V	**Three Phase Synchronous Generators**: Principle of operation, Constructional details, Synchronous speed, Frequency of generated voltage, emf equation, Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors). **Three Phase Induction Motors**: Principle of operation, Generation of rotating magnetic field, Construction and Working of three-phase induction motor, Slip and its significance, Necessity of starter, star-delta starter.	**8**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	D C Kulshreshtha	Basic Electrical Engineering	Tata McGraw-Hill, 2nd Edition, 2019.
2	V.K. Mehta, Rohit Mehta	Principles of Electrical Engineering & Electronics	S. Chand & Company Ltd, 3rd Edition, 2014.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B. L. Theraja	Fundamentals of Electrical Engineering and Electronic	S. Chand & Company Ltd, 2022 Edition.
2	D. P. Kothari and I. J. Nagrath	Basic Electrical Engineering	Tata McGraw Hill, 4th Edition, 2019.
3	E. Hughes	Electrical Technology	Pearson Higher Education, 12th Edition, 2016.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mrs. Srividya C N	Name: Dr. Naveen K B	Name: Dr. M Shankar	Name: Dr. Shobha B N
Designation: Assistant Professor	Designation: Professor and Head	Designation: Director IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	Computer Aided Engineering Drawing
Course Code	22CAED15/25
Program	Mechanical Engineering
Academic Year/Semester	2025-2026/ 1st / 2nd Semester
Course Type	☐✓ **Core** ☐ Elective ☐ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 2 Tutorial: 0 Practical: 3 Total: 5
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Computer Aided Engineering Drawing is a foundational course designed to equip students with the principles and practices of technical drawing using modern CAD tool viz., Solid Edge. It integrates traditional engineering graphics with digital drafting techniques, enabling precise and standardized representation of mechanical components, assemblies, and systems.

2. Course Objectives

The basis of this course is to afford the knowledge of drafting skills, elevating conceptualization and practicality of the students

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apprehend the basics of engineering graphics and use of computer tools to create simple geometrical entities.	3	PO1, PO2, PO5, PO12
CO2	Ascertain the location of the object with respect to the planes of projection and draw its Orthographic views.	3	PO1, PO2, PO5, PO12
CO3	Draw the development and isometric projection of regular solids.	3	PO1, PO2, PO5, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction to Computer Aided Sketching:** Standard tool bar / menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering. (Demonstration only) **Orthographic Projections:** Definitions - Planes of projection, reference line and conventions employed. Projections of points in all the four quadrants. Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes.	**08**	**CO1**
II	**Projection of Planes:** Projection of planes such as triangle, square, rectangle, pentagon, hexagon and circle resting on HP in different positions by change of position method only.	**08**	
III	**Projection of Solids:** Projection of solids such as cube, prism, pyramid, cylinder, cone and tetrahedron (No problems on freely suspended prisms).	**10**	**CO2**
IV	**Development of Surfaces:** Development of lateral surfaces of solids- Different prisms and pyramids, cylinder and cone.	**08**	**CO3**
V	**Isometric Projection**: Introduction to isometric scale, isometric projection of cube, prisms, pyramids, cones, spheres, cut spheres, frustums of cones and pyramids in simple positions, combination of solids (Maximum of two solids). **Miscellaneous Applications:** (Lab practice only) Drawing Simple Mechanisms: Bicycles, two-wheeler cart, four-wheeler, fan and Furniture. Electronics Engineering Drawings- Simple electrical and electronic circuits. Sports: Drawing of different tool kits used.	**08**	

5. CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**			**2**							**1**
CO2	**3**	**2**			**2**							**1**
CO3	**3**	**2**			**2**							**1**

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	K.R. Gopalakrishna	Engineering Graphics	Subhash Publishers, 32nd Edition, 2005
2	N.D. Bhatt & V.M. Panchal	Engineering Graphics	Charotar Publishing House, 48th Edition, 2005
3	A Primer on Computer Aided Engineering Drawing - Solution Book prepared by ACU.		

7. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	S. Trymbaka Murthy	Computer Aided Engineering Drawing	I K International Publishing House Pvt. Ltd., 3rd Edition.
2	M. H. Annaiah, B. Sudheer Prem Kumar & C. N. Chandrappa	Computer Aided Engineering Drawing	New Age International (P) Ltd., 2016.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Assignments/Printouts	40
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Dr. Ranganatha swamy L**	**Name:** **Dr. Manjunath S H**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Applied Physics Lab
Course Code	22PHYL16/26
Program	For all Program
Academic Year/Semester	2025/ 1st / 2nd Semester
Course Type	☐ Core ☐ Elective ☐√ Lab
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 1 Total: 2
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This laboratory course provides hands-on experience in applied physics through experiments related to mechanics, optics, electronics, and material science. Students will determine fundamental constants such as spring constant, Young's modulus, rigidity modulus, dielectric constant, Fermi energy, and energy gap of semiconductors. The course also covers practical applications of lasers, optical fibers, resonance circuits, Zener diodes, and photodiodes, reinforcing theoretical concepts and enhancing experimental skills essential for engineering applications.

2. Course Objectives

1. To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations.
2. Design simple circuits and hence study the characteristics of semiconductor devices.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Recall the concepts of interference of light, diffraction of light, Fermi energy.	1	PO1, PO2, PO9
CO2	Demonstrate the principles of operations of optical fibers and semiconductor devices such as photodiode, and NPN transistor using simple circuits.	3	PO1, PO2, PO9
CO3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures.	3	PO1, PO2, PO9
CO4	Recognize the resonance concept and its practical applications.	2	PO1, PO2, PO9
CO5	Explain the importance of proper measurement procedures, honest data recording, accurate data representation, and reproducibility of final results.	2	PO1, PO2, PO9

4. Course Content (Expt-Wise)

No.	Topics	Hours	COs
1	Spring Constant - Determination of spring constant and verification of series and parallel combination of springs.	02	CO3
2	Single Cantilever - Determination of the Young's modulus of the given material.	02	CO3
3	Torsional Pendulum - Determination of rigidity modulus & momentum of inertia of the given material.	02	CO3
4	Laser Diffraction – Determination of Wavelength of semiconductor laser using Laser diffraction.	02	CO1
5	Optical Fiber – Determination of acceptance angle and numerical aperture of an optical fiber.	02	CO2
6	Fermi Energy - Determination of the Fermi energy of a given metal.	02	CO1
7	LCR Series and Parallel Resonance - Study the frequency response of series and parallel resonance circuit & Determination of self-inductance of a given coil.	02	CO4
8	Photodiode - Study of Photodiode characteristics.	02	CO2
9	Dielectric Constant - Determination of the dielectric constant of a material by charging and discharging method of a capacitor.	02	CO5
10	Black Body Radiator- Verify the Stefan's law of radiation.	02	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	Dr. S. L. Kakani, C. Hemrajani	Applied Physics Lab. Manual	Viva Books Pvt. Ltd. 1st Edition, 2022
2	Sesha Sai Kumar Vemula	Engineering Physics Lab. Manual	LAP Lambert Academic, 1st Edition 2017

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	H. Sathyaseelan	Laboratory Manual in Applied Physics	New Age International 5th Edition, 2020
2	Dr. Hussain Jeevakhan	Applied Physics Lab	Khanna Publishers, 1st Edition 2021

8. Assessment Scheme

Component	Weightage (%)
Observation, Writeup & Punctuality	10
Conduction of Experiment and Output	10
Viva-Voce	10
Record Write Up	10
Internal Test	10
Semester End Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: **Dr. Shankara S R**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Professor**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

ACU - OBE STANDARD SYLLABUS

1. Course Information

Section	Details
Course Title	**Basic Electrical Engineering Lab.**
Course Code	**22ELEL-17/27**
Program	Electronics and Communication Engineering
Academic Year/Semester	2022-23/ 1st / 2nd Semester
Course Type	☐ Core ☐ Elective ☐✓ Lab
Prerequisite (If any)	Basic knowledge about safety, equipment usage, and basic circuit concepts.
Contact Hours per Week	Lecture: 0 Tutorial: 0 Practical: **2** Total: 2
Credits	**1**
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	A Basic Electrical Lab course is designed to provide hands-on experience and practical application of the fundamental principles learned in a basic electrical engineering theory course. The main objective is to help students verify theoretical concepts through experimentation, familiarize themselves with common electrical equipment, and develop essential circuit building and measurement skills.

2. Course Objectives

1. To provide exposure to common electrical components such as Resistors, capacitors and inductors, types of wires and measuring instruments.
2. To measure power and power factor measurement of different types of lamps and three phase circuits.
3. To explain measurement of impedance for R-L and R-C circuits.
4. To determine power consumed in a 3 phase load.
5. To explain methods of controlling a lamp from different places.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply the knowledge of KVL and KCL and three phase loads to verify the relationship between line and phase quantities in star and delta connected loads and measurement of three phase power.	3	PO1,PO2,PO3,PO9,PO12
CO2	Computing the ripple factor and efficiency of half wave and full wave rectifier and computing the impedance of a choke coil.	3	PO1,PO2,PO3,PO9,PO12

CO3	Experiment of two way and three way controlling of lamp and identifying the power consumption and determining the power factor of different lamps.	3	PO1,PO2,PO3,PO9,PO12
CO4	Examining the effects of open and short circuit in simple circuits and earth resistance.	3	PO1,PO2,PO3,PO9,PO12
CO5	Design Inverting, Non Inverting amplifier and voltage follower using Op-Amp.	3	PO1,PO2,PO3,PO9,PO12

4. Course Content

Experiments	Topics	Hours	COs
1	Verification of KCL and KVL for DC circuits.	3	CO1
2	Measurement of current, power and power factor of incandescent lamp, fluorescent lamp, and LED lamp.	3	CO4
3	Measurement of resistance and inductance of a choke coil using 3 voltmeter method.	3	CO2
4	Determination of phase and line quantities in three phase star and delta connected loads.	3	CO1
5	Measurement of three phase power using two wattmeter methods.	3	CO1
6	Two way and three way control of lamp and formation of truth table.	3	CO4
7	Measurement of Earth Resistance.	3	CO5
8	Study of effect of open and short circuit in simple circuits.	3	CO5
9	Half Wave and Full Wave Rectifier.	3	CO2
10	Design of inverting, non-inverting and voltage follower using Op-amp.	3	CO6
DEMONSTRATION EXPERIMENTS			
1	Demonstration of fuse, MCB by creating a fault.	1	
2	Demonstration of cut-out sections of electrical machines (DC machines, Induction machines and synchronous machines).	1	
3	Understanding ac and dc supply, use of tester and test lamp to ascertain the healthy status of mains.	1	

5. CO–PO Mapping Matrix

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1						1			1
CO2	2	2	1						1			1
CO3	2	2	1						1			1
CO4	2	2	1						2			1
CO5	2	2	1						1			1
CO6	2	2	1						1			1

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	D C Kulshreshtha	Basic Electrical Engineering	Tata McGraw-Hill, 2nd Edition, 2019.
2	V.K. Mehta, Rohit Mehta	Principles of Electrical Engineering & Electronics	S. Chand & Company Ltd, 3rd Edition.2014.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B. L. Theraja	Fundamentals of Electrical Engineering and Electronic	S. Chand & Company Ltd, 2022 Edition .
2	D. P. Kothari and I. J. Nagrath	Basic Electrical Engineering	4th Edition, Tata McGraw Hill, 2019.
3	E. Hughes	Electrical Technology	12th Edition, Pearson Higher Education, 2016.

8. Assessment Scheme

Component	Weightage (%)
Observation, Write up and Punctuality	10
Conduction of Experiment and output	10
Viva Voce	10
Record write up	10
Internal Assessment Test	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Mr. Sandeep S V**	**Name:** **Dr. Naveen K B**	**Name:** **Dr. M Shankar**	**Name:** **Dr. B N Shobha**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Communicative English-I
Course Code	**22AEC-18**
Program	Basic Science
Academic Year/Semester	2025-2026 / 1st Semester
Course Type	☐ √**Core** ☐ Elective ☐ Lab
Prerequisite (If any)	-
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 0 Total:1
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Communicative English-1 is an essential paper in Engineering Courses that ensures the communicative skills in English. This course provides a strong communicative basis by emphasizing on LSRW skills. It focusses language competency of students for their profession.

2. Course Objectives

The course will enable the students,

- To know about Fundamentals of Communicative English and Communication Skills in general.
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better communication skills.
- To impart Basic English grammar and essentials of important language skills.
- To enhance English vocabulary and language proficiency for better communication skills.
- To learn about Techniques of Information Transfer through presentation.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply the Fundamentals of Communication Skills in their communication skills.	2	PO1, PO2, PO10, PO12
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.	4	PO1, PO2, PO10, PO12
CO3	To impart Basic English grammar and essentials of language skills as per present requirement.	2	PO1, PO2, PO10, PO12

CO4	Use all types of English vocabulary and language proficiency.	2	PO1, PO2, PO10, PO12
CO5	Adopt the Techniques of Information Transfer through presentation.	3	PO1, PO2, PO10, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Orientation and activity:** **Mentoring**-Group discussion about Our Constitution like justice, liberty, equality, fraternity, human dignity and the unity and integrity of the Nation. **Creative Arts and Culture**-Students should be Exposed to culture and art forms like painting, sculpture, Pottery, music, dance etc., **Literary Activity**-Reading a book/article, writing its summary debate and enacting a play etc., Lectures by Eminent People-alumni, socially active, in profession. **Visits to Local Area**-visit to a monument like Adichunchanagiri temple, Central Library, Shravanabelagola, AIMS hospital and Industry visits. Picnic and trip etc.	**10**	**CO1**
II	**Introduction to Phonetics:** Introduction, Phonetic Transcription, English Pronunciation, Pronunciation Guidelines Related to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, Syllables and Structure, Word Accent and Stress Shift, Rules for Word Accent, Intonation–purposes of intonation, Spelling Rules and Words of ten Misspell Exercises point Common Errors in Pronunciation.	**10**	**CO2**
III	**Basic English Communicative Grammar and Vocabulary PART – I:** Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Conjunctions, Articles and Preposition. Preposition, kinds of Preposition and Prepositions often confused. Articles: Use of Articles–Indefinite and Definite Articles, Pronunciation of 'The', words ending 'age', some plural forms. Introduction to Vocabulary, All Types of Vocabulary –Exercises nit.	**10**	**CO3**
IV	**Basic English Communicative Grammar and Vocabulary PART - II:** Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exception sin Question Tags and Exercises, One Word Substitutes and Exercises. Strong and Weak forms of words, Words formation-Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations. Word Pairs (Minimal Pairs)–Exercises, Tense and Types of tenses, The Sequence of Tenses (Rule sinuses of Tense) and Exercises in it.	**10**	**CO4**

V	**Communication Skills for Employment:** Information Transfer: Oral Presentation- Examples and Practice. Extempore /Public Speaking, Difference between Extempore / Public Speaking, Communication Guidelines for Practice. Mother Tongue Influence (MTI) –South Indian Speakers, Various Techniques for Neutralization of Mother Tongue Influence–Exercises. Reading and Listening Comprehensions Exercises.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Text Books

SL. No.	Author(s)	Title	Publisher & Year
1	Philip Carr	Introduction to Phonetics and Phonology	Penguin Publication, 2020, 1st Edition
2	Raymond	Essential English Grammar, A self-study reference and practice book	Cambridge University Press, 5th Edition, 2021

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	Raymond Murphy	Essential English Grammar	Cambridge University Press, 5th Edition2021
2	Wren and Martin	English Grammar and Composition	S Chand Publication-2022

7. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

8. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **D. Vidyashankari**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director and Head**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Biology for Engineers**
Course Code	**22BIO-19/29**
Program	For all Program
Academic Year/Semester	2025-2026/ I Semester
Course Type	☐✓ Core ☐Elective ☐ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 0 Total: 16
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamental principles of biology with an emphasis on their relevance to engineering applications. It begins by highlighting the importance of biological knowledge for engineers, addressing real-world examples such as the Shinkansen sonic boom and the biological basis of human wellness. Students will explore the concept of life, its origin, evolution, and the cellular foundation of living systems.

2. Course Objectives

1. Introduce the fundamental concepts of biology and highlight their relevance to engineering and technology.
2. Explain the molecular basis of life through the study of cells and the four fundamental biomolecules—lipids, carbohydrates, proteins, and nucleic acids.
3. Provide an understanding of cellular processes such as DNA replication, transcription, translation, and cell division.
4. Enable students to connect biological principles with real-world engineering applications in areas such as bioreactors, bioenergy, biomaterials, and medical sciences.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	**Explain** the importance of biology for engineers and its role in addressing technological and societal challenges.	2	PO1, PO2
CO2	**Describe** the origin of life, cell structure, and the functional role of fundamental biomolecules.	2	PO2
CO3	**Analyze** cellular processes such as DNA replication, transcription, translation, and energy generation.	4	PO1

CO4	Apply the concepts of enzyme kinetics, bioenergy, and bioreactor design to solve engineering-related problems.	3	PO1, PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Why Should Engineers Know Biology** Introduction, Need for Biology, Shinkansen Sonic Boom, For Our Wellness—We are All Biological Entities, Learning Biology is, Fundamentally Not Different, From Learning Mathematics. Life-Its Origin and Evolution on Earth: Introduction, why are the Surgical Instruments Sterilized Before Use? What is Life? Cell—The Fundamental Functional Unit of Life, Cells in the Human Body, The Scientific View on the, Origin of Life on Earth, what is Evolution?	4	**CO1**
II	**The Fundamental Molecules of Life—1:** Introduction, Bioreactors, Shear in Bioreactors and its Effect on Productivity, What Gets Affected by Shear in Cells? A Typical Eukaryotic Cell Contains Many Parts Tightly Packed Inside it, What Constitutes the Cell (Plasma) Membrane, Microscopically Speaking? Molecules that Comprise the Cell (Plasma) Membrane, Cell Membrane Functions, Lipids—One of the Four Fundamental Biomolecules, Lipids—The Human Angle. **The Fundamental Molecules of Life—2:** Introduction, how is Curd/Yogurt Made at Home? Why Does Milk Turn into Curd? What is the Source of the Acid? Carbohydrates—The Second of the four Fundamental, Biomolecules, Action at a Molecular Level, Water and its Biological, Casein and Curd Formation, Significance of Carbohydrates in the Human Body, Bioenergy.	3	**CO2**
III	**The Fundamental Molecules of Life—3:** Introduction, Casein is a Protein, Amino Acids and Their Polymers, Structure of Proteins—The Third, Structure—Function Relationship and Significance, Role of Proteins in the Cell and its Membrane, Role of Proteins in the Human Body, Enzymes are Mostly Proteins, Enzymes Used in the Industry, Quantification of Enzyme, Activity and Kinetics of the Four Fundamental Biomolecules. **The Fundamental Molecules of Life—4:** Introduction, How Does the Cell Get the Energy Needed for its Various Processes? Nucleic Acids—The Fourth of the Four Fundamental Biomolecules, Phosphorylation of ADP to ATP, Substrate Level Phosphorylation, Electron Transport Phosphorylation, Where do Phosphorylation's Take Place in a Cell? Polymers of Nucleotides—DNA, RNA Structural Aspects of DNA and RNA, Where and in What Formas DNA Present in the Cell?	3	**CO3**

IV	**DNA Replication:** Introduction, Separation of Strands, Replication Bubble, and Forks Priming, Addition of New Monomers (DNA Elongation) and Directionality Leading and Lagging Strands and Okazaki Fragments, Problem at the Ends of, Non-Circular DNA Proofreading and Repair of DNA Cell Replication and Its Quantification: Introduction, DNA Replication in a Cell- Part of the Cell Cycle, Steps in a Cell Cycle, Why Should Cells Replicate? Quantification of Cell Division, Chromosomes in the Cell, All Cells Undergo Mitosis, Germ Cells Undergo Both Mitosis and Meiosis.	**3**	**CO4**
V	**How are Proteins Made in the Cell:** Transcription and Translation: Introduction, The Central Dogma, Overview—Transcription and Translation Processes, The Genetic Code, Transcription—Initiation, Elongation, and Termination, Initiation, Elongation, Termination, Modifications to the Eukaryotic, Pre-MRNA, Cut-Paste, Translation— Initiation, Elongation, and Termination, Initiation, Elongation of the Polypeptide Chain, Termination, Post-Translational Modifications, Protein Targeting, Mutations and Their Outcomes, Mutation—The Molecular Mechanism of Evolution and, the Core of Genetic Engineering. **Mendelian Genetics as a Useful Tool:** Introduction, Common Genetic Disorders in India, Common Genetic Disorders, Across the World, Mendelian Genetics—The First Approximation Tool to Predict Genetic Disorders in the Offspring, Essentials of Mendelian Genetics, Probabilities of Occurrence in Mendelian Genetics, Pedigree Analysis, Sex-Linked Inheritance, Non-Mendelian Inheritance	**3**	**CO4**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	G K Suraishkumar	Biology for Engineers	Oxford University Press. 2021 Edition
2	K. A. N. Kumar	Biology for Engineers	McGraw Hill Education, 1st Edition, 2019.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1.	Nelson D. L. & Cox M. M.	Lehninger Principles of Biochemistry,	*Lehninger Principles of Biochemistry*,

8. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Conduction of Experiments, Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Mr. Gangadharagowda P H**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Engineering Mathematics -I
Course Code	**22MAT-11**
Program	Common to all branches
Academic Year/Semester	2025-2026 / 1st Semester
Course Type	☐ Core ☐ Elective ☐ Lab ☐✓ **Integrated**
Prerequisite (If any)	Algebra,Trignometry and Elementry Caluclus
Contact Hours per Week	Lecture: 3 Tutorial: 2 Practical: 0 Total: 5
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces students to the fundamental concepts of differential and integral calculus, differential equations, and elementary linear algebra. Emphasis is placed on developing problem-solving skills and applying mathematical tools to science and engineering contexts. By the end of the course, students will be able to analyze and solve mathematical problems effectively, laying a strong foundation for advanced studies and practical applications in their respective disciplines.

2. Course Objectives

This course (**22MAT-11**) will enable students to expert the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	**Apply** calculus techniques to **solve** problems involving polar curves and compute the curvature of a function.	3	PO1, PO2, PO5, PO12
CO2	**Apply** the principles of partial differentiation to calculate the rate of change of multivariate functions, and **solve** problems involving composite functions using the chain rule and the Jacobian matrix.	3	PO1, PO2, PO5, PO12
CO3	**Apply** the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes	4	PO1, PO2, PO5, PO12

CO4	**Identify** the type of first-order ODEs (e.g., separable, linear, exact) and **apply** the appropriate analytical method to find their general and particular solutions.	3	PO1, PO2, PO5, PO12
CO5	**Apply** matrix theory to **solve** systems of linear equations and **compute** eigenvalues and eigenvectors to perform matrix diagonalization.	3	PO1, PO2, PO5, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Differential Calculus-1:** Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof).	**10**	**CO1**
II	**Differential Calculus-2:** Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms- L-Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Jacobians-Simple problems.	**10**	**CO2**
III	**Integral Calculus:** Review of elementary integral calculus. **Multiple integrals:** Evaluation of double and triple integrals. Evaluation of double integrals- change of order of integration. Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems.	**10**	**CO3**
IV	**Ordinary differential equations (ODE's)of first order:** Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's- Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equation only.	**10**	**CO4**
V	**Elementary Linear Algebra:** Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method. Eigen values and eigen vectors- Rayleigh's power method. Diagonalization of a square matrix of order two.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions.

Practical	Title of Experiment / Activity
1	2D plots for Cartesian and polar curves.
2	Finding angle between polar curves, curvature, and radius of curvature of a given curve.
3	Finding partial derivatives and Jacobian.
4	Taylor's Series Expansion and L'Hospital's Rule.
5	Evaluation of improper integrals, Beta and Gamma functions.
6	Solution of first-order ordinary differential equation and plotting the solution curves.
7	Solution of differential equation of oscillations of spring with various load.
8	Numerical solution of system of linear equations, test for consistency and graphical representation of the solution.
9	Solution of system of linear equations using Gauss-Seidel iteration.
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B. S. Grewal	Higher Engineering Mathematics	Khanna Publishers, 45th Edition,2023.
2	E. Kreyszing	Advanced Engineering Mathematics	John Wiley & Sons, 10th Edition (Reprint),2020.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	N. P. Bali and Manish Goyal	A Textbook of Engineering Mathematics	Laxmi Publications 12th Edition, 2020.
2	B.V. Ramana	Higher Engineering Mathematics	McGraw-Hill ,1st Edition, 2017.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test	20
Practical Components	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Mrs. Chaithra S M**	**Name** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Applied Chemistry**
Course Code	**22CHE-12/22**
Program	For all Program
Academic Year/Semester	2025/ 1st / 2nd Semester
Course Type	☐✓ **Core** ☐Elective ☐ Lab
Prerequisite (If any)	Include the basic knowledge of chemistry and some related areas that help them understand applications in engineering.
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total: 3
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Aug 2024
Course Description	This course provides an overview of electrochemistry, batteries, fuel cells, corrosion, and corrosion control techniques. It encompasses chemical fuels, solar energy systems, green chemistry principles, and water treatment methods. The course further introduces polymers, biodegradable materials, and nanomaterials, emphasizing their synthesis, properties, and engineering applications. Overall, it provides knowledge of modern materials, energy sources, and green technologies relevant to engineering applications.

2. Course Objectives

1. Master the basic knowledge of engineering chemistry for building technical competence in industries, research, and development.
2. Impart the basic knowledge of chemistry and its principles involved in electrochemistry, Battery technology and its applications.
3. Identifying and analyzing engineering problems related to metallic corrosion, achieving practical solutions for corrosion control and surface modifications of materials for engineering applications.
4. Apply the knowledge of Green Chemistry, principles for production of chemical compounds.
5. Master the knowledge of synthesis, properties, and utilization of engineering materials like polymers & Nano materials.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the concept of fuel cells and their significance in modern energy systems.	2	PO1, PO2
CO2	Apply their knowledge for protection of different metals from corrosion.	3	PO1, PO2
CO3	Use the theoretical knowledge on fuels like petrol and diesel and its drawbacks in engines.	2	PO1, PO2
CO4	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.	3	PO1, PO2, PO7, PO8
CO5	Use knowledge of polymer degradation to suggest applications where biodegradable polymers would be more suitable than metals or plastics.	2	PO1, PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Electrochemistry:** Introduction, Derivation of Nernst equation for single Electrode potential, Reference electrodes; Introduction, construction, working and applications of calomel electrode and Ag/Agcl electrodes. Ion selective electrode-Definition, construction and principle of glass electrode and determination of pH using glass electrode. Electrolyte concentration cells-definition, derivation of equation to find the emf of concentration cells, numerical problems on concentration cell. **Battery technology:** Introduction, characteristics, classification-primary, secondary, and reserve batteries. Construction, working and application of Zinc-Air, Ni-MH and Li-ion batteries. Fuel cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol oxygen fuel cell with H_2SO_4 electrolyte.	**10**	**CO1**
II	**Corrosion:** Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: anodic and cathodic areas, nature of corrosion product, nature of medium-pH, conductivity and temperature. Types of corrosion – Differential metal and differential aeriation-pitting and waterline) and stress (Caustic embrittlement in boilers). Corrosion control: Anodizing-Anodizing of aluminium and phosphating, cathodic protection-sacrificial anode and impressed current methods, Metal Coatings-Galvanization and Tinning. **Metal finishing:** Introduction, Technological importance of metal finishing. Factors governing electroplating-Polarization, Decomposition	10	**CO2**

	potential and Over voltage. Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electroless plating: Introduction, distinction between electroplating and electroless plating processes. Electroless plating of copper.		
III	**Chemical Fuels:** Introduction, Classification, definitions of CV, LCV and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine- definition, mechanism, ill effects and prevention. Octane and cetane number. Leaded petrol, unleaded petrol, Power alcohol and biodiesel. **Solar energy:** Photovoltaic cells-introduction, construction and working of a typical PV cell, Preparation of solar grade silicon by Union Carbide process/Method. Advantages & disadvantages of PV cell.	10	**CO3**
IV	**Green Chemistry:** Introduction, definition, Major environmental pollutants-Oxides of Nitrogen, Sulphur and Carbon (Source, effect and control), Basic principles of green chemistry-brief discussion on 12 principles of green chemistry. Various green chemical approaches-Microwave synthesis, Bio catalysed reaction (only explanation with examples), Solvent-free reactions advantages and conditions Synthesis of typical organic compounds by conventional and green route; i) Adipic acid ii) Paracetamol. Industrial applications of green chemistry. **Water chemistry:** Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Sources of water pollution, Definitions of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. **Sewage treatment:** primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.	10	**CO4**
V	**Engineering Materials** **Polymer:** Introduction, types of polymerization-addition and condensation polymers. Mechanism of polymerization-free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average Numerical problems, Synthesis and applications of Polyurethanes. Synthesis, properties and applications of Epoxy resin and Silicon rubber. **Biodegradable polymers:** Introduction and their requirements. Synthesis, properties and applications of Poly lactic acid. **Nanomaterials:** Introduction, size dependent properties (Surface area, Electrical, Optical, catalytic and Thermal properties) Synthesis of nanomaterials: Top down and bottom-up approaches, Synthesis by Sol-gel, and precipitation method, Nanoscale materials: Fullerenes, Carbon nanotubes and graphene- brief Explanation, properties, and applications.	10	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	P.C. Jain & Monica Jain	Engineering chemistry	Dhanpat Rai Publishing company, (2015- Edition).
2	Subhendu Chakroborty, Susheel Mittal & Somaditya Sen	Engineering Chemistry	Cengage India 1st Edition 2022

7. Reference Books

SL. No.	Author (s)	Title	Publisher & Year
1	O. G. Palanna	Engineering Chemistry	McGraw Hill, 2nd Edition, 2017
2	Prasanta Rath & Sanjay Kumar Singh	Engineering Chemistry	Cengage Learning India 1st Edition 2022

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

8. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Gangadharagowda P H**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shoba B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean & Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Programming in C Language**
Course Code	**22PCL13/23**
Program	Computer Science and Engineering
Academic Year/Semester	2025-26/1st / 2nd Semester
Course Type	☐ ✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total:3
Credits	03
W.e.f	2022-23
Approved in AC on	23.01.2025
Course Description	A "Programming in C" course typically introduces students to the fundamentals of computer programming using the C language. The course aims to provide a strong foundation in programming concepts and problem-solving techniques.

2. Course Objectives

1. To learn basic principles of Problem solving
2. Implementing through C programming language.
3. Design & develop programming skills.

3. Course Outcomes (COs)

Students should be able to

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Discuss and explore the fundamental Computer concepts and identify basic elements of c programming structures like data types expressions.	2	PO1,PO2,PO3, PO10,PO12
CO2	Identify basic elements of C programming structures like control statements, various simple functions and in view of using them in problem solving.	2	PO1,PO2,PO3, PO10,PO12
CO3	Apply various operations on derived data types like arrays and strings.	3	PO1,PO2,PO3, PO10,PO12
CO4	Apply various operations of functions and structure in problem solving.	3	PO1,PO2,PO3, PO10,PO12
CO5	Apply various operations of pointer and file handling.	3	PO1,PO2,PO3,PO10,PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Introduction to computing, Constants, variables, Data types, operators and expressions, Input and output operations. **Decision making & Branching:** Introduction, Decision making with if statement, simple if statement, the if-else statement, nesting of if-else statement, the else-if ladder, the switch statement, ternary operator? Goto statement, Programming examples and exercises.	**10**	**CO1**
II	**Looping:** Introduction, the while statement, the do statement, the for statement, break and continue, Programming examples and Exercises. **Textbook 1: Chapter 7** **Arrays:** Introduction, One-dimensional array, Declaration of One-Dimensional arrays, Initialization of one- dimensional arrays programming examples (Linear search, binary search, bubble sort, selection sort), Two-dimensional arrays, Initialization of two-dimensional arrays, programming examples (Addition of two matrices, multiplication of two matrix)	**10**	**CO2**
III	**Strings:** Introduction, Declaring and Initializing string variables, Reading and writing strings, String handling functions, String input and output functions, Array of strings. **Textbook 1: Chapter 9** **Functions**: Introduction, need for user-defined functions, elements of user defined function, Definition of functions, parameter passing mechanisms: Call by value and call by reference, Category of functions, nesting of functions. Passing arrays to functions.	**10**	**CO3**
IV	**Preprocessors:** Introduction to Preprocessors, macro substitution, file inclusion, compiler control Directives, Programming examples and Exercises. **Textbook 1: Chapter 15** **Structures:** Introduction, defining a structure, declaring a structure, accessing a structure member, structure initialization, copying and comparing structure variables, Array of structures, arrays within structures, structure within structures. **Unions:** Union definition, declaration.	**10**	**CO4**
V	**Pointers:** Introduction to pointers, pointers and arrays, pointers and strings, pointer and structure, Allocating Memory at Runtime. **File Management:** Introduction, Defining and opening a File, Closing a File, Input/output operations on Files, Error Handling during I/O Operations, Random Access to Files.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)-

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	E. Balagurusamy	Programming in ANSI C	McGraw-Hill, 8th edition 2014.
2	Vikas Gupta	Computer Concepts and C Programming	Dreamtech Press 2014
3	Yashavant kanetkar	Understanding Pointer in C	McGraw-Hill, 5th Edition 2019

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language	PHI, 2nd Edition, 2012
2	R S Bichkar	Programming with C	University Press, 1st Edition, 2012
3	V Rajaraman	Computer Programming in C	PHI, 2nd Edition 2019.
4	Byron GottFried & Schaum's	Outlines Programming with C	McGraw-Hill, 2nd Edition, 2013

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
Semester End Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr.Prasanna Kumar M J	**Name: Dr. Shashikala S V**	**Name: Dr. M Shankar**	**Name: Dr. Shobha B N**
Designation: Assistant Professor	**Designation: Professor and HoD**	**Designation: Director IQAC**	**Designation: Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Basic Electronics**
Course Code	**22ELN-14/24**
Program	Electronics & Communication Engineering
Academic Year/Semester	2025-26/ 1st and 2nd Semester
Course Type	☐✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	The student is expected to have a basic understanding of Physics (semiconductors, electricity, and magnetism) and fundamental Electrical Engineering concepts such as Ohm's law, Kirchhoff's laws, and AC/DC circuit analysis.
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical:0 Total: 3
Credits	**3**
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamentals of semiconductor devices, diodes, transistors, and operational amplifiers. The course covers rectifiers, amplifiers, oscillators, and basic digital circuits with applications in communication and control.

2. Course Objectives

1. Uunderstand characteristics, operation and applications of the diodes, Bipolar Junction Transistors, Field Effect Transistors, SCR and Operational Amplifiers in electronic circuits.
2. Understand different number systems and working of fundamental building block of Digital Circuits.
3. Understand the principle of basic communication system and mobile phones.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the construction, operation and Characteristics of semiconductor diodes.	3	PO1, PO2, PO3, PO12
CO2	Explain the construction, operation and applications of transistor circuits.	3	PO1, PO2, PO3, PO12
CO3	Design op-amp for various applications.	3	PO1, PO2, PO3, PO12
CO4	Apply the knowledge of engineering fundamentals to analyze and design digital circuits.	3	PO1, PO2, PO3, PO12
CO5	Describe the basic principle of operation of communication system and mobile phones.	3	PO1, PO2, PO3, PO12

4. Course Content (Module-Wise)

Unit	Topics	Hours	COs
I	**Semiconductor Devices:** Classification of semiconductors, P-N junction diode: operation and its characteristics, Half wave rectifier: operation, efficiency, Full wave rectifiers: types, operation, efficiency, Zener diode and its characteristics, Zener diode as Voltage regulator.	**8**	**CO1**
II	**Transistors & its Applications:** Bi-polar junction transistor : operation, types (NPN & PNP), CE configurations and characteristics, DC load line and operating point, Biasing techniques, BJT as an amplifier and switch. Field-Effect Transistors: Depletion-Type MOSFET, Enhancement- Type MOSFET. Construction & Characteristic of JFET, Silicon Controlled Rectifier (SCR), Two Transistor Model.	**8**	**CO2**
III	**Oscillators :** Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations). **Operational amplifiers** Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits.	**8**	**CO3**
IV	**Digital fundamentals Number System** Binary, Hexadecimal, Conversion Decimal to binary, Hexadecimal to decimal and vice-versa, Binary addition and subtraction using 1's and 2's complement method, Review of logic gates, NAND as universal gate (as OR, AND & NOT), Boolean Algebra, Demorgan's theorems, Simplification and realization of Boolean expressions using basic gates and NAND gates, Half adder, Full adder and Parallel adder	**8**	**CO4**
V	**Analog Communication System** Block diagram of communication system, Need for modulation, Definition of modulation, Amplitude modulation: Definition and waveform, Expression for AM, Modulation index. Frequency Modulation: Definition and waveform (Qualitative analysis), Modulation index, Comparison of AM and FM, Principle of operation of Mobile Phone, Microwave Communication, Optical fiber communication. **Digital Modulation Schemes:** Advantages of digital communication over Analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques	**8**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Robert L. Boylestad, Louis Nashelsky	Electronic devices and circuit theory	PHI Publication, 11th Edition, 2012.
2	D P Kothari, I J Nagrath	Basic Electronics	McGraw Hill Education, 2nd Edition, 2017.

7. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Thomas L Floyd	Electronic Devices	Pearson Education, 9th Edition, 2012.
2	Sudhakar Samuel	Logic Design	Pearson / Sanguine, 10th Edition, 2007.
3	George Kennedy	Electronic Communication System	TMH, 5th Edition, 2015.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Dr. Prabhavathi K	Name: Dr. Naveen K B	Name: Dr. M Shankar	Name: Dr. Shobha B N
Designation: Assistant Professor	Designation: Professor	Designation: Director, IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	ELEMENTS OF MECHANICAL ENGINEERING
Course Code	**22EME15/25**
Program	Mechanical Engineering
Academic Year/Semester	2025-2026 / 1st / 2nd Semester
Course Type	☐✓ **Core** ☐Elective ☐ Lab
Prerequisite (If any)	Basic Physics and Chemistry Knowledge, General Science Background, Curiosity and Observation
Contact Hours per Week	Lecture: 2 Tutorial: 2 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Aug 2024
Course Description	Elements Of Mechanical Engineering course introduces the fundamental concepts and applications of mechanical engineering. It covers essential topics including energy sources, engineering materials, internal combustion engines, power transmission systems, and emerging technologies such as mechatronics and robotics. The course is designed to build a strong foundation in both conventional and modern mechanical engineering practices and prepare students for multidisciplinary applications in real-world scenarios.

2. Course Objectives

1. Acquire a basic understanding role of Mechanical Engineering in the industry and society.
2. Acquire a basic understanding of energy resources and basic concepts of Hydraulic turbines.
3. Acquire knowledge of various engineering materials and metal joining techniques.
4. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.
5. Acquire essential experience on basic Power transmission systems, robotics and automation.
6. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their Advancement

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Comprehend the basic knowledge of mechanical engineering in energy and its utilization, materials technology, manufacturing techniques, and transmission systems through demonstrations	2	PO1,PO2,PO6,PO7,P012

CO2	Recognize the application of energy sources in Power generation and utilization of Engineering materials in manufacturing	2	PO1,PO2,,PO6,PO7,P012
CO3	Apply the skills in developing simple mechanical elements and processes.	3	PO1,PO2,PO3,PO8,P012

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Energy Sources and Power Plants**: Review of energy sources; Construction and working of Hydel power plant, Solar power plant, Tidal power plant, Wind power plant. **Steam formation and application:** Modes of heat transfer, steam formation, Types of Steam, Stem properties and application, Numerical problems	**08**	**CO1**
II	**Engineering Materials**: Ferrous Metals: Cast iron and its types, Steel: Mild steel and Medium carbon steel. Non-ferrous Metals: Aluminum, Copper and its alloys. Smart materials- Piezoelectric materials, shape memory alloys, semiconductors, and super- insulators. **Metal Joining Processes:** Soldering, Brazing and Welding: Definitions. Classification and methods of soldering, brazing, and welding. Brief description of arc welding, Electrodes used in arc welding Oxy-acetylene welding, types of flames.	**08**	**CO1**
III	**Fundamentals of IC Engines:** Review of Internal Combustion Engines, 2-Strokes and 4-Strokes engines, Components and working principles, Performance parameters. Insight into future mobility technology: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles, Drives and Transmission. Advantages and disadvantages of EVs and Hybrid vehicles. **Refrigeration and Air-Conditioning:** Principle of refrigeration, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapour Compression and Vapour absorption Refrigeration. Working Principles of Air Conditioning, Classification, and Applications of Air Conditioners. Concept and operation of room air conditioning system	**08**	**CO2**
IV	**Power Transmission:** Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Numerical problems on Simple Gear trains Belt Drives: Components of belt drive and concept of velocity ratio; Types of belt drives- Flat- Belt Drive and V-Belt Drive with Application. Simple numerical on Belt drives involving velocity ratios. **Fundamentals of Machine Tools and Operations**: Working Principle of Lathe and Operations: Turning, Facing, Thread Cutting, Taper Turning and Knurling. Working Principle of Drilling Machine and operations: Reaming, Boring, Tapping, Counter Boring, Counter Sinking. Working Principle of Milling and Operations: Plain or slab milling, Face milling, End milling, Slot milling, Angular milling.	**08**	**CO2**

V	**Introduction to Mechatronics**: Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle. **Introduction to Robotics and Automation**: Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection. Automation types, NC machines, CNC machines, 3D Printing.	**08**	**CO3**

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2				1	2					2
CO2	3	2				1	2					2
CO3	3	2	1					1				2

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Demonstration of working models of various energy sources and power plants
2	Identification of engineering materials and demonstration of basic welding methods
3	Dismantling and assembly of a two-stroke/ four-stroke engine
4	Demonstration of lathe machine operations and gear/belt drive mechanisms

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	K. R. Gopala Krishna	Elements of Mechanical Engineering	Subhash publications 2nd 2022
2	Jonathan A. Wickert, Kemper Lewis	An Introduction to Mechanical Engineering	Cengage Learning India, 4th Kdition 2023
3	Appu Kuttan K K	Robotics	I K International Publishing House, 1st 2013

8. Reference Books

S. No.	Author (s)	Title	Publisher & Year
1	S. Trambaka Murthy	Elements of Mechanical Engineering	I K International Publishing House, Revised 3rd Edition 2010
2	H G Kataria, S.M.Bhat	Elements of Mechanical Engineering	Books India Publications, 9th Edition 2017

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Keerthi B L**	**Name:** **Dr. Manjunath S H**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Applied Chemistry Lab
Course Code	**22CHEL-16/26**
Program	For all Program
Academic Year/Semester	2025-2026/ 1st / 2nd semester
Course Type	☐ Core ☐ Elective ☐✓ Lab
Prerequisite (If any)	Fundamental Concepts of Chemistry
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides fundamental insights into modern physics and its applications in engineering. It covers quantum mechanics concepts including blackbody radiation, wave-particle duality, uncertainty principle, and free electron theory. The study of oscillations, damping, resonance, and shock waves builds understanding of wave phenomena. Properties of engineering materials such as elasticity, bending, and torsion are explored. The course introduces laser principles, optical fiber communication, and applications in defence, medicine, and data storage.

2. Course Objectives

1. Quantitative analysis of materials by volumetric and chemical method. 2.Instrumental methods for developing experimental skills in building technical competence.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the basic knowledge for different types of instruments.	2	PO1, PO2
CO2	Carrying different types of titrations for estimation of concentration of the solution.	2	PO1, PO2
CO3	Knowledge on water analysis.	1	PO1, PO2

4. Course Content (Unit-Wise)

Part A: Instrumental Experiments			
No.	**Toipcs**	**Hours**	**COs**
1	Estimation of FAS Potentiometrically using standard $K_2Cr_2O_7$ solution.	02	CO1
2	Estimation of Acids in acid mixture Conductometrically.	02	CO2
3	Determination of Viscosity co-efficient of a given liquid using Ostwald's viscometer.	02	CO1
4	Estimation of copper by Colorimeter.	02	CO2
5	Determination of pKa value of a given weak acid using pH meter.	02	CO1
Part B: Volumetric Experiments			
1	Estimation of Total hardness of water by EDTA complexometric method.	02	CO3
2	Estimation of CaO in cement solution by rapid EDTA method.	02	CO2
3	Determination of percentage of copper in brass using standard sodium thiosulphate solution	02	CO2
4	Determination of COD of industrial waste water.	02	CO1
5	Estimation of percentage of Iron in given haematite ore solution using standard $K_2Cr_2O_7$ solution (External indicator method).	02	CO2

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2	2	3										
CO3	3	2										

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	Vogel's A.I.	A text book of quantitative analysis	Longman Scientific & Technical, 35th edition, 2012.
2	Willard, Merit, Dean and Settle	A text book of Instrumental analysis	Wadsworth Publishing Company, 6th edition 2012.

7. Reference Books

Sr. No.	Author(s)	Title	Publisher & Year
1.	G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I	Vogel's text book of quantitative analysis,	Longman Scientific & Technical. 35th edition, 2012.
2.	Gary D Christian,	Analytical Chemistry	Wiley India, 6th edition, 2015.

8. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Conduction of Experiments, Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: **Mr. Gangadharagowda P H**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Computer Programming Laboratory**
Course Code	**22CPL17/27**
Program	Computer Science and Engineering
Academic Year/Semester	2025-26/1st /2nd Semester
Course Type	☐ Core ☐ Elective ☐ ✓ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total:3
Credits	01
W.e.f	2022-23
Approved in AC on	23.01.2025
Course Description	This laboratory course introduces students to the fundamentals of problem-solving using **C** programming. Implementation is done by using modern IDEs (e.g., Code::Blocks, Turbo C, GCC in Linux, or Visual Studio). It provides hands-on experience in algorithm design, flowcharting, and structured programming techniques. The experiments focus on developing computational thinking, implementing control structures, using data types, arrays, strings, structures, functions, pointers, recursion, and file handling. Students will also practice debugging, code organization, and program documentation.

2. Course Objectives

1. To practice writing flowcharts, algorithms and programs.
2. To implement basics of C programming language.
3. To provide solutions to the laboratory programs.
4. To familiarize the processes of debugging and execution.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Execute C Program on control structures.	2	PO1, PO2,PO5,PO12
CO2	Execute C programs using arrays and functions.	2	PO1,PO2,PO3,PO5,PO12
CO3	Execute C programs on string handling functions.	3	PO1,PO2,PO3,PO4,PO12
CO4	Execute C programs on pointers, structures and files.	3	PO1,PO2,PO3,PO4,PO12

4. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)-

5. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Develop an algorithm and implement simple C program to solve simple computational problems using arithmetic expressions, demonstrate familiarization with programming environment, concept of naming the program files, storing, compilation and debugging, using different data types.
2	Draw the flowchart and implement a simple C program to solve problems involving if-then-else structures to find the largest of given three positive integers.
3	Design and develop a flowchart or an algorithm that takes three coefficients (a, b, and c) of a Quadratic equation (ax2+bx+c=0) as input and compute all possible roots. Implement a C program for the developed flowchart/ algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages. (Using switch statement).
4	Design and develop an algorithm to find the reverse of an integer number NUM and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: 2014, Reverse: 4102, Not a Palindrome.
5	Draw the flowchart and Write C Program to compute Sin(x) using Taylor series approximation given by Sin(x) = x - (x3/3!) + (x5/5!) - (x7/7!) + ……. Compare the result with the built- in Library function and print both the results with appropriate messages.
6	Develop an algorithm, implement and execute a C program that reads N integer numbers and arrange them in ascending order using Bubble Sort.
7	Develop, implement and execute a C program that reads two matrices A (m x n) and B (p x q) and Compute the product A and B. Read matrix A and matrix B in row major order and in column major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only. Program must check the compatibility of orders of the matrices for multiplication. Report appropriate message in case of incompatibility.
8	Draw the flowchart and write a recursive C function to find the factorial of a number, n!, defined by fact(n)=1, if n=0. Otherwise fact(n)=n*fact(n-1). Using this function, write a C program to compute the binomial coefficient nCr. Tabulate the results for different values of n and r with suitable messages.
9	Implement structures to read, write, and compute average- marks and the students scoring above and below the average marks for a class of 60 students.

10	Write and execute a C program that: i. Implement string copy operation STRCPY (str1, str2) that copies a string str1 to another string str2 without using library function. ii. Reads a sentence and prints frequency of each of the vowels and total count of consonants using user defined functions
11	Develop, implement and execute a C program to search a Name in a list of names using Binary searching Technique.
12	Write a C program to find the sum and average of N floating point numbers Using pointer.
13	Write a C Program to first read from the file and then append the data of the file.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	E. Balagurusamy	Programming in ANSI C	McGraw-Hill, 8th edition 2014.
2	Vikas Gupta	Computer Concepts and C Programming	Dreamtech Press 2014
3	Yashavant kanetkar	Understanding Pointer in C	McGraw-Hill, 5th Edition 2019

8 Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language	PHI, 2nd Edition, 2012
2	R S Bichkar	Programming with C	University Press, 1st Edition, 2012
3	V Rajaraman	Computer Programming in C	PHI, 2nd Edition 2019.
4	Byron GottFried & Schaum's	Outlines Programming with C	McGraw-Hill, 2nd Edition, 2013

9. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
Semester End Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mr.Prasanna Kumar M J	Name: Dr. Shashikala S V	Name: Dr. M Shankar	Name: Dr. B N Shobha
Designation: Assistant Professor	Designation: Professor and Head	Designation: Director IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	Communicative English-I
Course Code	**22AEC-18**
Program	Basic Science
Academic Year/Semester	2025-2026 / 1st Semester
Course Type	☐ √**Core** ☐ Elective ☐ Lab
Prerequisite (If any)	-
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 0 Total:1
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Communicative English-1 is an essential paper in Engineering Courses that ensures the communicative skills in English. This course provides a strong communicative basis by emphasizing on LSRW skills. It focusses language competency of students for their profession.

2. Course Objectives

The course will enable the students,

- To know about Fundamentals of Communicative English and Communication Skills in general.
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better communication skills.
- To impart Basic English grammar and essentials of important language skills.
- To enhance English vocabulary and language proficiency for better communication skills.
- To learn about Techniques of Information Transfer through presentation.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply the Fundamentals of Communication Skills in their communication skills.	2	PO1, PO2, PO10, PO12
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.	4	PO1, PO2, PO10, PO12
CO3	To impart Basic English grammar and essentials of language skills as per present requirement.	2	PO1, PO2, PO10, PO12

CO4	Use all types of English vocabulary and language proficiency.	2	PO1, PO2, PO10, PO12
CO5	Adopt the Techniques of Information Transfer through presentation.	3	PO1, PO2, PO10, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Orientation and activity:** **Mentoring**-Group discussion about Our Constitution like justice, liberty, equality, fraternity, human dignity and the unity and integrity of the Nation. **Creative Arts and Culture**-Students should be Exposed to culture and art forms like painting, sculpture, Pottery, music, dance etc., **Literary Activity**-Reading a book/article, writing its summary debate and enacting a play etc., Lectures by Eminent People-alumni, socially active, in profession. **Visits to Local Area**-visit to a monument like Adichunchanagiri temple, Central Library, Shravanabelagola, AIMS hospital and Industry visits. Picnic and trip etc.	**10**	**CO1**
II	**Introduction to Phonetics:** Introduction, Phonetic Transcription, English Pronunciation, Pronunciation Guidelines Related to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, Syllables and Structure, Word Accent and Stress Shift, Rules for Word Accent, Intonation–purposes of intonation, Spelling Rules and Words of ten Misspell Exercises point Common Errors in Pronunciation.	**10**	**CO2**
III	**Basic English Communicative Grammar and Vocabulary PART – I:** Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Conjunctions, Articles and Preposition. Preposition, kinds of Preposition and Prepositions often confused. Articles: Use of Articles–Indefinite and Definite Articles, Pronunciation of 'The', words ending 'age', some plural forms. Introduction to Vocabulary, All Types of Vocabulary –Exercises nit.	**10**	**CO3**
IV	**Basic English Communicative Grammar and Vocabulary PART - II:** Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exception sin Question Tags and Exercises, One Word Substitutes and Exercises. Strong and Weak forms of words, Words formation-Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations. Word Pairs (Minimal Pairs)–Exercises, Tense and Types of tenses, The Sequence of Tenses (Rule sinuses of Tense) and Exercises in it.	**10**	**CO4**

V	**Communication Skills for Employment:** Information Transfer: Oral Presentation- Examples and Practice. Extempore /Public Speaking, Difference between Extempore / Public Speaking, Communication Guidelines for Practice. Mother Tongue Influence (MTI) –South Indian Speakers, Various Techniques for Neutralization of Mother Tongue Influence–Exercises. Reading and Listening Comprehensions Exercises.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Text Books

SL. No.	Author(s)	Title	Publisher & Year
1	Philip Carr	Introduction to Phonetics and Phonology	Penguin Publication, 2020, 1st Edition
2	Raymond	Essential English Grammar, A self-study reference and practice book	Cambridge University Press, 5th Edition, 2021

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	Raymond Murphy	Essential English Grammar	Cambridge University Press, 5th Edition2021
2	Wren and Martin	English Grammar and Composition	S Chand Publication-2022

7. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

8. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **D. Vidyashankari**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Data Science**
Course Code	**22DS19/29**
Program	Computer Science and Engineering
Academic Year/Semester	2025-26/1st /2nd Semester
Course Type	☐ Core ☐ Elective ☐ ✓ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total:3
Credits	03
W.e.f	2022-23
Approved in AC on	23.01.2025
Course Description	A data science lab involves hands-on application of scientific methods, programming languages (like Python), and tools (Jupyter Notebooks, Pandas, NumPy) to analyze and extract insights from data. These courses focus on transforming theoretical knowledge into practical skills for data collection, manipulation, modeling (including AI/ML), visualization, and presenting results to solve real-world problems in domains like finance and healthcare.

2. Course Objectives

1. To acquire programming skills in core Python.
2. To learn how to write loops and decision statements in Python.
3. To develop the skill of designing Graphical user Interfaces in Python.

3. Course Outcomes (COs)

Students able to do

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Illustrate basic operations in Python program.	2	PO1,PO2
CO2	Illustrate Python programs with conditionals and loops	2	PO1,PO2,PO3
CO3	Implement concepts of searching and sorting using Python Programming.	3	PO1,PO2,PO3,PO5
CO4	Implement the basic building blocks and display different chats	2	PO1,PO2,PO5,PO10

4. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)-

5. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Write a Python program to find sum and average of two numbers
2	Write a Python program to convert temperature in Celsius to Fahrenheit
3	Write a Python program to check whether a given number is prime or not
4	Write a Python program to find length of string and to convert upper to lower case of a string.
5	Write a program to count a number of vowels in a string.
6	Write a Python program to create an array of 5 integers and display an array.
7	Write a Python program to plot bar graph using labels of languages ‘C’, ‘C++’, ‘Java’, ‘Python’, ‘PHP’ and students’ marks scored in above languages.
8	Write a Python program to plot pie chart using labels of brands of cars ‘AUDI’, ‘BMW’,’FORD’, ‘TESLA’, ‘JAGUAR’, ‘MERCEDES’ and sales of the cars.

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Charles R. Severance	Python for Everybody: Exploring Data Using Python 3	Create Space Independent 1st Edition. 2013
2	Allen B. Downey,	Think Python: How to Think Like a Computer Scientist,	Green Tea Press, 2nd Edition, 2015

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Charles Dierbach	Introduction to Computer Science Using Python	Wiley, 1st Edition , 2015
2.	Mark Lutz,	Programming Python,	OReilly, Media,4th Edition, 2011

8. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
Semester End Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Conduction of Experiments, Internal Tests, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mr.Prasanna Kumar M J	**Name: Dr. Shashikala S V**	**Name: Dr. Shankar M**	**Name: Dr. B K Narendra**
Designation: Assistant Professor	**Designation: Professor and HoD**	**Designation: IQAC, Director**	**Designation: Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

Scheme for Second Semester B.E (Physics Cycle)

Sl. No	Course Code	Title of the Course	Teaching Department	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	22MAT21	Engineering Mathematics – II	Mathematics	3	2	0	5	3	50	50	100	4
2	22PHY22	Applied Physics	BS	3	1	0	4	3	50	50	100	3
3	22CIV23	Civil Engineering & Mechanics	CV	2	2	0	4	3	50	50	100	3
4	22ELE24	Basics of Electrical Engineering	ECE	3	0	0	3	3	50	50	100	3
5	22CED25	Computer Aided Engineering Drawing	ME	2	0	2	4	3	50	50	100	3
6	22PHYL26	Applied Physics Lab	BS	0	0	2	2	3	50	50	100	1
7	22ELEL27	Basic Electrical Engineering Lab	ECE	0	0	2	2	3	50	50	100	1
8	22AEC28	Communicative English-II	HRD	3	2	0	5	3	50	50	100	1
9	22 BIO29	Biology for Engineers	Humanities	0	--	2	2	2	50	50	100	1
									450	450	900	
TOTAL CREDITS& CONTACT HOURS							**31**					**20**
TOTAL CREDITS OF I SEMESTER												**20**

Scheme for Second Semester B.E (Chemistry Cycle)

Sl. No	Course Code	Title of the Course	Teaching Department	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	22MAT21	Engineering Mathematics – II	Mathematics	3	2	0	5	3	50	50	100	4
2	22CHE22	Applied Chemistry	BS	3	1	0	4	3	50	50	100	3
3	22 PCL23	Programming in C Language	CSE	3	1	0	4	3	50	50	100	3
4	22ELN24	Basic Electronics	ECE	3	0	0	3	3	50	50	100	3
5	22 EME25	Elements of Mechanical Engineering	ME	2	2	0	4	3	50	50	100	3
6	22CHEL26	Applied Chemistry Lab	BS	0	0	2	2	3	50	50	100	1
7	22CPL27	Computer Programming Laboratory	CSE	0	1	2	3	3	50	50	100	1
8	22AEC28	Communicative English-II	HRD	3	2	0	5	1	50	50	100	1
9	22 DS29	Data Science	CSE	0	--	2	2	1	50	50	100	1
									450	450	900	
TOTAL CREDITS& CONTACT HOURS							**31**					**20**
TOTAL CREDITS OF I SEMESTER												**20**

SEE for Data science and Biology for Engineers is conducted with one internal from Parent Department and one from other Department.

1. Course Information

Section	Details
Course Title	Engineering Mathematics -II
Course Code	**22MAT-21**
Program	Common to all branches
Academic Year/Semester	2025-2026 / 2nd Semester
Course Type	☐ Core ☐ Elective ☐ Lab ☐✓ **Integrated**
Prerequisite (If any)	Algebra ,Trignometry,Elementry Caluclus
Contact Hours per Week	Lecture: 3 Tutorial: 2 Practical: 0 Total: 5
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive foundation in advanced mathematical concepts essential for engineering and applied sciences. It covers vector calculus, ordinary and partial differential equations, infinite series, and numerical methods. Emphasis is placed on developing problem-solving skills and applying these mathematical tools to analyze and model real-world engineering problems.

2. Course Objectives

The purpose of the course is to enable the students with concrete foundation of vector calculus, ordinary and partial differential equations, infinite series, and numerical methods enabling them to acquire the knowledge of these mathematical tools.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Solve the solenoidal and irrotational vector andsurface volume integral applications.	3	PO1, PO2, PO5, PO12
CO2	Students will be able to analyze and explain physical models formulated with higher-order differential equations and apply appropriate methods to solve these linear ordinary differential equations.	2	PO1, PO2, PO5, PO12
CO3	Students will be able to understand and classify different types of partial differential equations, and apply exact methods, including the method of separation of variables, to obtain their solutions.	2	PO1,PO2,PO5 ,PO12
CO4	Describe the applications of infinite series and obtain series solution of ordinary differential equations.	2	PO1,PO2,PO5 ,PO12

CO5	Apply the knowledge of numerical methods in the models of various physical and engineering phenomena.	3	PO1, PO2, PO5, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Vector Differentiation:** Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- Illustrative problems.	**10**	**CO1**
II	**Differential Equations of higher order:** Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters and; Cauchy's and Legendre homogeneous equations.	**10**	**CO2**
III	**Partial Differential Equations (PDE's):** Formation of PDE's by elimination of arbitrary constants / functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Derivation of one-dimensional heat and wave equations and solutions by the method of separation of variables.	**10**	**CO3**
IV	**Infinite Series:**Series of Positive Terms-Convergence and divergence of infinite series.Cauchy's root test and D'Alembert's ratio test (without proof) - Illustrative examples. **Power series solutions:** Series solution of Bessel's differential equation leading to $5_5(5)$-Besel's function of first kind orthogonality.	**10**	**CO4**
V	**Numerical Methods:** Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof). Solution of polynomial and transcendental equations –Newton-Raphson and Regula-Falsi methods (only formulae)- Illustrative examples. **Numerical integration:** Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof) – Problems.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions.

Practical	Title of Experiment / Activity
1	Finding gradient, divergent, curl and their geometrical interpretation.
2	Solutions of Second-order ordinary differential equations with initial/ boundary conditions.
3	Solution of one-dimensional heat equation and wave equation.
4	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson.
5	Interpolation/Extrapolation using Newton's forward and backward difference formula.
6	Computation of area under the curve using Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule.
7	Programme to compute area, volume, and center of gravity.
8	Solution of ODE of first order and first degree by runge Kutta fourth order
9	Solution of ODE of first order and first degree by Milne's method
10	Solution of ODE of first order and first degree by Taylors series method

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B. S. Grewal	Higher Engineering Mathematics	Khanna Publishers, 45^{th} Edition,2023.
2	E. Kreyszing	Advanced Engineering Mathematics	John Wiley & Sons, 10^{th} Edition (Reprint),2020.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	N. P. Bali and Manish Goyal	A Textbook of Engineering Mathematics	Laxmi Publications 12^{th} Edition, 2020.
2	B.V. Ramana	Higher Engineering Mathematics	McGraw-Hill ,1^{st} Edition, 2017.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test	20
Practical Components	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mrs. Dakshayini G	Name: Dr. Yuvaraja B K	Name: Dr. M Shankar	Name: Dr. Shobha B N
Designation: Assistant Professor	Designation: Professor and Head	Designation: Director IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	Applied Physics
Course Code	22PHY12/22
Program	For all Program
Academic Year/Semester	2025/ 1st and 2nd Semester
Course Type	☐ √ Core ☐ Elective ☐ Lab
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total: 3
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides fundamental insights into modern physics and its applications in engineering. It covers quantum mechanics concepts including blackbody radiation, wave-particle duality, uncertainty principle, and free electron theory. The study of oscillations, damping, resonance, and shock waves builds understanding of wave phenomena. Properties of engineering materials such as elasticity, bending, and torsion are explored. The course introduces laser principles, optical fiber communication, and applications in defence, medicine, and data storage.

2. Course Objectives

1. To recognize the importance and learn basic concepts of physics for engineering applications.
2. To identify the importance of quantum mechanics, lasers, optical fibers for advances in technology.
3. To understand the theoretical models used for the study of physical properties of various materials.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Distinguish between phase and group velocities and apply the quantum theory to understand the electrical conductivity of metals.	2	PO1, PO2
CO2	Discuss the various types of oscillations and their implications; the role of Shock waves in various fields.	2	PO1, PO2
CO3	Recognize the elastic properties of materials for engineering applications.	3	PO1, PO2, PO3
CO4	Analyze suitability of lasers and optical fibers for engineering applications.	4	PO1, PO2
CO5	Compute the carrier concentration in metals and semiconductors.	3	PO1, PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Quantum theory of radiation:** Black body radiation, Planck's law of radiation (Qualitative). Wave-Particle duality, De-Broglie Wavelength Hypothesis, De-Broglie wavelength for electron. Heisenberg's uncertainty principle and its illustration. Application: Non-existence of electrons in the nucleus. **Quantum Free electron theory of metals:** Quantum free electron theory – Assumptions, Fermi Dirac Statistics (qualitative), Fermi level, Fermi energy, Fermi velocity and Fermi factor. Variation of Fermi factor with Energy and temperature, Mention of Expression for density of states. Derive the expression for Fermi energy at absolute zero kelvin. Numerical Problems.	**08**	**CO1**
II	**Oscillations:** Definition of SHM, Derivation of differential equation for SHM, Mechanical simple harmonic oscillators (mass suspended to spring oscillator). Equation of motion for free oscillations, Natural frequency of oscillations. Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance. **Shock waves**: Types of waves, Mach number, Properties of Shock waves, control volume. Construction and working of Reddy shock tube, applications of shock waves. Numerical problems.	**08**	**CO2**
III	**Elasticity:** Basics of elasticity, Hooke's law, Types of elastic moduli, Poisson's ratio. Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (η) in terms of α and β. Relation between Y, η and K. **Bending of Beams:** Neutral surface and Neutral plane, Derivation of expression for bending moment of a beam with circular and rectangular cross section. Single cantilever derivation of expression for Young's modulus. **Torsion of cylinder**: Expression for couple per unit twist of a solid cylinder, Torsional pendulum-Expression for period of oscillation.	**08**	**CO3**
IV	**Lasers**: Interaction of radiation with matter – Induced Absorption – Spontaneous Emission and Stimulated Emission. Expression for energy density of radiation in terms of Einstein's coefficients at thermal equilibrium. Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO_2. Applications of Lasers in defence & medical field. **Optical fibers:** Propagation mechanism, Angle of acceptance and Numerical aperture – their relationship with refractive indices of core and clad. Condition for propagation. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and mention of expression for attenuation coefficient, Discussion of block diagram of point to point communication system. Applications of optical fibers in communication and data storage. Numerical problems.	**08**	**CO4**

V	**Semiconductors:** Classification of Semiconductors, Fermi level in intrinsic and extrinsic semiconductors. Expression for electron concentration in conduction band and Mention the expression for hole concentration in valance band of an intrinsic semiconductor. Expression for conductivity and resistivity of an intrinsic semiconductor in terms of mobility of charge carriers. **Dielectric Materials:** Electric dipole, dipole moment, Dielectric constant, polarization of dielectric materials and types of polarization. Internal field in solids. Expression for Clausius-Mossotti equation. Numerical problems.	**08**	**CO5**

5. CO–PO Mapping Matrix

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

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	R.K. Gaur & S.L. Gupta	Engineering Physics	Dhanpat Rai & Sons, 2024 Edition
2	S.P. Basavaraju	Engineering Physics	Subhas Stores Publications 2018 Edition

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	Halliday, Resnick & Walker	Fundamentals of Physics	John Wiley & Sons 2021 Edition
2	A.S. Vasudeva	Modern Engineering Physics	S. Chand, 9th Edition 2022

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
Semester End Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Dr. Shankara S R**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Civil Engineering and Mechanics
Course Code	22CIV-13/23
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 1st Semester
Course Type	☐√ Core ☐ Elective ☐ Lab
Prerequisite (If any)	NIL
Contact Hours per Week	Lecture: 2 Tutorial: 2 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces students to the scope and diverse fields of Civil Engineering, highlighting its role in infrastructural development and societal progress. It provides foundational knowledge of basic civil engineering concepts while emphasizing their practical importance. The course develops students' analytical skills in solving problems related to forces and moments, along with their engineering applications. In addition, students will gain the ability to determine centroids and moments of inertia of various sections and understand their significance in structural analysis and design.

2. Course Objectives

1. To make students to learn scope of various fields of Civil Engineering, basics of civil engineering concepts and importance of infrastructural development.
2. To develop a student's ability to analyse the problems involving Forces and Moments with their applications.
3. To develop a student's ability to find the Centroid and Moment of inertia and their application

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Mention the applications of various fields of civil engineering	2	PO1, PO2, PO3, PO6 PO12
CO2	Compute the resultant of given force system subjected to various loads	3	PO1, PO2, PO3, PO6 PO12
CO3	Compute the reactions developed in trusses	4	PO1, PO2, PO3, PO6 PO12

CO4	Comprehend the action of forces, moments and other loads on system of rigid bodies and compute the reactive forces that develop as a result of the external loads	4	PO1, PO2, PO3, PO12
CO5	Locate the centroid and compute the moment of inertia of regular and build up sections.	3	PO1, PO2, PO3, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering. Role of Civil Engineers in infrastructural development, Effect of the infrastructural facilities on socio-economic development of a country. Classification of Roads, Dams and Bridges	**10**	**CO1**
II	Basic concepts of idealization, particle, continuum and rigid body; force; system of forces; Basic principles – physical independence of forces, Superposition, Transmissibility, Newton‘s law of motion, Resolution and Composition of forces, Law of parallelogram of forces, Polygonal law, Resultant of Concurrent coplanar force system, moment and couple of forces	**10**	**CO2**
III	Analysis of non-Concurrent force system Coplanar on concurrent force system, moment of forces, couple, Varignon‘s theorem, Resultant of Coplanar non concurrent force system. Analysis of Trusses: types of trusses, analysis of truss by method of joints.	**10**	**CO3**
IV	Equilibrium of Forces: Free body diagrams, Lami‘s theorem, Equations of Equilibrium, Equilibrium of concurrent and non-concurrent coplanar force systems. Support Reactions: Types of Loads and Supports, statically determinate and indeterminate beams, Support reaction in beams. Numerical problems on support reactions for statically determinate beams (Point load, uniformly distributed and uniformly varying loads and Moments).	**10**	**CO4**
V	Centroid & Moment of Inertia: Centroid of simple figures from first principle, centroid of composite/built-up sections; moment of inertia: Introduction, second moment of area of plane sections from first principles, Parallel and perpendicular axes theorems, Radius of gyrations, Moment of inertia of composite area and built-up sections. Concept of product of inertia (No Problems).	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R. C. Hibbeler	Engineering Mechanics: Principles of Statics and Dynamics	Pearson/Prentice Hall-2022 Edition.
2	R. K. Bansal	A Textbook of Engineering Mechanics	Laxmi Publications – 2016 Edition.
3.	Andy Ruina; Rudra Pratap	Introduction to Statics and Dynamics	Oxford University Press (preprint) 2015
4	K. Vijaya Kumar Reddy; J. Suresh Kumar	Singer's Engineering Mechanics: Statics and Dynamics	BSP Books (BS Publications) 2024 Edition.
5.	F. P. Beer; E. R. Johnston Jr.	Mechanics for Engineers: Statics and Dynamics	McGraw-Hill-2024 Edition.
6.	Irving H. Shames	Engineering Mechanics (Statics & Dynamics)	Prentice-Hall-2005 Edition.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	F. P. Beer & E. R. Johnston	Vector Mechanics for Engineers, Vol. I: Statics; Vol. II: Dynamics	Tata McGraw Hill 2024 Edition.
2	Andy Ruina & Rudra Pratap	Introduction to Statics and Dynamics	Oxford University Press 2024 Edition.
3	K. Vijay Kumar Reddy & K. Suresh Kumar	Singer's Engineering Mechanics	Pearson / McGraw Hill 2024 Edition.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Dr. Mahalingegowda H R**	**Name:** **Dr. Shruthi R**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Associate Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Basic Electrical Engineering**
Course Code	**22ELE-14/24**
Program	Electronics & Communication Engineering
Academic Year/Semester	2025-26 / 1st / 2nd Semester
Course Type	✓Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge about fundamental concepts of electricity and circuit analysis.
Contact Hours per Week	Lecture: **3** Tutorial: 0 Practical: 0 Total:3
Credits	**3**
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Basic Electrical Engineering introduces the fundamental principles of electrical engineering, providing a strong foundation for all engineering disciplines. It covers the basic laws of electricity, circuit analysis, electrical machines, and power systems. And to analyze DC and AC circuits, understand the operation of transformers, motors, and generators, and gain knowledge of electrical safety and practical applications.

2. Course Objectives

1. To explain Ohm's law and Kirchhoff's laws used for the analysis of DC circuits.
2. To explain fundamentals of AC circuits and the behaviour of R, L and C and their combinations in AC circuits.
3. To discuss three phase balanced circuits.
4. To explain principle of operation, construction and performance of electrical machines such as single-phase transformer, DC machines, synchronous generator and three phase induction motor.
5. To introduce concepts of electrical wiring, circuit protecting devices and earthing.

3. Course Outcomes (COs)

COs	Course Outcome	BTL	POs Mapped
CO1	Explain DC circuits and AC fundamental concepts.	2	PO1, PO2, PO3, PO4 PO12
CO2	Analyze single phase AC circuits with R, L, C and behaviour of three phase AC circuits.	3	PO1, PO2, PO3, PO4 PO12
CO3	Explain the working of single-phase transformer and concepts of electrical wiring circuit protecting devices and earthing.	2	PO1, PO2, PO3, PO4, PO12

CO4	Discuss the principle of operation and construction of DC Machines.	2	PO1, PO2, PO3, PO4, PO12
CO5	Describe the principle of operation and construction of AC Synchronous generators and three phase induction motors	2	PO1, PO2, PO3, PO4, PO12

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	**D.C. Circuits**: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources, Power and Energy. **A.C. Fundamentals**: Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.	**8**	**CO1**
II	**Single Phase Circuits**: Analysis with phasor diagram of circuits with R, L, C, RL, RC, RLC for series configurations, Real power, reactive power, apparent power and power factor. **Three Phase circuits:** Advantages of 3-phase power Circuits, Generation of 3-phase power, Three-phase balanced circuits, voltage and current relations in star and delta connections, Measurement of three phase power using two wattmeter method.	**8**	**CO2**
III	**FUNDAMENTALS OF ELECTROMAGNETISM:** Concepts of Magneto motive force, Reluctance, Flux and flux density, Concept of self-Inductance and mutual Inductance, Coefficient of coupling (only elementary treatment and Simple numerical problems). **TRANSFORMERS:** Principle of operation of single-phase transformer, Constructional features, EMF equation (simple numerical problems).	**8**	**CO3**
IV	**DC Generators**: Principle of operation, Construction of D.C. Generators. Expression for induced emf, Types of D.C. Generators, Relation between induced emf and terminal voltage. **DC motors**: Principle of operation, Back emf, Torque equation, Types of dc motors, Characteristics of dc motors (shunt and series motors only) and Applications.	**8**	**CO4**
V	**Three Phase Synchronous Generators**: Principle of operation, Constructional details, Synchronous speed, Frequency of generated voltage, emf equation, Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors). **Three Phase Induction Motors**: Principle of operation, Generation of rotating magnetic field, Construction and Working of three-phase induction motor, Slip and its significance, Necessity of starter, star-delta starter.	**8**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	D C Kulshreshtha	Basic Electrical Engineering	Tata McGraw-Hill, 2nd Edition, 2019.
2	V.K. Mehta, Rohit Mehta	Principles of Electrical Engineering & Electronics	S. Chand & Company Ltd, 3rd Edition, 2014.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B. L. Theraja	Fundamentals of Electrical Engineering and Electronic	S. Chand & Company Ltd, 2022 Edition.
2	D. P. Kothari and I. J. Nagrath	Basic Electrical Engineering	Tata McGraw Hill, 4th Edition, 2019.
3	E. Hughes	Electrical Technology	Pearson Higher Education, 12th Edition, 2016.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mrs. Srividya C N	Name: Dr. Naveen K B	Name: Dr. M Shankar	Name: Dr. Shobha B N
Designation: Assistant Professor	Designation: Professor and Head	Designation: Director IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	Computer Aided Engineering Drawing
Course Code	22CAED15/25
Program	Mechanical Engineering
Academic Year/Semester	2025-2026/ 1st / 2nd Semester
Course Type	☐✓ **Core** ☐ Elective ☐ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 2 Tutorial: 0 Practical: 3 Total: 5
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Computer Aided Engineering Drawing is a foundational course designed to equip students with the principles and practices of technical drawing using modern CAD tool viz., Solid Edge. It integrates traditional engineering graphics with digital drafting techniques, enabling precise and standardized representation of mechanical components, assemblies, and systems.

2. Course Objectives

The basis of this course is to afford the knowledge of drafting skills, elevating conceptualization and practicality of the students

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apprehend the basics of engineering graphics and use of computer tools to create simple geometrical entities.	3	PO1, PO2, PO5, PO12
CO2	Ascertain the location of the object with respect to the planes of projection and draw its Orthographic views.	3	PO1, PO2, PO5, PO12
CO3	Draw the development and isometric projection of regular solids.	3	PO1, PO2, PO5, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction to Computer Aided Sketching:** Standard tool bar / menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering. (Demonstration only) **Orthographic Projections:** Definitions - Planes of projection, reference line and conventions employed. Projections of points in all the four quadrants. Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes.	**08**	**CO1**
II	**Projection of Planes:** Projection of planes such as triangle, square, rectangle, pentagon, hexagon and circle resting on HP in different positions by change of position method only.	**08**	
III	**Projection of Solids:** Projection of solids such as cube, prism, pyramid, cylinder, cone and tetrahedron (No problems on freely suspended prisms).	**10**	**CO2**
IV	**Development of Surfaces:** Development of lateral surfaces of solids- Different prisms and pyramids, cylinder and cone.	**08**	**CO3**
V	**Isometric Projection**: Introduction to isometric scale, isometric projection of cube, prisms, pyramids, cones, spheres, cut spheres, frustums of cones and pyramids in simple positions, combination of solids (Maximum of two solids). **Miscellaneous Applications:** (Lab practice only) Drawing Simple Mechanisms: Bicycles, two-wheeler cart, four-wheeler, fan and Furniture. Electronics Engineering Drawings- Simple electrical and electronic circuits. Sports: Drawing of different tool kits used.	**08**	

5. CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**			**2**							**1**
CO2	**3**	**2**			**2**							**1**
CO3	**3**	**2**			**2**							**1**

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	K.R. Gopalakrishna	Engineering Graphics	Subhash Publishers, 32nd Edition, 2005
2	N.D. Bhatt & V.M. Panchal	Engineering Graphics	Charotar Publishing House, 48th Edition, 2005
3	A Primer on Computer Aided Engineering Drawing - Solution Book prepared by ACU.		

7. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	S. Trymbaka Murthy	Computer Aided Engineering Drawing	I K International Publishing House Pvt. Ltd., 3rd Edition.
2	M. H. Annaiah, B. Sudheer Prem Kumar & C. N. Chandrappa	Computer Aided Engineering Drawing	New Age International (P) Ltd., 2016.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Assignments/Printouts	40
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Dr. Ranganatha swamy L**	**Name:** **Dr. Manjunath S H**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Applied Physics Lab
Course Code	22PHYL16/26
Program	For all Program
Academic Year/Semester	2025/ 1st / 2nd Semester
Course Type	☐ Core ☐ Elective ☐√ Lab
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 1 Total: 2
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This laboratory course provides hands-on experience in applied physics through experiments related to mechanics, optics, electronics, and material science. Students will determine fundamental constants such as spring constant, Young's modulus, rigidity modulus, dielectric constant, Fermi energy, and energy gap of semiconductors. The course also covers practical applications of lasers, optical fibers, resonance circuits, Zener diodes, and photodiodes, reinforcing theoretical concepts and enhancing experimental skills essential for engineering applications.

2. Course Objectives

1. To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations.
2. Design simple circuits and hence study the characteristics of semiconductor devices.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Recall the concepts of interference of light, diffraction of light, Fermi energy.	1	PO1, PO2, PO9
CO2	Demonstrate the principles of operations of optical fibers and semiconductor devices such as photodiode, and NPN transistor using simple circuits.	3	PO1, PO2, PO9
CO3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures.	3	PO1, PO2, PO9
CO4	Recognize the resonance concept and its practical applications.	2	PO1, PO2, PO9
CO5	Explain the importance of proper measurement procedures, honest data recording, accurate data representation, and reproducibility of final results.	2	PO1, PO2, PO9

4. Course Content (Expt-Wise)

No.	Topics	Hours	COs
1	Spring Constant - Determination of spring constant and verification of series and parallel combination of springs.	02	CO3
2	Single Cantilever - Determination of the Young's modulus of the given material.	02	CO3
3	Torsional Pendulum - Determination of rigidity modulus & momentum of inertia of the given material.	02	CO3
4	Laser Diffraction – Determination of Wavelength of semiconductor laser using Laser diffraction.	02	CO1
5	Optical Fiber – Determination of acceptance angle and numerical aperture of an optical fiber.	02	CO2
6	Fermi Energy - Determination of the Fermi energy of a given metal.	02	CO1
7	LCR Series and Parallel Resonance - Study the frequency response of series and parallel resonance circuit & Determination of self-inductance of a given coil.	02	CO4
8	Photodiode - Study of Photodiode characteristics.	02	CO2
9	Dielectric Constant - Determination of the dielectric constant of a material by charging and discharging method of a capacitor.	02	CO5
10	Black Body Radiator- Verify the Stefan's law of radiation.	02	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	Dr. S. L. Kakani, C. Hemrajani	Applied Physics Lab. Manual	Viva Books Pvt. Ltd. 1st Edition, 2022
2	Sesha Sai Kumar Vemula	Engineering Physics Lab. Manual	LAP Lambert Academic, 1st Edition 2017

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	H. Sathyaseelan	Laboratory Manual in Applied Physics	New Age International 5th Edition, 2020
2	Dr. Hussain Jeevakhan	Applied Physics Lab	Khanna Publishers, 1st Edition 2021

8. Assessment Scheme

Component	Weightage (%)
Observation, Writeup & Punctuality	10
Conduction of Experiment and Output	10
Viva-Voce	10
Record Write Up	10
Internal Test	10
Semester End Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: **Dr. Shankara S R**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Associate Professor**	**Designation:** **Professor**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

ACU - OBE STANDARD SYLLABUS

1. Course Information

Section	Details
Course Title	**Basic Electrical Engineering Lab.**
Course Code	**22ELEL-17/27**
Program	Electronics and Communication Engineering
Academic Year/Semester	2022-23/ 1st / 2nd Semester
Course Type	☐ Core ☐ Elective ☐✓ Lab
Prerequisite (If any)	Basic knowledge about safety, equipment usage, and basic circuit concepts.
Contact Hours per Week	Lecture: 0 Tutorial: 0 Practical: **2** Total: 2
Credits	**1**
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	A Basic Electrical Lab course is designed to provide hands-on experience and practical application of the fundamental principles learned in a basic electrical engineering theory course. The main objective is to help students verify theoretical concepts through experimentation, familiarize themselves with common electrical equipment, and develop essential circuit building and measurement skills.

2. Course Objectives

1. To provide exposure to common electrical components such as Resistors, capacitors and inductors, types of wires and measuring instruments.
2. To measure power and power factor measurement of different types of lamps and three phase circuits.
3. To explain measurement of impedance for R-L and R-C circuits.
4. To determine power consumed in a 3 phase load.
5. To explain methods of controlling a lamp from different places.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply the knowledge of KVL and KCL and three phase loads to verify the relationship between line and phase quantities in star and delta connected loads and measurement of three phase power.	3	PO1,PO2,PO3,PO9,PO12
CO2	Computing the ripple factor and efficiency of half wave and full wave rectifier and computing the impedance of a choke coil.	3	PO1,PO2,PO3,PO9,PO12

CO3	Experiment of two way and three way controlling of lamp and identifying the power consumption and determining the power factor of different lamps.	3	PO1,PO2,PO3,PO9,PO12
CO4	Examining the effects of open and short circuit in simple circuits and earth resistance.	3	PO1,PO2,PO3,PO9,PO12
CO5	Design Inverting, Non Inverting amplifier and voltage follower using Op-Amp.	3	PO1,PO2,PO3,PO9,PO12

4. Course Content

Experiments	Topics	Hours	COs
1	Verification of KCL and KVL for DC circuits.	3	CO1
2	Measurement of current, power and power factor of incandescent lamp, fluorescent lamp, and LED lamp.	3	CO4
3	Measurement of resistance and inductance of a choke coil using 3 voltmeter method.	3	CO2
4	Determination of phase and line quantities in three phase star and delta connected loads.	3	CO1
5	Measurement of three phase power using two wattmeter methods.	3	CO1
6	Two way and three way control of lamp and formation of truth table.	3	CO4
7	Measurement of Earth Resistance.	3	CO5
8	Study of effect of open and short circuit in simple circuits.	3	CO5
9	Half Wave and Full Wave Rectifier.	3	CO2
10	Design of inverting, non-inverting and voltage follower using Op-amp.	3	CO6
DEMONSTRATION EXPERIMENTS			
1	Demonstration of fuse, MCB by creating a fault.	1	
2	Demonstration of cut-out sections of electrical machines (DC machines, Induction machines and synchronous machines).	1	
3	Understanding ac and dc supply, use of tester and test lamp to ascertain the healthy status of mains.	1	

5. CO–PO Mapping Matrix

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1						1			1
CO2	2	2	1						1			1
CO3	2	2	1						1			1
CO4	2	2	1						2			1
CO5	2	2	1						1			1
CO6	2	2	1						1			1

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	D C Kulshreshtha	Basic Electrical Engineering	Tata McGraw-Hill, 2nd Edition, 2019.
2	V.K. Mehta, Rohit Mehta	Principles of Electrical Engineering & Electronics	S. Chand & Company Ltd, 3rd Edition.2014.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B. L. Theraja	Fundamentals of Electrical Engineering and Electronic	S. Chand & Company Ltd, 2022 Edition .
2	D. P. Kothari and I. J. Nagrath	Basic Electrical Engineering	4th Edition, Tata McGraw Hill, 2019.
3	E. Hughes	Electrical Technology	12th Edition, Pearson Higher Education, 2016.

8. Assessment Scheme

Component	Weightage (%)
Observation, Write up and Punctuality	10
Conduction of Experiment and output	10
Viva Voce	10
Record write up	10
Internal Assessment Test	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Mr. Sandeep S V**	**Name:** **Dr. Naveen K B**	**Name:** **Dr. M Shankar**	**Name:** **Dr. B N Shobha**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Communicative-English-II**
Course Code	**22AEC-28**
Program	Basic Science
Academic Year/Semester	2025-2026 / 2nd Semester
Course Type	☐ √**Core** ☐ Elective ☐ Lab
Prerequisite (If any)	-
Contact Hours per Week	Lecture: 1 Tutorial: 1 Practical: 0 Total:5
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Communicative English-II is an essential paper in Engineering Courses that ensures the communicative skills in English. This course provides a strong communicative basis by emphasizing on LSRW skills. It focusses language competency of students for their profession.

2. Course Objectives

The course will enable the students,

- To Identify the Common Errors in Writing and Speaking of English.
- To achieve better technical writing and Presentation skills for employment.
- To read technical proposals properly and make them to write good technical reports.
- Acquire Employment and Workplace communication skills. To learn about Techniques of Information Transfer through presentation in different level.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify the Common Errors in Writing and Speaking.	2	PO1.PO2, PO10, PO12
CO2	To achieve better technical writing and Presentation skills.	3	PO1.PO2, PO10, PO12
CO3	To read technical proposals properly and make them to Write good technical reports.	2	PO1.PO2, PO10, PO12
CO4	Use all types of English vocabulary and language proficiency.	3	PO1.PO2, PO10, PO12
CO5	Adopt the Techniques of Information Transfer through presentation.	5	PO1.PO2, PO10, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Orientation and activity:** **Daily Activity –** Leadership work and position, academic Clubs and teams, Volunteering and community service (Park/Garden cleanup, Book donation, Plant trees, Donating Blood etc) and Artistic and Pursuits etc. **Proficiency in language –** Practice, read English newspapers, magazines, articles and books or journals. Extra-Curricular Activities in College- By doing some Cultural activities, event competitions like political activism (rallies, street marches, strikes), social activity (NSS), technological skills and debate etc.	**10**	**CO1**
II	**Nature and Style of sensible writing:** Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indians in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercise, Practice of Sentence Corrections activities. Importance of Summarizing and Paraphrasing. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés.	**10**	**CO2**
III	**Technical Reading and Writing Practices:** Reading Process and Reading Strategies, Introduction to Technical writing process, understanding of writing process, Effective Technical Reading and Writing Practices, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. **Introduction to Technical Proposals Writing,** Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar–Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.	**10**	**CO3**
IV	**Professional Communication for Employment:** The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener. Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading. Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume v/s Biodata, Profile, CV and others, Types of resumes, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.	**10**	**CO4**
V	**Professional Communication at Workplace:** Group Discussions– Importance, Characteristics, Strategies of Group Discussions. Group Discussions is a Tool for Selection. Employment/Job Interviews- Importance, Characteristics. Strategies of an Employment / Job Interviews. Intra and Interpersonal Communication Skills-	**10**	**CO5**

	Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. Non-Verbal Communication Skills (Body Language) and its Importance in GD and PI/JI/EI. Presentation skills and Formal Presentations by Students-Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various Situations (Activity based Practical Sessions in class by Students).		

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Text Books

SL. No.	Author(s)	Title	Publisher & Year
1	Kriti gulati	Teaching academic writing in English:- a practical approach	Atlantic, 2012 Edition
2	Natasha terk	Professional Writing skills	Harper Collins 2017 Edition

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	John Seely	Oxford Guide to Effective Writing and Speaking	Oxford University -2013 Edition
2	Michael Swan	Practical English Usage	Oxford University -2017 Edition

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **D. Vidyashankari**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director and Head**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Biology for Engineers**
Course Code	**22BIO-19/29**
Program	For all Program
Academic Year/Semester	2025-2026/ I Semester
Course Type	☐✓ Core ☐Elective ☐ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 0 Total: 16
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamental principles of biology with an emphasis on their relevance to engineering applications. It begins by highlighting the importance of biological knowledge for engineers, addressing real-world examples such as the Shinkansen sonic boom and the biological basis of human wellness. Students will explore the concept of life, its origin, evolution, and the cellular foundation of living systems.

2. Course Objectives

1. Introduce the fundamental concepts of biology and highlight their relevance to engineering and technology.
2. Explain the molecular basis of life through the study of cells and the four fundamental biomolecules—lipids, carbohydrates, proteins, and nucleic acids.
3. Provide an understanding of cellular processes such as DNA replication, transcription, translation, and cell division.
4. Enable students to connect biological principles with real-world engineering applications in areas such as bioreactors, bioenergy, biomaterials, and medical sciences.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	**Explain** the importance of biology for engineers and its role in addressing technological and societal challenges.	2	PO1, PO2
CO2	**Describe** the origin of life, cell structure, and the functional role of fundamental biomolecules.	2	PO2
CO3	**Analyze** cellular processes such as DNA replication, transcription, translation, and energy generation.	4	PO1

CO4	Apply the concepts of enzyme kinetics, bioenergy, and bioreactor design to solve engineering-related problems.	3	PO1, PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Why Should Engineers Know Biology** Introduction, Need for Biology, Shinkansen Sonic Boom, For Our Wellness—We are All Biological Entities, Learning Biology is, Fundamentally Not Different, From Learning Mathematics. Life-Its Origin and Evolution on Earth: Introduction, why are the Surgical Instruments Sterilized Before Use? What is Life? Cell—The Fundamental Functional Unit of Life, Cells in the Human Body, The Scientific View on the, Origin of Life on Earth, what is Evolution?	4	**CO1**
II	**The Fundamental Molecules of Life—1:** Introduction, Bioreactors, Shear in Bioreactors and its Effect on Productivity, What Gets Affected by Shear in Cells? A Typical Eukaryotic Cell Contains Many Parts Tightly Packed Inside it, What Constitutes the Cell (Plasma) Membrane, Microscopically Speaking? Molecules that Comprise the Cell (Plasma) Membrane, Cell Membrane Functions, Lipids—One of the Four Fundamental Biomolecules, Lipids—The Human Angle. **The Fundamental Molecules of Life—2:** Introduction, how is Curd/Yogurt Made at Home? Why Does Milk Turn into Curd? What is the Source of the Acid? Carbohydrates—The Second of the four Fundamental, Biomolecules, Action at a Molecular Level, Water and its Biological, Casein and Curd Formation, Significance of Carbohydrates in the Human Body, Bioenergy.	3	**CO2**
III	**The Fundamental Molecules of Life—3:** Introduction, Casein is a Protein, Amino Acids and Their Polymers, Structure of Proteins—The Third, Structure—Function Relationship and Significance, Role of Proteins in the Cell and its Membrane, Role of Proteins in the Human Body, Enzymes are Mostly Proteins, Enzymes Used in the Industry, Quantification of Enzyme, Activity and Kinetics of the Four Fundamental Biomolecules. **The Fundamental Molecules of Life—4:** Introduction, How Does the Cell Get the Energy Needed for its Various Processes? Nucleic Acids—The Fourth of the Four Fundamental Biomolecules, Phosphorylation of ADP to ATP, Substrate Level Phosphorylation, Electron Transport Phosphorylation, Where do Phosphorylation's Take Place in a Cell? Polymers of Nucleotides—DNA, RNA Structural Aspects of DNA and RNA, Where and in What Formas DNA Present in the Cell?	3	**CO3**

IV	**DNA Replication:** Introduction, Separation of Strands, Replication Bubble, and Forks Priming, Addition of New Monomers (DNA Elongation) and Directionality Leading and Lagging Strands and Okazaki Fragments, Problem at the Ends of, Non-Circular DNA Proofreading and Repair of DNA Cell Replication and Its Quantification: Introduction, DNA Replication in a Cell- Part of the Cell Cycle, Steps in a Cell Cycle, Why Should Cells Replicate? Quantification of Cell Division, Chromosomes in the Cell, All Cells Undergo Mitosis, Germ Cells Undergo Both Mitosis and Meiosis.	**3**	**CO4**
V	**How are Proteins Made in the Cell:** Transcription and Translation: Introduction, The Central Dogma, Overview—Transcription and Translation Processes, The Genetic Code, Transcription—Initiation, Elongation, and Termination, Initiation, Elongation, Termination, Modifications to the Eukaryotic, Pre-MRNA, Cut-Paste, Translation— Initiation, Elongation, and Termination, Initiation, Elongation of the Polypeptide Chain, Termination, Post-Translational Modifications, Protein Targeting, Mutations and Their Outcomes, Mutation—The Molecular Mechanism of Evolution and, the Core of Genetic Engineering. **Mendelian Genetics as a Useful Tool:** Introduction, Common Genetic Disorders in India, Common Genetic Disorders, Across the World, Mendelian Genetics—The First Approximation Tool to Predict Genetic Disorders in the Offspring, Essentials of Mendelian Genetics, Probabilities of Occurrence in Mendelian Genetics, Pedigree Analysis, Sex-Linked Inheritance, Non-Mendelian Inheritance	**3**	**CO4**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	G K Suraishkumar	Biology for Engineers	Oxford University Press. 2021 Edition
2	K. A. N. Kumar	Biology for Engineers	McGraw Hill Education, 1st Edition, 2019.

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1.	Nelson D. L. & Cox M. M.	Lehninger Principles of Biochemistry,	*Lehninger Principles of Biochemistry*,

8. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Conduction of Experiments, Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Mr. Gangadharagowda P H**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Engineering Mathematics -II
Course Code	**22MAT-21**
Program	Common to all branches
Academic Year/Semester	2025-2026 / 2nd Semester
Course Type	☐ Core ☐ Elective ☐ Lab ☐✓ **Integrated**
Prerequisite (If any)	Algebra ,Trignometry,Elementry Caluclus
Contact Hours per Week	Lecture: 3 Tutorial: 2 Practical: 0 Total: 5
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive foundation in advanced mathematical concepts essential for engineering and applied sciences. It covers vector calculus, ordinary and partial differential equations, infinite series, and numerical methods. Emphasis is placed on developing problem-solving skills and applying these mathematical tools to analyze and model real-world engineering problems.

2. Course Objectives

The purpose of the course is to enable the students with concrete foundation of vector calculus, ordinary and partial differential equations, infinite series, and numerical methods enabling them to acquire the knowledge of these mathematical tools.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Solve the solenoidal and irrotational vector andsurface volume integral applications.	3	PO1, PO2, PO5, PO12
CO2	Students will be able to analyze and explain physical models formulated with higher-order differential equations and apply appropriate methods to solve these linear ordinary differential equations.	2	PO1, PO2, PO5, PO12
CO3	Students will be able to understand and classify different types of partial differential equations, and apply exact methods, including the method of separation of variables, to obtain their solutions.	2	PO1,PO2,PO5 ,PO12
CO4	Describe the applications of infinite series and obtain series solution of ordinary differential equations.	2	PO1,PO2,PO5 ,PO12

CO5	Apply the knowledge of numerical methods in the models of various physical and engineering phenomena.	3	PO1, PO2, PO5, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Vector Differentiation:** Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- Illustrative problems.	**10**	**CO1**
II	**Differential Equations of higher order:** Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters and; Cauchy's and Legendre homogeneous equations.	**10**	**CO2**
III	**Partial Differential Equations (PDE's):** Formation of PDE's by elimination of arbitrary constants / functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Derivation of one-dimensional heat and wave equations and solutions by the method of separation of variables.	**10**	**CO3**
IV	**Infinite Series:**Series of Positive Terms-Convergence and divergence of infinite series.Cauchy's root test and D'Alembert's ratio test (without proof) - Illustrative examples. **Power series solutions:** Series solution of Bessel's differential equation leading to $5_5(5)$-Besel's function of first kind orthogonality.	**10**	**CO4**
V	**Numerical Methods:** Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof). Solution of polynomial and transcendental equations –Newton-Raphson and Regula-Falsi methods (only formulae)- Illustrative examples. **Numerical integration:** Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof) – Problems.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions.

Practical	Title of Experiment / Activity
1	Finding gradient, divergent, curl and their geometrical interpretation.
2	Solutions of Second-order ordinary differential equations with initial/ boundary conditions.
3	Solution of one-dimensional heat equation and wave equation.
4	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson.
5	Interpolation/Extrapolation using Newton's forward and backward difference formula.
6	Computation of area under the curve using Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule.
7	Programme to compute area, volume, and center of gravity.
8	Solution of ODE of first order and first degree by runge Kutta fourth order
9	Solution of ODE of first order and first degree by Milne's method
10	Solution of ODE of first order and first degree by Taylors series method

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B. S. Grewal	Higher Engineering Mathematics	Khanna Publishers, 45^{th} Edition,2023.
2	E. Kreyszing	Advanced Engineering Mathematics	John Wiley & Sons, 10^{th} Edition (Reprint),2020.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	N. P. Bali and Manish Goyal	A Textbook of Engineering Mathematics	Laxmi Publications 12^{th} Edition, 2020.
2	B.V. Ramana	Higher Engineering Mathematics	McGraw-Hill ,1^{st} Edition, 2017.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test	20
Practical Components	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mrs. Dakshayini G	Name: Dr. Yuvaraja B K	Name: Dr. M Shankar	Name: Dr. Shobha B N
Designation: Assistant Professor	Designation: Professor and Head	Designation: Director IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	**Applied Chemistry**
Course Code	**22CHE-12/22**
Program	For all Program
Academic Year/Semester	2025/ 1st / 2nd Semester
Course Type	☐✓ **Core** ☐Elective ☐ Lab
Prerequisite (If any)	Include the basic knowledge of chemistry and some related areas that help them understand applications in engineering.
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total: 3
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Aug 2024
Course Description	This course provides an overview of electrochemistry, batteries, fuel cells, corrosion, and corrosion control techniques. It encompasses chemical fuels, solar energy systems, green chemistry principles, and water treatment methods. The course further introduces polymers, biodegradable materials, and nanomaterials, emphasizing their synthesis, properties, and engineering applications. Overall, it provides knowledge of modern materials, energy sources, and green technologies relevant to engineering applications.

2. Course Objectives

1. Master the basic knowledge of engineering chemistry for building technical competence in industries, research, and development.
2. Impart the basic knowledge of chemistry and its principles involved in electrochemistry, Battery technology and its applications.
3. Identifying and analyzing engineering problems related to metallic corrosion, achieving practical solutions for corrosion control and surface modifications of materials for engineering applications.
4. Apply the knowledge of Green Chemistry, principles for production of chemical compounds.
5. Master the knowledge of synthesis, properties, and utilization of engineering materials like polymers & Nano materials.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the concept of fuel cells and their significance in modern energy systems.	2	PO1, PO2
CO2	Apply their knowledge for protection of different metals from corrosion.	3	PO1, PO2
CO3	Use the theoretical knowledge on fuels like petrol and diesel and its drawbacks in engines.	2	PO1, PO2
CO4	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.	3	PO1, PO2, PO7, PO8
CO5	Use knowledge of polymer degradation to suggest applications where biodegradable polymers would be more suitable than metals or plastics.	2	PO1, PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Electrochemistry:** Introduction, Derivation of Nernst equation for single Electrode potential, Reference electrodes; Introduction, construction, working and applications of calomel electrode and Ag/Agcl electrodes. Ion selective electrode-Definition, construction and principle of glass electrode and determination of pH using glass electrode. Electrolyte concentration cells-definition, derivation of equation to find the emf of concentration cells, numerical problems on concentration cell. **Battery technology:** Introduction, characteristics, classification-primary, secondary, and reserve batteries. Construction, working and application of Zinc-Air, Ni-MH and Li-ion batteries. Fuel cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol oxygen fuel cell with H_2SO_4 electrolyte.	**10**	**CO1**
II	**Corrosion:** Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: anodic and cathodic areas, nature of corrosion product, nature of medium-pH, conductivity and temperature. Types of corrosion – Differential metal and differential aeriation-pitting and waterline) and stress (Caustic embrittlement in boilers). Corrosion control: Anodizing-Anodizing of aluminium and phosphating, cathodic protection-sacrificial anode and impressed current methods, Metal Coatings-Galvanization and Tinning. **Metal finishing:** Introduction, Technological importance of metal finishing. Factors governing electroplating-Polarization, Decomposition	10	**CO2**

	potential and Over voltage. Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electroless plating: Introduction, distinction between electroplating and electroless plating processes. Electroless plating of copper.		
III	**Chemical Fuels:** Introduction, Classification, definitions of CV, LCV and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine- definition, mechanism, ill effects and prevention. Octane and cetane number. Leaded petrol, unleaded petrol, Power alcohol and biodiesel. **Solar energy:** Photovoltaic cells-introduction, construction and working of a typical PV cell, Preparation of solar grade silicon by Union Carbide process/Method. Advantages & disadvantages of PV cell.	10	**CO3**
IV	**Green Chemistry:** Introduction, definition, Major environmental pollutants-Oxides of Nitrogen, Sulphur and Carbon (Source, effect and control), Basic principles of green chemistry-brief discussion on 12 principles of green chemistry. Various green chemical approaches-Microwave synthesis, Bio catalysed reaction (only explanation with examples), Solvent-free reactions advantages and conditions Synthesis of typical organic compounds by conventional and green route; i) Adipic acid ii) Paracetamol. Industrial applications of green chemistry. **Water chemistry:** Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Sources of water pollution, Definitions of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. **Sewage treatment:** primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.	10	**CO4**
V	**Engineering Materials** **Polymer:** Introduction, types of polymerization-addition and condensation polymers. Mechanism of polymerization-free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average Numerical problems, Synthesis and applications of Polyurethanes. Synthesis, properties and applications of Epoxy resin and Silicon rubber. **Biodegradable polymers:** Introduction and their requirements. Synthesis, properties and applications of Poly lactic acid. **Nanomaterials:** Introduction, size dependent properties (Surface area, Electrical, Optical, catalytic and Thermal properties) Synthesis of nanomaterials: Top down and bottom-up approaches, Synthesis by Sol-gel, and precipitation method, Nanoscale materials: Fullerenes, Carbon nanotubes and graphene- brief Explanation, properties, and applications.	10	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	P.C. Jain & Monica Jain	Engineering chemistry	Dhanpat Rai Publishing company, (2015- Edition).
2	Subhendu Chakroborty, Susheel Mittal & Somaditya Sen	Engineering Chemistry	Cengage India 1st Edition 2022

7. Reference Books

SL. No.	Author (s)	Title	Publisher & Year
1	O. G. Palanna	Engineering Chemistry	McGraw Hill, 2nd Edition, 2017
2	Prasanta Rath & Sanjay Kumar Singh	Engineering Chemistry	Cengage Learning India 1st Edition 2022

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

8. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Gangadharagowda P H**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shoba B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean & Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Programming in C Language**
Course Code	**22PCL13/23**
Program	Computer Science and Engineering
Academic Year/Semester	2025-26/1st / 2nd Semester
Course Type	☐ ✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total:3
Credits	03
W.e.f	2022-23
Approved in AC on	23.01.2025
Course Description	A "Programming in C" course typically introduces students to the fundamentals of computer programming using the C language. The course aims to provide a strong foundation in programming concepts and problem-solving techniques.

2. Course Objectives

1. To learn basic principles of Problem solving
2. Implementing through C programming language.
3. Design & develop programming skills.

3. Course Outcomes (COs)

Students should be able to

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Discuss and explore the fundamental Computer concepts and identify basic elements of c programming structures like data types expressions.	2	PO1,PO2,PO3, PO10,PO12
CO2	Identify basic elements of C programming structures like control statements, various simple functions and in view of using them in problem solving.	2	PO1,PO2,PO3, PO10,PO12
CO3	Apply various operations on derived data types like arrays and strings.	3	PO1,PO2,PO3, PO10,PO12
CO4	Apply various operations of functions and structure in problem solving.	3	PO1,PO2,PO3, PO10,PO12
CO5	Apply various operations of pointer and file handling.	3	PO1,PO2,PO3,PO10,PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Introduction to computing, Constants, variables, Data types, operators and expressions, Input and output operations. **Decision making & Branching:** Introduction, Decision making with if statement, simple if statement, the if-else statement, nesting of if-else statement, the else-if ladder, the switch statement, ternary operator? Goto statement, Programming examples and exercises.	**10**	**CO1**
II	**Looping:** Introduction, the while statement, the do statement, the for statement, break and continue, Programming examples and Exercises. **Textbook 1: Chapter 7** **Arrays:** Introduction, One-dimensional array, Declaration of One-Dimensional arrays, Initialization of one- dimensional arrays programming examples (Linear search, binary search, bubble sort, selection sort), Two-dimensional arrays, Initialization of two-dimensional arrays, programming examples (Addition of two matrices, multiplication of two matrix)	**10**	**CO2**
III	**Strings:** Introduction, Declaring and Initializing string variables, Reading and writing strings, String handling functions, String input and output functions, Array of strings. **Textbook 1: Chapter 9** **Functions**: Introduction, need for user-defined functions, elements of user defined function, Definition of functions, parameter passing mechanisms: Call by value and call by reference, Category of functions, nesting of functions. Passing arrays to functions.	**10**	**CO3**
IV	**Preprocessors:** Introduction to Preprocessors, macro substitution, file inclusion, compiler control Directives, Programming examples and Exercises. **Textbook 1: Chapter 15** **Structures:** Introduction, defining a structure, declaring a structure, accessing a structure member, structure initialization, copying and comparing structure variables, Array of structures, arrays within structures, structure within structures. **Unions:** Union definition, declaration.	**10**	**CO4**
V	**Pointers:** Introduction to pointers, pointers and arrays, pointers and strings, pointer and structure, Allocating Memory at Runtime. **File Management:** Introduction, Defining and opening a File, Closing a File, Input/output operations on Files, Error Handling during I/O Operations, Random Access to Files.	**10**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)-

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	E. Balagurusamy	Programming in ANSI C	McGraw-Hill, 8th edition 2014.
2	Vikas Gupta	Computer Concepts and C Programming	Dreamtech Press 2014
3	Yashavant kanetkar	Understanding Pointer in C	McGraw-Hill, 5th Edition 2019

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language	PHI, 2nd Edition, 2012
2	R S Bichkar	Programming with C	University Press, 1st Edition, 2012
3	V Rajaraman	Computer Programming in C	PHI, 2nd Edition 2019.
4	Byron GottFried & Schaum's	Outlines Programming with C	McGraw-Hill, 2nd Edition, 2013

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
Semester End Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr.Prasanna Kumar M J	**Name: Dr. Shashikala S V**	**Name: Dr. M Shankar**	**Name: Dr. Shobha B N**
Designation: Assistant Professor	**Designation: Professor and HoD**	**Designation: Director IQAC**	**Designation: Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Basic Electronics**
Course Code	**22ELN-14/24**
Program	Electronics & Communication Engineering
Academic Year/Semester	2025-26/ 1st and 2nd Semester
Course Type	☐✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	The student is expected to have a basic understanding of Physics (semiconductors, electricity, and magnetism) and fundamental Electrical Engineering concepts such as Ohm's law, Kirchhoff's laws, and AC/DC circuit analysis.
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical:0 Total: 3
Credits	**3**
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamentals of semiconductor devices, diodes, transistors, and operational amplifiers. The course covers rectifiers, amplifiers, oscillators, and basic digital circuits with applications in communication and control.

2. Course Objectives

1. Uunderstand characteristics, operation and applications of the diodes, Bipolar Junction Transistors, Field Effect Transistors, SCR and Operational Amplifiers in electronic circuits.
2. Understand different number systems and working of fundamental building block of Digital Circuits.
3. Understand the principle of basic communication system and mobile phones.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the construction, operation and Characteristics of semiconductor diodes.	3	PO1, PO2, PO3, PO12
CO2	Explain the construction, operation and applications of transistor circuits.	3	PO1, PO2, PO3, PO12
CO3	Design op-amp for various applications.	3	PO1, PO2, PO3, PO12
CO4	Apply the knowledge of engineering fundamentals to analyze and design digital circuits.	3	PO1, PO2, PO3, PO12
CO5	Describe the basic principle of operation of communication system and mobile phones.	3	PO1, PO2, PO3, PO12

4. Course Content (Module-Wise)

Unit	Topics	Hours	COs
I	**Semiconductor Devices:** Classification of semiconductors, P-N junction diode: operation and its characteristics, Half wave rectifier: operation, efficiency, Full wave rectifiers: types, operation, efficiency, Zener diode and its characteristics, Zener diode as Voltage regulator.	**8**	**CO1**
II	**Transistors & its Applications:** Bi-polar junction transistor : operation, types (NPN & PNP), CE configurations and characteristics, DC load line and operating point, Biasing techniques, BJT as an amplifier and switch. Field-Effect Transistors: Depletion-Type MOSFET, Enhancement- Type MOSFET. Construction & Characteristic of JFET, Silicon Controlled Rectifier (SCR), Two Transistor Model.	**8**	**CO2**
III	**Oscillators :** Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations). **Operational amplifiers** Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits.	**8**	**CO3**
IV	**Digital fundamentals Number System** Binary, Hexadecimal, Conversion Decimal to binary, Hexadecimal to decimal and vice-versa, Binary addition and subtraction using 1's and 2's complement method, Review of logic gates, NAND as universal gate (as OR, AND & NOT), Boolean Algebra, Demorgan's theorems, Simplification and realization of Boolean expressions using basic gates and NAND gates, Half adder, Full adder and Parallel adder	**8**	**CO4**
V	**Analog Communication System** Block diagram of communication system, Need for modulation, Definition of modulation, Amplitude modulation: Definition and waveform, Expression for AM, Modulation index. Frequency Modulation: Definition and waveform (Qualitative analysis), Modulation index, Comparison of AM and FM, Principle of operation of Mobile Phone, Microwave Communication, Optical fiber communication. **Digital Modulation Schemes:** Advantages of digital communication over Analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques	**8**	**CO5**

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Robert L. Boylestad, Louis Nashelsky	Electronic devices and circuit theory	PHI Publication, 11th Edition, 2012.
2	D P Kothari, I J Nagrath	Basic Electronics	McGraw Hill Education, 2nd Edition, 2017.

7. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Thomas L Floyd	Electronic Devices	Pearson Education, 9th Edition, 2012.
2	Sudhakar Samuel	Logic Design	Pearson / Sanguine, 10th Edition, 2007.
3	George Kennedy	Electronic Communication System	TMH, 5th Edition, 2015.

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Dr. Prabhavathi K	Name: Dr. Naveen K B	Name: Dr. M Shankar	Name: Dr. Shobha B N
Designation: Assistant Professor	Designation: Professor	Designation: Director, IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	ELEMENTS OF MECHANICAL ENGINEERING
Course Code	**22EME15/25**
Program	Mechanical Engineering
Academic Year/Semester	2025-2026 / 1st / 2nd Semester
Course Type	☐✓ **Core** ☐Elective ☐ Lab
Prerequisite (If any)	Basic Physics and Chemistry Knowledge, General Science Background, Curiosity and Observation
Contact Hours per Week	Lecture: 2 Tutorial: 2 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Aug 2024
Course Description	Elements Of Mechanical Engineering course introduces the fundamental concepts and applications of mechanical engineering. It covers essential topics including energy sources, engineering materials, internal combustion engines, power transmission systems, and emerging technologies such as mechatronics and robotics. The course is designed to build a strong foundation in both conventional and modern mechanical engineering practices and prepare students for multidisciplinary applications in real-world scenarios.

2. Course Objectives

1. Acquire a basic understanding role of Mechanical Engineering in the industry and society.
2. Acquire a basic understanding of energy resources and basic concepts of Hydraulic turbines.
3. Acquire knowledge of various engineering materials and metal joining techniques.
4. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.
5. Acquire essential experience on basic Power transmission systems, robotics and automation.
6. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their Advancement

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Comprehend the basic knowledge of mechanical engineering in energy and its utilization, materials technology, manufacturing techniques, and transmission systems through demonstrations	2	PO1,PO2,PO6,PO7,P012

CO2	Recognize the application of energy sources in Power generation and utilization of Engineering materials in manufacturing	2	PO1,PO2,,PO6,PO7,P012
CO3	Apply the skills in developing simple mechanical elements and processes.	3	PO1,PO2,PO3,PO8,P012

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Energy Sources and Power Plants**: Review of energy sources; Construction and working of Hydel power plant, Solar power plant, Tidal power plant, Wind power plant. **Steam formation and application:** Modes of heat transfer, steam formation, Types of Steam, Stem properties and application, Numerical problems	**08**	**CO1**
II	**Engineering Materials**: Ferrous Metals: Cast iron and its types, Steel: Mild steel and Medium carbon steel. Non-ferrous Metals: Aluminum, Copper and its alloys. Smart materials- Piezoelectric materials, shape memory alloys, semiconductors, and super- insulators. **Metal Joining Processes:** Soldering, Brazing and Welding: Definitions. Classification and methods of soldering, brazing, and welding. Brief description of arc welding, Electrodes used in arc welding Oxy-acetylene welding, types of flames.	**08**	**CO1**
III	**Fundamentals of IC Engines:** Review of Internal Combustion Engines, 2-Strokes and 4-Strokes engines, Components and working principles, Performance parameters. Insight into future mobility technology: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles, Drives and Transmission. Advantages and disadvantages of EVs and Hybrid vehicles. **Refrigeration and Air-Conditioning:** Principle of refrigeration, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapour Compression and Vapour absorption Refrigeration. Working Principles of Air Conditioning, Classification, and Applications of Air Conditioners. Concept and operation of room air conditioning system	**08**	**CO2**
IV	**Power Transmission:** Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Numerical problems on Simple Gear trains Belt Drives: Components of belt drive and concept of velocity ratio; Types of belt drives- Flat- Belt Drive and V-Belt Drive with Application. Simple numerical on Belt drives involving velocity ratios. **Fundamentals of Machine Tools and Operations**: Working Principle of Lathe and Operations: Turning, Facing, Thread Cutting, Taper Turning and Knurling. Working Principle of Drilling Machine and operations: Reaming, Boring, Tapping, Counter Boring, Counter Sinking. Working Principle of Milling and Operations: Plain or slab milling, Face milling, End milling, Slot milling, Angular milling.	**08**	**CO2**

V	**Introduction to Mechatronics**: Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle. **Introduction to Robotics and Automation**: Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection. Automation types, NC machines, CNC machines, 3D Printing.	**08**	**CO3**

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2				1	2					2
CO2	3	2				1	2					2
CO3	3	2	1					1				2

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Demonstration of working models of various energy sources and power plants
2	Identification of engineering materials and demonstration of basic welding methods
3	Dismantling and assembly of a two-stroke/ four-stroke engine
4	Demonstration of lathe machine operations and gear/belt drive mechanisms

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	K. R. Gopala Krishna	Elements of Mechanical Engineering	Subhash publications 2nd 2022
2	Jonathan A. Wickert, Kemper Lewis	An Introduction to Mechanical Engineering	Cengage Learning India, 4th Kdition 2023
3	Appu Kuttan K K	Robotics	I K International Publishing House, 1st 2013

8. Reference Books

S. No.	Author (s)	Title	Publisher & Year
1	S. Trambaka Murthy	Elements of Mechanical Engineering	I K International Publishing House, Revised 3rd Edition 2010
2	H G Kataria, S.M.Bhat	Elements of Mechanical Engineering	Books India Publications, 9th Edition 2017

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **Keerthi B L**	**Name:** **Dr. Manjunath S H**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Applied Chemistry Lab
Course Code	**22CHEL-16/26**
Program	For all Program
Academic Year/Semester	2025-2026/ 1st / 2nd semester
Course Type	☐ Core ☐ Elective ☐✓ Lab
Prerequisite (If any)	Fundamental Concepts of Chemistry
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides fundamental insights into modern physics and its applications in engineering. It covers quantum mechanics concepts including blackbody radiation, wave-particle duality, uncertainty principle, and free electron theory. The study of oscillations, damping, resonance, and shock waves builds understanding of wave phenomena. Properties of engineering materials such as elasticity, bending, and torsion are explored. The course introduces laser principles, optical fiber communication, and applications in defence, medicine, and data storage.

2. Course Objectives

1. Quantitative analysis of materials by volumetric and chemical method. 2.Instrumental methods for developing experimental skills in building technical competence.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the basic knowledge for different types of instruments.	2	PO1, PO2
CO2	Carrying different types of titrations for estimation of concentration of the solution.	2	PO1, PO2
CO3	Knowledge on water analysis.	1	PO1, PO2

4. Course Content (Unit-Wise)

Part A: Instrumental Experiments			
No.	**Toipcs**	**Hours**	**COs**
1	Estimation of FAS Potentiometrically using standard $K_2Cr_2O_7$ solution.	02	CO1
2	Estimation of Acids in acid mixture Conductometrically.	02	CO2
3	Determination of Viscosity co-efficient of a given liquid using Ostwald's viscometer.	02	CO1
4	Estimation of copper by Colorimeter.	02	CO2
5	Determination of pKa value of a given weak acid using pH meter.	02	CO1
Part B: Volumetric Experiments			
1	Estimation of Total hardness of water by EDTA complexometric method.	02	CO3
2	Estimation of CaO in cement solution by rapid EDTA method.	02	CO2
3	Determination of percentage of copper in brass using standard sodium thiosulphate solution	02	CO2
4	Determination of COD of industrial waste water.	02	CO1
5	Estimation of percentage of Iron in given haematite ore solution using standard $K_2Cr_2O_7$ solution (External indicator method).	02	CO2

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2	2	3										
CO3	3	2										

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	Vogel's A.I.	A text book of quantitative analysis	Longman Scientific & Technical, 35th edition, 2012.
2	Willard, Merit, Dean and Settle	A text book of Instrumental analysis	Wadsworth Publishing Company, 6th edition 2012.

7. Reference Books

Sr. No.	Author(s)	Title	Publisher & Year
1.	G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I	Vogel's text book of quantitative analysis,	Longman Scientific & Technical. 35th edition, 2012.
2.	Gary D Christian,	Analytical Chemistry	Wiley India, 6th edition, 2015.

8. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Conduction of Experiments, Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: **Mr. Gangadharagowda P H**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director IQAC**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Computer Programming Laboratory**
Course Code	**22CPL17/27**
Program	Computer Science and Engineering
Academic Year/Semester	2025-26/1st /2nd Semester
Course Type	☐ Core ☐ Elective ☐ ✓ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total:3
Credits	01
W.e.f	2022-23
Approved in AC on	23.01.2025
Course Description	This laboratory course introduces students to the fundamentals of problem-solving using **C** programming. Implementation is done by using modern IDEs (e.g., Code::Blocks, Turbo C, GCC in Linux, or Visual Studio). It provides hands-on experience in algorithm design, flowcharting, and structured programming techniques. The experiments focus on developing computational thinking, implementing control structures, using data types, arrays, strings, structures, functions, pointers, recursion, and file handling. Students will also practice debugging, code organization, and program documentation.

2. Course Objectives

1. To practice writing flowcharts, algorithms and programs.
2. To implement basics of C programming language.
3. To provide solutions to the laboratory programs.
4. To familiarize the processes of debugging and execution.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Execute C Program on control structures.	2	PO1, PO2,PO5,PO12
CO2	Execute C programs using arrays and functions.	2	PO1,PO2,PO3,PO5,PO12
CO3	Execute C programs on string handling functions.	3	PO1,PO2,PO3,PO4,PO12
CO4	Execute C programs on pointers, structures and files.	3	PO1,PO2,PO3,PO4,PO12

4. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)-

5. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Develop an algorithm and implement simple C program to solve simple computational problems using arithmetic expressions, demonstrate familiarization with programming environment, concept of naming the program files, storing, compilation and debugging, using different data types.
2	Draw the flowchart and implement a simple C program to solve problems involving if-then-else structures to find the largest of given three positive integers.
3	Design and develop a flowchart or an algorithm that takes three coefficients (a, b, and c) of a Quadratic equation (ax2+bx+c=0) as input and compute all possible roots. Implement a C program for the developed flowchart/ algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages. (Using switch statement).
4	Design and develop an algorithm to find the reverse of an integer number NUM and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: 2014, Reverse: 4102, Not a Palindrome.
5	Draw the flowchart and Write C Program to compute Sin(x) using Taylor series approximation given by Sin(x) = x - (x3/3!) + (x5/5!) - (x7/7!) + ……. Compare the result with the built- in Library function and print both the results with appropriate messages.
6	Develop an algorithm, implement and execute a C program that reads N integer numbers and arrange them in ascending order using Bubble Sort.
7	Develop, implement and execute a C program that reads two matrices A (m x n) and B (p x q) and Compute the product A and B. Read matrix A and matrix B in row major order and in column major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only. Program must check the compatibility of orders of the matrices for multiplication. Report appropriate message in case of incompatibility.
8	Draw the flowchart and write a recursive C function to find the factorial of a number, n!, defined by fact(n)=1, if n=0. Otherwise fact(n)=n*fact(n-1). Using this function, write a C program to compute the binomial coefficient nCr. Tabulate the results for different values of n and r with suitable messages.
9	Implement structures to read, write, and compute average- marks and the students scoring above and below the average marks for a class of 60 students.

10	Write and execute a C program that: i. Implement string copy operation STRCPY (str1, str2) that copies a string str1 to another string str2 without using library function. ii. Reads a sentence and prints frequency of each of the vowels and total count of consonants using user defined functions
11	Develop, implement and execute a C program to search a Name in a list of names using Binary searching Technique.
12	Write a C program to find the sum and average of N floating point numbers Using pointer.
13	Write a C Program to first read from the file and then append the data of the file.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	E. Balagurusamy	Programming in ANSI C	McGraw-Hill, 8th edition 2014.
2	Vikas Gupta	Computer Concepts and C Programming	Dreamtech Press 2014
3	Yashavant kanetkar	Understanding Pointer in C	McGraw-Hill, 5th Edition 2019

8 Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language	PHI, 2nd Edition, 2012
2	R S Bichkar	Programming with C	University Press, 1st Edition, 2012
3	V Rajaraman	Computer Programming in C	PHI, 2nd Edition 2019.
4	Byron GottFried & Schaum's	Outlines Programming with C	McGraw-Hill, 2nd Edition, 2013

9. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
Semester End Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mr.Prasanna Kumar M J	Name: Dr. Shashikala S V	Name: Dr. M Shankar	Name: Dr. B N Shobha
Designation: Assistant Professor	Designation: Professor and Head	Designation: Director IQAC	Designation: Dean and Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	**Communicative-English-II**
Course Code	**22AEC-28**
Program	Basic Science
Academic Year/Semester	2025-2026 / 2nd Semester
Course Type	☐ √**Core** ☐ Elective ☐ Lab
Prerequisite (If any)	-
Contact Hours per Week	Lecture: 1 Tutorial: 1 Practical: 0 Total:5
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Communicative English-II is an essential paper in Engineering Courses that ensures the communicative skills in English. This course provides a strong communicative basis by emphasizing on LSRW skills. It focusses language competency of students for their profession.

2. Course Objectives

The course will enable the students,

- To Identify the Common Errors in Writing and Speaking of English.
- To achieve better technical writing and Presentation skills for employment.
- To read technical proposals properly and make them to write good technical reports.
- Acquire Employment and Workplace communication skills. To learn about Techniques of Information Transfer through presentation in different level.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify the Common Errors in Writing and Speaking.	2	PO1.PO2, PO10, PO12
CO2	To achieve better technical writing and Presentation skills.	3	PO1.PO2, PO10, PO12
CO3	To read technical proposals properly and make them to Write good technical reports.	2	PO1.PO2, PO10, PO12
CO4	Use all types of English vocabulary and language proficiency.	3	PO1.PO2, PO10, PO12
CO5	Adopt the Techniques of Information Transfer through presentation.	5	PO1.PO2, PO10, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Orientation and activity:** **Daily Activity –** Leadership work and position, academic Clubs and teams, Volunteering and community service (Park/Garden cleanup, Book donation, Plant trees, Donating Blood etc) and Artistic and Pursuits etc. **Proficiency in language –** Practice, read English newspapers, magazines, articles and books or journals. Extra-Curricular Activities in College- By doing some Cultural activities, event competitions like political activism (rallies, street marches, strikes), social activity (NSS), technological skills and debate etc.	**10**	**CO1**
II	**Nature and Style of sensible writing:** Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indians in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercise, Practice of Sentence Corrections activities. Importance of Summarizing and Paraphrasing. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés.	**10**	**CO2**
III	**Technical Reading and Writing Practices:** Reading Process and Reading Strategies, Introduction to Technical writing process, understanding of writing process, Effective Technical Reading and Writing Practices, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. **Introduction to Technical Proposals Writing,** Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar–Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.	**10**	**CO3**
IV	**Professional Communication for Employment:** The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener. Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading. Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume v/s Biodata, Profile, CV and others, Types of resumes, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.	**10**	**CO4**
V	**Professional Communication at Workplace:** Group Discussions– Importance, Characteristics, Strategies of Group Discussions. Group Discussions is a Tool for Selection. Employment/Job Interviews- Importance, Characteristics. Strategies of an Employment / Job Interviews. Intra and Interpersonal Communication Skills-	**10**	**CO5**

	Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. Non-Verbal Communication Skills (Body Language) and its Importance in GD and PI/JI/EI. Presentation skills and Formal Presentations by Students-Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various Situations (Activity based Practical Sessions in class by Students).		

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Text Books

SL. No.	Author(s)	Title	Publisher & Year
1	Kriti gulati	Teaching academic writing in English:- a practical approach	Atlantic, 2012 Edition
2	Natasha terk	Professional Writing skills	Harper Collins 2017 Edition

7. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	John Seely	Oxford Guide to Effective Writing and Speaking	Oxford University -2013 Edition
2	Michael Swan	Practical English Usage	Oxford University -2017 Edition

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: **D. Vidyashankari**	**Name:** **Dr. Yuvaraja B K**	**Name:** **Dr. M Shankar**	**Name:** **Dr. Shobha B N**
Designation: **Assistant Professor**	**Designation:** **Professor and Head**	**Designation:** **Director and Head**	**Designation:** **Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	**Data Science**
Course Code	**22DS19/29**
Program	Computer Science and Engineering
Academic Year/Semester	2025-26/1st /2nd Semester
Course Type	☐ Core ☐ Elective ☐ ✓ Lab
Prerequisite (If any)	
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total:3
Credits	03
W.e.f	2022-23
Approved in AC on	23.01.2025
Course Description	A data science lab involves hands-on application of scientific methods, programming languages (like Python), and tools (Jupyter Notebooks, Pandas, NumPy) to analyze and extract insights from data. These courses focus on transforming theoretical knowledge into practical skills for data collection, manipulation, modeling (including AI/ML), visualization, and presenting results to solve real-world problems in domains like finance and healthcare.

2. Course Objectives

1. To acquire programming skills in core Python.
2. To learn how to write loops and decision statements in Python.
3. To develop the skill of designing Graphical user Interfaces in Python.

3. Course Outcomes (COs)

Students able to do

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Illustrate basic operations in Python program.	2	PO1,PO2
CO2	Illustrate Python programs with conditionals and loops	2	PO1,PO2,PO3
CO3	Implement concepts of searching and sorting using Python Programming.	3	PO1,PO2,PO3,PO5
CO4	Implement the basic building blocks and display different chats	2	PO1,PO2,PO5,PO10

4. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)-

5. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Write a Python program to find sum and average of two numbers
2	Write a Python program to convert temperature in Celsius to Fahrenheit
3	Write a Python program to check whether a given number is prime or not
4	Write a Python program to find length of string and to convert upper to lower case of a string.
5	Write a program to count a number of vowels in a string.
6	Write a Python program to create an array of 5 integers and display an array.
7	Write a Python program to plot bar graph using labels of languages ‘C’, ‘C++’, ‘Java’, ‘Python’, ‘PHP’ and students’ marks scored in above languages.
8	Write a Python program to plot pie chart using labels of brands of cars ‘AUDI’, ‘BMW’,’FORD’, ‘TESLA’, ‘JAGUAR’, ‘MERCEDES’ and sales of the cars.

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Charles R. Severance	Python for Everybody: Exploring Data Using Python 3	Create Space Independent 1st Edition. 2013
2	Allen B. Downey,	Think Python: How to Think Like a Computer Scientist,	Green Tea Press, 2nd Edition, 2015

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Charles Dierbach	Introduction to Computer Science Using Python	Wiley, 1st Edition , 2015
2.	Mark Lutz,	Programming Python,	OReilly, Media,4th Edition, 2011

8. Assessment Scheme

Component	Weightage (%)
Description, Write Up and punctuality (10%)	40
Conduction of experiment and output (10%)	
Viva Voce (10%)	
Record Write up (10%)	
Internal Assessment Test	10
Semester End Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Conduction of Experiments, Internal Tests, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Mr.Prasanna Kumar M J	**Name: Dr. Shashikala S V**	**Name: Dr. Shankar M**	**Name: Dr. B K Narendra**
Designation: Assistant Professor	**Designation: Professor and HoD**	**Designation: IQAC, Director**	**Designation: Dean and Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

III **SEMESTER**

Sl. No	Course Code	Title of the Course	Teaching Hours/week				Examination				Credits
			L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	22MAT31	Mathematics III	03	01	0	04	03	50	50	03	4
2	22CV32	Strength of Materials	03	01	0	04	03	50	50	03	4
3	22CV33	Building Materials	03	01	0	04	03	50	50	03	3
4	22CV34	Urban Transport Engineering	03	01	0	04	03	50	50	03	3
5	22CV35	Geomatics	03	01	0	04	03	50	50	03	3
6	22CVL36	Material Testing Lab	01	0	2	03	03	50	50	02	1
7	22CVL37	Geomatics Lab	01	0	2	03	03	50	50	02	1
8	22AEC38A/38B	Design Thinking/ SSD-1	01	0	2	02	02	50	50	01	1
9	22UHV39A/39B	Yoga/ Sports	01	0	0	02	02	50	50	01	1
10	22DIPMAT40	Additional Mathematics-I	3	0	0	3	----	50	---	50	
			19	05	6	30	25	500	450	950	21
20 + 20 + 21											61

IV **SEMESTER**

Sl. No	Course Code	Title of the Course	Teaching Hours/week				Examination				Credits
			L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	22MAT41	Mathematics IV	03	01	0	04	03	50	50	100	4
2	22CV42	Structural Analysis	03	01	0	04	03	50	50	100	4
3	22CV43	Hydrodynamics	03	01	0	04	03	50	50	100	3
4	22CV44	Transportation Infrastructure Design	03	01	0	04	03	50	50	100	3
5	22CVL45	Computer Aided Building Planning & Drawing Lab	03	01	0	04	03	50	50	100	3
6	22CVL46	Concrete and Highway Material Testing Lab	01	0	2	03	03	50	50	100	1
7	22CVL47	Hydrodynamics Lab	01	0	2	03	03	50	50	100	1
8	22AEC 48A/48B	Design Thinking / SSD-I	01	0	2	02	02	50	50	100	1
9	22 UHV49A/49B	Yoga / Sports	01	0	0	02	02	50	50	100	1
10	22DIPMAT50	Additional Mathematics-II	3	0	0	3	----	50	----	50	21
			22	05	6	33	25	500	450	950	
20 + 20 + 21 + 21											82

V **SEMESTER**

Sl. No	Course	Course Code	Title of the Course	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	22CV51	Reinforced Cement Concrete	03	01	00	04	03	50	50	100	04
2	PCC	22CV52	Geotechnical Engg	03	01	00	04	03	50	50	100	03
3	IPCC	22CV53	Hydrology & Irrigation Engg	02	00	02	04	03	50	50	100	04
4	PCC	22CV54	Repair and Rehabilitation of Structures	03	01	00	04	03	50	50	100	03
5	PCC	22CV55X	Professional Elective-I	03	01	00	04	03	50	50	100	03
6	PCCL	22CVL56	Geotechnical Engg Lab	01	00	02	03	02	50	50	100	01
7	PCCL	22CVL57	CAED-RCC	01	00	02	03	02	50	50	100	01
8	HSMC	22AEC58	MOOCS/NPTEL	00	00	02	02	02	50	50	100	01
9	HSMC	22UHV59	CIP	02	00	00	02	02	50	50	100	01
TOTAL CREDITS & CONTACT HOURS				**18**	**04**	**08**	**30**	**23**	**450**	**450**	**900**	**21**
TOTAL CREDITS (I+II+III+IV)				**20 + 20 + 21 + 21+21**								**103**

VI SEMESTER

Sl. No	Course	Course Code	Title of the Course	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	22CV61	Construction Management & Entrepreneurship	03	01	00	04	03	50	50	100	03
2	PCC	22CV62	Design of Steel Structures	03	01	00	04	03	50	50	100	04
3	PCC	22CV63	Water & Waste Water Engg	03	01	00	04	03	50	50	100	04
4	PCC	22CV64X	Professional Elective-II	03	01	00	04	03	50	50	100	03
5	PCC	22CVOE65X	Open Elective-I	03	01	00	04	03	50	50	100	03
6	PCCL	22CVL66	Extensive Survey Project	01	00	02	03	02	50	50	100	01
7	PCCL	22CVL67	CAED-SS	01	00	02	03	02	50	50	100	01
8	HSMC	22AEC68	RM	00	00	02	02	02	50	50	100	01
9	HSMC	22UHV69	EVS	02	00	00	02	02	50	50	100	01
TOTAL CREDITS & CONTACT HOURS				**19**	**05**	**06**	**30**	**23**	**450**	**450**	**900**	**21**
TOTAL CREDITS (I+II+III+IV)				**20 + 20 + 21 + 21+21+21**								**124**

VII SEMESTER

Sl. No	Course	Course Code	Title of the Course	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	IPCC	22CV71	Project Management	02	00	02	04	03	50	50	100	04
2	PCC	22CV72	Estimation & Costing	03	01	00	04	03	50	50	100	04
3	PCC	22CV73X	Professional Elective-III	03	01	00	04	03	50	50	100	03
4	PCC	22CVOE74X	Open Elective-II	03	01	00	04	03	50	50	100	03
5	PCC	22CVTS75	Technical Seminar	03	01	00	04	03	50	50	100	03
6	PCCL	22CVL76	Software Application Lab	01	00	02	03	02	50	50	100	01
7	PCCL	22CVL77	Environmental Engg Lab	01	00	02	03	02	50	50	100	01
8	PCCL	22CVPW78	Project Phase I	00	00	02	02	02	50	50	100	02
TOTAL CREDITS & CONTACT HOURS				**16**	**04**	**08**	**28**	**21**	**400**	**400**	**800**	**21**
TOTAL CREDITS (I+II+III+IV)				**20 + 20 + 21 + 21+21+21+21**								**145**

VIII SEMESTER

Sl. No	Course	Course Code	Title of the Course	Teaching Hours/week				Examination				Credits
				L	T	P	TL	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	22CV81	Pre-stressed Concrete	03	01	00	04	03	50	50	100	03
2	PCC	22CV82X	Professional Elective-IV	03	01	00	04	03	50	50	100	03
3	PCCL	22CVIN83	Internship	00	00	04	04	03	50	50	100	05
4	PCCL	22CVPW84	Project Work	00	00	06	06	03	100	100	200	10
TOTAL CREDITS & CONTACT HOURS				**06**	**02**	**10**	**18**	**12**	**250**	**250**	**500**	**21**
TOTAL CREDITS (I+II+III+IV+V+VI+VII+VIII)				**20 + 20 + 21 + 21+21+21+21+21**								**166**

ADICHUNCHANAGIRI UNIVERSITY
FACULTY OF ENGINEERING, MANAGEMENT & TECHNOLOGY
SCHEME OF TEACHING AND EXAMINATION
Bachelor of Engineering – Civil Engineering

Professional Elective - 1	
Code	**Course Title**
22CV551	Alternate Building Materials
22CV552	Matrix Method Of Structural Analysis
22CV553	Pavement Design
22CV554	Solid Waste Management

Professional Elective - 2	
Code	**Course Title**
22CV641	Traffic Engg
22CV642	Numerical Methods In Civil Engg
22CV643	Ground Improvement Technique
22CV644	Design for Safety

Professional Elective - 3	
Code	**Course Title**
22CV731	MOOC/NPTEL
22CV732	Urban Transportation Planning
22CV733	Advanced Concrete Technology
22CV734	Advanced Design Of RCC

Professional Elective - 4	
Code	**Course Title**
22CV821	Remote Sensing & GIS
22CV822	Advanced Constructional Materials
22CV823	Infrastructure Development & Management
22CV824	Design of Bridges

Open Elective - 1	
Code	**Course Title**
22CVOE651	Occupational Health & Safety
22CVOE652	Building Materials & Planning
22CVOE653	Space Technology
22CVOE654	Infrastructure Management

Open Elective – II	
Code	**Course Title**
22CVOE741	Environmental Impact Assessment
22CVOE742	Basic of Transportation Engineering
22CVOE743	Remote Sensing & GIS

1. Course Information

Section	Details
Course Title	Mathematics-III
Course Code	22MAT31
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Calculus, Differential Equations and Linear Algebra.
Contact Hours per Week	Lecture: 2 Tutorial: 1 Practical: 0 Total:3
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces Laplace transforms, Fourier series, and inverse techniques for solving engineering differential equations. It covers numerical methods such as Runge–Kutta and predictor–corrector approaches for practical problem-solving. Emphasis is placed on Vedic Mathematics to improve speed, accuracy, and creativity in calculations. The course also explores the calculus of variations with applications in physics, rigid body dynamics, and vibration analysis.

2. Course Objectives

1. To have an insight into Fourier series, Fourier transforms, Laplace transforms.
2. To develop the proficiency in variational calculus and solving ODE‘s arising in engineering applications, using numerical methods.
3. To increase the creativity and confidence to do calculations in Arithmetic, Algebra and even Geometry for that matter and simplify and speed up calculations.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Use Laplace transform and Inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.	L3	PO1, PO2, PO12
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.	L3	PO1, PO2, PO12

CO3	Solve first and second-order ordinary differential equations arising in engineering problems by applying single-step and multistep numerical methods.	L3	PO1, PO2, PO12
CO4	Foster the love for mathematics by creating a positive attitude through Vedic and Ancient Indian Mathematics, the extremals of functionals using the calculus of variations and solve problems arising in the dynamics of Rigid bodies and vibration analysis.	L3	PO1, PO2, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Laplace Transforms:** Definition and Laplace transform of elementary functions. Properties of Laplace transforms (without proof). Laplace transforms of Periodic functions (statement only) and unit-step function - problems.	10	CO1
II	**Inverse Laplace Transforms:** Inverse Laplace transform - problems, Convolution theorem to find the inverse Laplace transform (without proof) and problems, solution of linear differential equations using Laplace transforms.	10	CO2
III	**Fourier series:** Periodic functions, Dirichlet‘s condition. Fourier series of periodic functions period 2□ and arbitrary period 2l. Fourier series of even and odd function. Half range Fourier series. Practical harmonic analysis, examples from engineering field.	10	CO3
IV	**Numerical Solutions of Ordinary Differential Equations (ODE ‘s):** Numerical solution of ODE ‘s of first order and first degree- Taylor ‘s series method, Modified Euler ‘s method. Runge - Kutta method of fourth order, Milne‘s and Adam‘s- Bashforth predictor and corrector method (No derivations of formulae), Problems.	10	CO4
V	**Vedic Mathematics:** Introduction to Vedic Mathematics, Multiplication of any number by number containing digit 1 only, Multiplication of any number by number containing digit 9 only, Multiplication of any 4 digit numbers by any 4 digit numbers (Using Urdhvatiryagbhyam sutra).Finding the square root of perfect squares and cube roots of perfect cubes. Solution of Linear equations: Introduction, Solution of simple equations. Finding the Determinants of 4X4 matrix .Vedic Geometry- Area of Triangle (co-ordinates are given). **Calculus of Variations:** Variation of function and functional, variational problems, Euler ‘s equation, Geodesics, hanging chain, problems.	10	CO5

5. CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	
2	
3	
...	

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B. S. Grewal	Higher Engineering Mathematics	45th Edition, Khanna Publishers, 2023.
2	E. Kreyszing	Advanced Engineering Mathematics	10th Edition (Reprint),John Wiley & Sons, 2020.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B.V. Ramana,	Higher Engineering Mathematics,	11th Edition, McGraw-Hill, 2010.
2	N. P. Bali and Manish Goyal,	A Text Book of Engineering Mathematics	12th Edition, Laxmi Publications, 2014.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assesments/ Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assesments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Dakshayini G	**Name:** Dr.Yuvaraja B K	**Name:** Dr.M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Strength of materials
Course Code	22CV32
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	✔Core ☐ Elective ☐ Lab
Prerequisite (If any)	Fundamental Knowledge Of Engineering Mechanics And Basic Concepts Of Physics (Forces, Moments, Stress, Strain).
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the concepts of stress, strain, elastic constants, and theories of failure. It explains the behaviour of thin and thick cylinders, beams under shear and bending, and their deflections. Students learn the analysis of columns, struts, and torsional behaviour of shafts. The focus is on applying these principles for safe and efficient design of structural members.

2. Course Objectives

1. To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
3. To analyse and understand different internal forces and stresses induced due to representative loads on structural elements.
4. To determine slope and deflections of beams.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Analyze the behavior of materials under simple and compound stresses to determine principal stresses, strains, and factors of safety using stress–strain relationships.	L4	PO1, PO2, PO3
CO2	Analyze different internal forces and stresses induced due to representative loads on structural elements and Theories of Failure.	L4	PO1, PO2, PO3

CO3	Apply the concepts of shear force, bending moment, and bending stress to determine internal forces and deflections in statically determinate beams.	L3	PO1, PO2,PO3
CO4	Apply Euler's theory, Rankine's formula, and torsion equations to determine buckling loads and torsional strength of structural and machine elements.	L3	PO1, PO2, PO3

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Simple Stresses and Strain:** Introduction, Definition and concept and of stress and strain. Hooke's law, Stress-Strain diagrams for ferrous and non-ferrous materials, factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Compound bars, state of simple shear, Elastic constants and their relationship. **Compound Stresses:** Introduction, state of stress at a point, General two dimensional stress system, Principal stresses and principal planes	10	CO1
II	**Theories of Failure:** Introduction, maximum principal stress theory (Rankine's theory), Maximum shearing stress theory (Tresca's theory), Strain energy theory (Beltrami and Haigh), and maximum strain theory (St. Venant's theory). **Thin and Thick Cylinders:** Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure; Lame's equation, radial and hoop stress distribution	10	CO2
III	**Shear Force and Bending Moment in Beams:** Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force, Shear force and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads.	10	CO3
IV	**Bending and Shear Stresses in Beams:** Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Bending and shear stress distribution diagrams for circular, rectangular, I and T sections. **Deflection of Beams:** Definition of slope, Deflection & curvature, Sign conventions, Derivation of moment-curvature equation.	10	CO3
V	**Columns and Struts:** Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine Gordons formula for columns. **Torsion in Circular Shaft:** Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft.	10	CO4

5.CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6.Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Video Demonstration on Stress Strain Analysis Of Mild Steel.

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B.S. Basavarajaiah, P. Mahadevappa.	Strength of Materials in SI Units	4th (Revised), CBS Publishers & Distributors Pvt Ltd, India, 2019
2	Ferdinand P. Beer, E. Russell Johnston and Jr. John T. De Wolf	Mechanics of Materials	9th,Cengage Learning India Pvt. Ltd., 2022

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	D.H. Young, S.P. Timoshenko	Elements of Strength of Materials,	**5th,** Van Nostrand / Van Nostrand Reinhold Company, 2008
2	R K Bansal	A Textbook of Strength of Materials	6th Edition, Laxmi Publications, 2018

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assesment/ Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Building Materials
Course Code	22CV33
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	✔Core ☐ Elective ☐ Lab
Prerequisite (If any)	Familiarity With Common Construction Materials And Their Uses In Buildings And Infrastructure.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	4
W.e.f	2022-2023
Approved in AC on	23 January 2023
Course Description	This course introduces the properties, types, and testing of building materials like aggregates, cements bricks, blocks, and mortars. It covers foundations, masonry, and essential building components. Students learn about chemical and mineral admixtures, fresh concrete workability, and proper manufacturing practices. Hardened concrete properties, durability, and in-situ testing are discussed. The course also covers concrete mix design and special concretes such as self-compacting, fiber-reinforced, and lightweight concrete with practical applications.

2.Course Objectives

1. In recognizing the good materials to be used for the construction work.
2. In investigating of soil condition, deciding the suitable foundation for different structures, different types of masonry and importance of building components.
3. Recognize the importance of material characteristics and their contributions to strength development in concrete.
4. Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
5. Ascertain and measure engineering properties of concrete in fresh and hardened state which meet the requirement of real time structures

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the properties and test conducted on aggregates, cement, bricks, concrete blocks and mortar.	L2	PO1, PO2, PO12

CO2	Understand the basics of foundation, masonry, lintels, arches, floors and roofs.	L2	PO1, PO2, PO3
CO3	Analyze the workability, strength, and durability characteristics of fresh and hardened concrete using standard laboratory tests.	L4	PO1, PO2, PO3
CO4	Apply standard tests to assess the strength, shrinkage, creep, and durability characteristics of hardened concrete.	L3	PO1, PO2, PO3, PO4
CO5	Apply IS 10262 for concrete mix design and identify applications of special concretes.	L3	PO1, PO2, PO3, PO4

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Building Materials** **Fine Aggregate:** Introduction, Natural sources of sand, Test on fine aggregate. Coarse Aggregate: Introduction, Importance of size, shape and texture, Grading of aggregate, Tests on coarse aggregate.Cement: Types of cement, hydration of cement, Tests on Cement.Bricks: Introduction, Manufacturing of clay bricks, Requirement of good bricks, Classification of bricks, Field and Laboratory tests on bricks.Cement Concrete Blocks: Introduction, Manufacturing of blocks, Tests on blocks, Requirement of good blocks.Mortar: Introduction, Classification of mortars, Requirement of good mortar.	10	CO1
II	**Foundation and Masonry** Introduction, Types of foundations, Preliminary investigation of soil , Essential requirements of good foundation, Bearing capacity of soils. Typesof Masonry, Terms used in masonry , Bonds in brick work; Stretcher bond, Header bond, English bond, Flemish bond, Comparison of brick and stone masonry. **Basic Components of Building:** Introduction and Types of Lintels, Arches, Floors and Roofs. Importance of Doors, Windows, Ventilators, Stairs and Formwork. Importance of Plastering, Pointing, Damp proofing and Painting	10	CO2
III	**Chemical and Mineral Admixtures** Chemical admixtures – plasticizers, accelerators, retarders aairentraining agents.Mineral admixtures – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Met kaolin and rice husk ash. **Fresh Concrete** Workability-factors affecting workability. Measurement of workability– slump, Compaction factor and Vee-Bee Consistometer tests, flow tests. Segregation and bleeding. Process of manufacturing of concrete- Batching, Mixing, Transporting, Placing and Compaction. Curing – Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self- curing. Good and Bad practices of making and using fresh concrete and effect of heat of hydration during mass concreting at project sites.	10	CO3

IV	**Hardened Concrete:** Factors influencing strength, W/C ratio, gel/space ratio, Maturity concept, testing of hardened concrete, Creep –factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability, Mechanisms- Sulphate attack – chloride attack, carbonation, freezing and thawing. Corrosion, Durability requirements as perIS-456, In-situ testing of concrete Penetration and pull out test, rebound hammer test, ultrasonic pulse velocity.	10	CO4
V	**Concrete Mix Proportioning** Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix proportioning. Numerical Examples of Mix Proportioning using IS IS-10262,Special Concretes Self-Compacting concrete- concept, materials, tests, properties, applications. Fiber reinforced concrete - Fibers types, properties, application of FRC. Light weight concrete-material properties and types, application.	10	CO5

5. CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field Visit to Ready-Mix Concrete (RMC) Plant.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Rangawala S C	Engineering Materials	43rd Edition, Charotar Publishing House Pvt. Ltd., 2019
2	Dr. B C Punmia, Ashok Kumar Jain, Arun Kumar Jain	Building Construction	33rd Edition, Charotar Publishing House Pvt. Ltd., 2015

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	S K Duggal	Building Materials	6th Edition, New Age International Pvt. Ltd., 2022
2	M S Shetty	Concrete Technology	8th Edition, S. Chand Publishing, 2019

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assesments/ Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assesments,End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Urban Transport Engineering
Course Code	22CV34
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	✔Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic Civil Engineering, Introductory Transportation Engineering, And Applied Mathematics.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamentals of transportation engineering, including highways, railways, harbours, tunnels, and airports. It covers highway alignment, pavement materials and design, and planning aspects of different transport modes. Emphasis is placed on sustainability, safety, and modern engineering practices to develop efficient transportation infrastructure.

2. Course Objectives

1. Gain knowledge of different modes of transportation systems, history, development of highways and the organizations associated with research and development of the same in India.
2. Get the basic knowledge of Pavement materials and aggregates used in roadway.
3. Understand railways, railway planning and development based on essential criteria's.
4. Get the knowledge of basic components of tunnels and harbours with design principles.
5. Get the knowledge of basic features of airways with characteristics and classification.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the importance, modes, and characteristics of transportation systems, and their coordination for sustainable development.	L2	PO1, PO2, PO12
CO2	Apply principles of highway alignment, surveys, and geometric design for planning new and realigned transportation projects.	L3	PO1, PO2, PO3
CO3	Analyze pavement materials, subgrade properties, and bituminous materials to determine their suitability for	L4	PO1, PO2, PO3, PO4

	flexible and rigid pavements.		
CO4	Apply railway planning concepts, permanent way design, station layouts, and track material calculations for urban and high-speed rail systems.	L3	PO1, PO2, PO3, PO4
CO5	Apply planning and design principles for harbors, tunnels, and airports, including runway geometrics and terminal layouts, adhering to standards and regulations.	L3	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Principles of Transportation Engineering:** Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport. Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute. **Highway Alignment and Surveys:** Ideal Alignment, Factors affecting the alignment, Engineering surveys- Map study, Reconnaissance, Preliminary and Final location & detailed survey, Reports and drawings for new and re-aligned projects.	10	CO1
II	**Pavement Materials** Pavement Materials: Sub grade soil - desirable properties-HRB soil classification-determinationof CBR and modulus of sub grade reaction with Problems.Aggregates- Desirable properties and tests, Bituminous materials- Explanation on Tar, bitumen, cutback and emulsion-tests on bituminous material.**Pavement Design**: Pavement types, component parts of flexible and rigid pavements and their functions, Types of joints used in rigid pavements, Critical stresses in flexible and rigid pavement.	10	CO2
III	**Railway Planning** Coordination of Road, Rail, Air and Water transport modes to achieve sustainability – Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, creep in rails, defects in rails Route alignment surveys, conventional methods. Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways. Calculation of quantity of materials required for laying a track, Metro train and High speed train..	10	CO3
IV	**Harbour and Tunnel Engineering** Definition of Basic Terms in Harbours, Planning of Harbours and Design of Harbours, Requirements, Classification, Location and Design Principles of Harbours – Harbour Layout and Terminal Facilities, Coastal Structures, Inland Water Transport. Tunnelling: Introduction, size and shape of the tunnel, tunnelling methods in soils, tunnel lining, tunnel drainage and ventilation	10	CO4
V	**Airport Planning**	10	CO5

	Air transport characteristics, airport classification, airport planning: objectives, components, layout characteristics, and socioeconomic characteristics of the catchment area, criteria for airport site selection and ICAO stipulations, typical airport layouts, Parking and circulation area. Runway, Basic runway length, Correction and examples, Runway geometrics		

5.CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6.Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field Visit to Near Railway Station.

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	S K Khanna and C E G Justo.	Highway Engineering	4th Edition, Wiley-Blackwell, 2022
2	C Venkatramaiah	Transportation Engineering	4th Edition, Wiley, 2000

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	C. Jotin Khisty, B. Kentlal,	Transportation Engineering	1st Edition, Butterworth-Heinemann, 2016.
2	Srinivasan R. Harbour,	Dock and Tunnel Engineering	30th Edition, Charotar Publishing House Pvt. Ltd., 2018

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assesment / Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Geomatics
Course Code	22CV35
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic Mathematics, Physics, Surveying Fundamentals..
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	4
W.e.f	2022-2023
Approved in AC on	23 January 2023
Course Description	This course introduces the fundamentals of surveying and its applications in civil engineering. It covers geodetic principles, measurement of linear, angular, and vertical dimensions, and analysis of survey data. Students learn leveling, contouring, theodolite surveying, tachometry, and curve setting. Emphasis is placed on modern instruments like Total Station and Lidar for accurate data collection. The course also includes map preparation, and computation of areas and volumes for engineering projects.

2. Course Objectives

1. Understand the basic principles of Surveying.
2. Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
3. Design proper types of curves for deviating type of alignments.
4. Analyse the spatial data to compute areas and volumes.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the principles, objectives, and classification of surveying, types of errors, map scales, and conventional symbols.	L2	PO1, PO2, PO12
CO2	Apply techniques for measurement of horizontal distances using tapes and electronic distance measurement (EDM) with necessary corrections.	L3	PO1, PO2, PO3
CO3	Apply leveling methods, contouring techniques, and trigonometric leveling to determine elevations and prepare topographic data.	L3	PO1, PO2, PO3, PO4

CO4	Apply theodolite and tacheometric methods, including modern instruments like total stations and LIDAR, to measure angles, distances, and elevations accurately.	L3	PO1, PO2, PO3, PO4
CO5	Analyze and compute areas and volumes of land using geometrical methods, co-ordinates, trapezoidal, prismoidal, and Simpson's rules.	L4	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Definition of surveying, Objectives and importance of surveying. Classification of surveys. Principles of surveying. Units of measurements, Surveying measurements and errors, types of errors, precision and accuracy. Classification of maps, map scale, conventional symbols, topographic maps, map layout, Survey of India Map numbering systems. **Measurement of Horizontal Distances:** Measuring tape and types. Measurement using tapes, Taping on level ground and sloping ground. Errors and corrections in tape measurements, ranging of lines, direct and indirect methods of ranging, Electronic distance measurement, basic principle. Booking of tape survey work, Field book, entries, Conventional symbols, Obstacles in tape survey, Numerical problems.	10	CO1
II	**Leveling:** Basic terms and definitions, Methods of leveling, Dumpy level, auto level. Curvature and refraction corrections. Booking and reduction of levels. Differential leveling, profile leveling, fly leveling, check leveling, reciprocal leveling. **Contouring:** Contours, Methods of contouring, Interpolation of contours, contour gradient, characteristics of contours and uses.	10	CO2
III	**Theodolite Survey:** Theodolite and types, Fundamental axes and parts of Transit theodolite, uses of theodolite, Temporary adjustments of transit theodolite, measurement of horizontal vertical angles, **Trigonometric Levelling:** Trigonometric leveling (heights and distances-single plane and double plane methods). **Tacheometry:** Basic principle, types of tacheometry, distance and elevation equation for horizontal and inclined line of sight for fixed hair method, problems.	10	CO3
IV	**Curve Surveying:** Curves – Necessity – Types, Simple curves, Elements , Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankines deflection angle method (Numerical problems).Compound curves, Elements, Design of compound curves, Setting out of compound curves (numerical problems). Reverse curve between two Parallel straights (numerical problems on Equal radius and unequal radius). Transition curves Characteristics, numerical problems on Length of Transition curve,	10	CO4

V	**Modern Surveying Instruments** Modern Surveying Introduction, Electromagnetic spectrum, Electromagnetic distance measurement, Total station, Lidar scanners for topographical survey. **Areas and Volumes:** Measurement of area by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpson's one third rule, area from co-ordinates, introduction to planimeter, digital planimeter.Measurement of volumes- trapezoidal and prismoidal formula.	10	CO5

5. CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Demonstration on Layout marking in field.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B.C. Punmia,	Surveying Vol.1 & 2	5th Edition, McGraw Hill Education, 2019.
2	Kanetkar T P and S V Kulkarni ,	Surveying and Leveling Part I & II	24th Edition, Vidyarthi Griha Prakashan, 2010

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	S.K. Duggal,	Surveying Vol. I & II	5th Edition,Laxmi Publications, 2015
2	R Subramanian,	Surveying and Leveling,	24th Edition, Vidyarthi Griha Prakashan, 2010

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assesment / Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

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1.Course Information

Section	Details
Course Title	Material Testing Lab
Course Code	22CVL36
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	☐ Core ☐ Elective ✔Lab
Prerequisite (If any)	Basic knowledge of civil engineering materials (soil, aggregates, cement, and bitumen) and fundamentals of laboratory safety practices.
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This lab course introduces testing of construction materials like aggregates, bricks, concrete blocks, metals, and wood. Students learn standard procedures to determine physical and mechanical properties such as strength, hardness, and density. Emphasis is on understanding material behavior under load and assessing suitability for construction. Hands-on training builds practical skills in testing and quality evaluation.

2.Course Objectives

1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques, skills and modern engineering tools necessary for engineering.
4. Understanding of professional and ethical responsibility in the areas of material testing.
5. Ability to communicate effectively the mechanical properties of materials.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.	L2	PO1, PO2, PO3
CO2	Identify, formulate and solve engineering problems of structural elements subjected to flexure.	L3	PO1, PO2, PO3, PO4

CO3	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.	L3	PO1, PO2, PO3,PO4,PO12

4.Course Content (Experiment-Wise)

S.No	Topics	Hours	COs
1	Tests on Fine aggregates-Moisture content, Specific gravity, Bulk density, Sieve analysis and Bulking.	04	CO3
2	Tests on Coarse aggregates-Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis.	04	CO3
3	Tests on Bricks, Tiles and Concrete Blocks.	05	CO3
4	Hardness tests on ferrous and non-ferrous metals- Brinell's, Rockwell	04	CO1
5	Impact test on Mild Steel (Charpy & Izod).	04	CO1
6	Bending Test on Wood Under two point loading.	04	CO2
7	Shear Test on Mild steel- single and double shear.	04	CO1
8	Tension test on mild steel and HYSD bars.	04	CO1
9	Compression test on mild steel, cast iron and wood.	04	CO1
10	Torsion test on mild steel circular sections.	05	CO1

5.CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	1

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Visit for tiles manufacturing company.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Davis, Troxell and Hawk,	Testing of Engineering Materials	43rd Edition, Charotar Publishing House Pvt. Ltd., 2019.
2	M L Gambhir and Neha Jamwal,	Building and construction materials-Testing and quality control,	1st Edition, McGraw-Hill Education, 2014.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Suryanarayana A K,	Testing of Metallic Materials,	2nd Edition, BS Publications, 2022.
2	Peter J. Shull	Non-Destructive Evaluation: Theory, Techniques and Application	1st Edition, CRC Press, 2002.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Geomatics Lab
Course Code	22CVL37
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	☐ Core ☐ Elective ✔Lab
Prerequisite (If any)	Basic Surveying Knowledge And Instrument Handling Skills.
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This lab provides practical training in linear, angular, and leveling measurements using conventional surveying instruments. Students practice profile leveling, tacheometry, curve setting, and theodolite applications. It also includes determination of inaccessible distances/heights and use of minorinstruments. The course equips students with essential field skills for professional surveying and civil engineering projects.

2.Course Objectives

1. Apply the basic principles of engineering surveying and measurements.
2. Follow effectively field procedures required for a professional surveyor.
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply surveying techniques to measure distances, set out perpendiculars, and determine angles using chains, theodolites, and minor instruments.	L3	PO1, PO2, PO3, PO4,PO5
CO2	Analyze leveling, tacheometric, and angular data to compute elevations, depths of cut/fill, and heights of inaccessible points accurately.	L4	PO1, PO2, PO3, PO4,PO5
CO3	Understand the principles, use, and limitations of surveying instruments and field procedures for effective topographic measurements.	L2	PO1, PO2, PO3, PO4,PO5

4.Course Content (Experiment-Wise)

S. No	List of Experiment	Hours	COs
1	Measurement of distance by, Direct Ranging and Chaining.	04	CO1
2	Setting out of perpendicular, (i) By linear method, (ii) By cross – staff, optical square and prism square.	04	CO1
3	To conduct Differential Levelling using Dumpy level / Auto level.	03	CO1
4	To conduct Profile Levelling for a given length and determining the depth of Cut / Fill with respect to the Formation Level.	04	CO2
5	Measurement of Horizontal angle by Repetition and Reiteration methods and measurement of Vertical angles using Theodolite.	04	CO1
6	Determination of Horizontal distance and Vertical height to a base inaccessible object using Theodolite by Single Plane Method.	04	CO2
7	Determination of Horizontal distance and Vertical height to a base inaccessible object using Theodolite by Double Plane Method.	04	CO2
8	To determine the Tacheometric constants by field procedure.	03	CO1
9	To determine distance and elevation using Tacheometric Surveying with Horizontal and Inclined line of sight.	04	CO1
10	Setting out of simple curve by Rankine‘s Method.	04	CO1
11	Demonstration of Minor instruments: Clinometer, Ceylon Ghat Tracer, Box Sextant, Hand Level, Planimeter, Nautical Sextant and Pentagraph.	04	CO3

5.CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	-	-
CO2	3	2	2	2	1	-	-	-	-	-	-	-
CO3	3	3	2	1	1	-	-	-	-	-	-	-

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6.Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Video Demonstration on Setting out a minor road or path alignment with tangents

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B.C. Punmia,	Surveying Vol.1 & 2	5th Edition, McGraw Hill Education, 2019.
2	Kanetkar T P and S V Kulkarni ,	Surveying and Leveling Part I & II	24th Edition, Vidyarthi Griha Prakashan, 2010

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	S.K. Duggal,	Surveying Vol. I & II	5th Edition,Laxmi Publications, 2015
2	R Subramanian,	Surveying and Leveling,	24th Edition, Vidyarthi Griha Prakashan, 2010

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Soft Skill Development I
Course Code	22AEC38B
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Basic Knowledge Of English And Willingness To Participate In Interactive Activities.
Contact Hours per Week	Lecture: 2 Tutorial: 0 Practical: 0 Total: 2
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course develops fundamental and advanced skills in quantitative aptitude and verbal ability. It covers logical reasoning, numerical problem-solving, grammar, vocabulary, and effective communication. The progressive levels enhance analytical thinking, accuracy, and speed, preparing learners for academic, professional, and competitive challenges.

2.Course Objectives

1.To Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
2. To provide students with a strong conceptual and practical framework to build, develop and manage teams.
3. To help formulate problem solving skills

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply basic quantitative techniques such as HCF & LCM, percentages, averages, ratios, and time-speed-distance to solve numerical problems.	L3	PO1, PO2, PO3, PO4, PO5
CO2	Analyze logical reasoning problems including blood relations, directions, coding-decoding, series, and data sufficiency to arrive at valid conclusions.	L2	PO1, PO2, PO3, PO4, PO5

CO3	Apply advanced quantitative problem-solving methods like Vedic mathematics, dot situations, mathematical operators, and machine input-output.	L4	PO1, PO2, PO3, PO4, PO5
CO4	Understand verbal concepts including grammar, sentence construction, idioms, phrases, abstract and collective nouns to enhance language proficiency.	L3	PO1, PO2, PO3, PO4, PO5
CO5	Analyze problems involving heights & distances and syllogisms to deduce logical conclusions.	L3	PO1, PO2, PO3, PO4, PO5

4.Course Content (Unit-Wise)

S.No	Topics	Hours	COs
1.	**Quantitative Aptitude (Level-1)** Blood Relation, Direction Sense, Decision making & logical Sequencing, Group of Identical Figures, Verification of Truth of Statement.	05	CO1
2.	**Verbal (Level-1)** Adjective and prepositions, Adverbs, Abstract nouns & collective nouns, Error spotting & sentence framing. Personal effectiveness, Idioms, phrases & Vocabulary	05	CO2
3.	**Quantitative Aptitude (Level-2)** Odd man out, HCF & LCM, Vedic Mathematics, Coding and Decoding, Image Analysis, Mathematical operators, Dot situation, Letter and symbol series, Data sufficiency, Machine input and output.	05	CO3
4.	**Verbal (Level-2)** Verbal analogies, One word substitute, Subject verb agreement, Idioms & phrases, Essay.	05	CO4
5.	**Quantitative Aptitude (Level-3)** Percentage, Profit & Loss, Averages, Heights & Distances, Syllogisms, Time Speed and Distance.	05	CO5

5. CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6.Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Exercises on Grammar Correction and Sentence Structuring.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Zestech Globla Pvt Ltd	Communicative English	3rd Revised Edition, The Hospitality Press, 2022
2	Arun Sharma	Quantitative Aptitude	4th Edition, S. Chand & Company Ltd., 2020

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Rajesh Verma	Fast Track Objective Arithmetic	Completely Revised Edition, Arihant Publications, 2022

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	**Vetted by**		**Confirmed by**
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Sports
Course Code	22UHV39B
Program	Civil Engineering
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	☐ Core ☐Elective ✔ Lab
Prerequisite (If any)	Basic Physical Fitness, Understanding Of Game Rules, And Fundamental Skills Of Selected Sports Or Exercises.
Contact Hours per Week	Lecture: 2 Tutorial: 0 Practical: 0 Total: 2
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces fundamental skills and techniques in team and field games such as Volleyball, Basketball, Cricket, Kabaddi, and Kho-Kho. Students learn rules, stance, movements, passing, attacking, and defensive strategies essential for each game. Emphasis is placed on improving physical fitness, coordination, teamwork, and game sense**.** The course also fosters discipline, sportsmanship, and leadership qualities through practical training and rule interpretations.

2.Course Objectives

1. Develop physical talents to their maximum potential.
2. Engage in competitive activities, while promoting sound health, safety, and physical fitness.
3. Exemplify good conduct as a means for learning good citizenship.
4.Learn to appropriately experience both success and failure in an educational environment.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply attacking and spiking skills such as straight smash, body turn smash, wrist outward/inward smash, and jump set in game situations.	L3	PO1, PO2, PO3, PO4, PO5
CO2	Apply strategic gameplay principles, including offensive and defensive tactics, to improve individual and team performance in competitive settings.	L3	PO1, PO2, PO3, PO4, PO5

CO3	Analyze player movements, game situations, and skill execution to identify strengths, weaknesses, and areas for improvement.	L4	PO1, PO2, PO3, PO4, PO5
CO4	Understand the rules, regulations, court/field markings, and responsibilities of officials to ensure fair play and adherence to sports ethics.	L2	PO1, PO2, PO3, PO4, PO5
CO5	Understand rules, court markings, scoring, and duties of officials to ensure fair play and proper conduct in Kho-Kho games.	L2	PO1, PO2, PO3, PO4, PO5

4.Course Content (Unit-Wise)

S.No	Topics	Hours	COs
1	**Volley ball** Player stance, Receiving and passing, The Volley (Overhead pass), The Dig (Underhand pass), Service Reception, Service- Under Arm Service, Tennis Service, Side Arm Spin Service, Round Arm Service. High spin service, Asian serve American serve (floating),Setting the ball- Set for attack, Back set, Jump set Smash Spike- Straight smash, Body turns smash. Wrist outward smash. Wrist inward smash.	05	CO1
2	**Basketball** Grip: Player stance- Triple threat stance and Ball handling exercises Passing (Two hand/one hand)- Chest pass, Bounce Pass, Overhead pass, Underhand pass, Hook Pass, Behind the back pass, Baseball pass, Side arm pass and passing in running. Receiving-Two Hand receiving, One hand receiving, Receiving in stationary position, Receiving While jumping, Receiving while running, Dribbling- How to start dribble, How to stop dribble, High / Low dribble with variations Shooting-Layup shot and its variations, one hand set shot, one hand jump shot, Free throw, Hook shot, Tip-in shot.	05	CO2
3	**Cricket** Batting-Forward (front foot) and backward (back foot) defensive stroke, Drives Bowling- Simple bowling techniques, Fast bowling, Spin bowling Fielding-Orthodox fielding and Long Barrier (defensive). Pick up and throw and Chase and Return/Throwing techniques (offensive) Catching-High catch and Low catch Wicket keeping techniques-Stance. Position, Collection of Ball, Ground measurements, Rule and their interpretations and Duties of officials.	05	CO3
4	**Kabaddi** **Raiding Skills: -**Can't, Entry, Footwork, Attack, Retreat; Hand touches; Leg touches: - Toe touch, Foot touch, Squat leg thrust: Various kicks: - Back kick, Side kick, Running kick, Curve kick. Crossing of baulk line, Crossing of Bonus line, Learning the opponent to catch, Pursuing. Additional skills in raiding: - Bringing the antis in to particular position, Escaping from various holds, Techniques of escaping from chain formation. Defensive Skills: - Holding Skills: Wrist hold. Ankle hold, Dive and Ankle Hold, Knee hold, thigh hold, Waist hold, Blocking- Chest block; Chain Hold.	05	CO4

5	**Kho-Kho:** Sitting in the square- Parallel toe / Shuffling or bullet toe method Giving—Kho':- Proximal and Distal foot, Advance Kho, Giving Kho' with a fake. General skills of the game- Running, Chasing, Dodging, Faking etc. Skills in chasing- Moving on the cross lane, Pursuing the runner, Direct, Indirect and Surprise attack, Tapping- Heel, Shoulder and on the pole, Diving, Judgment Kho, Rectification of Foel, Skills in Running- Single and double chain, Variations in ring games, dodging while facing on the back, Pole turning, Pole diving, Pole Avoiding, Attack after pole turning, Fakes- Body, Arm, Legs etc., Counter action for ring game, Combination of different skills Court marking, Rules and their interpretations and Duties of officials.	05	CO5

5.CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6.Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Conducting Psychological and Team-Building Exercises

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Muniraju	A Text Book on Kabaddi	1st Edition, LAP Lambert Academic Publishing, 2015.
2	Dr Kavita Verma	A Text Book of Kho-Kho	1st Edition, International E-Publication via ISCA, 2015

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Bob Miller.	The Volley ball Handbook	1st Edition, Human Kinetics, 2005.
2	Robert S. Weinberg & Daniel Gould	Foundations of Sport and Exercise Psychology	7th Edition, Human Kinetics, 2019

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Test, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Navyashree H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. Shobha B N
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Additional Mathamatics-I
Course Code	22MATDIP31
Program	Common to all Branch's
Academic Year/Semester	2024-2025 / 3rd Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Differentiation, Integration & Algebra of functions.
Contact Hours per Week	Lecture: 14 Tutorial: 0 Practical: 0 Total: 14
Credits	0
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces how to Apply the concepts of complex numbers and vector algebra**.** It covers techniques of differential calculus Emphasis is placed on analyze physical phenomena involving scalar and vector fields. The course also explores the Bernoulli's equations to model and analyze real-world engineering problems.

2.Course Objectives

The compulsory learning course 25DIPMAT-301, Advanced Mathematics-I aims to give basic concepts of complex trigonometry, vector algebra, differential & integral calculus, vector differentiation and method of solving first order differential equations.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply the concepts of complex numbers and vector algebra to solve problems involving modulus, amplitude.	L3	PO1, PO2, P012
CO2	Use techniques of differential calculus**,** including successive differentiation, polar curves, and partial differentiation, to analyze the behavior of functions and solve engineering-related problems.	L3	PO1, PO2, P012
CO3	Evaluate definite integrals and multiple integrals using standard formulas and reduction techniques, and apply them in computing areas and volumes in engineering contexts	L3	PO1, PO2, P012

CO4	Understand and apply vector differentiation concepts such as gradient, divergence, and curl to analyze physical phenomena involving scalar and vector fields	L4	PO1, PO2, P012
CO5	Solve first-order ordinary differential equations including homogeneous, exact, linear, and Bernoulli's equations to model and analyze real-world engineering problems	L4	PO1, PO2, P012

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Complex Trigonometry**: **Complex Numbers:** Definitions & properties. Modulus and amplitude of a complex number. **Vector Algebra**: Scalar and vectors. Vectors addition and subtraction. Multiplication of vectors (Dot and Cross products).	04	CO1
II	**Differential Calculus:** Review of successive differentiation. Formula for n^{th} derivatives of standard functions-Problems on $e^{ax,}$ sin(ax+b), cos(ax+b), $(ax+b)^m$ and 1/(ax+b) only. Polar curves-angle between the radius vector and the tangent pedal equation- Problems. **Partial Differentiation:** Basic concepts. Homogeneous functions of two variables-Euler's theorem-problems on first order derivatives only. Total derivatives- differentiation of composite and implicit function. Jacobians-Problems **(L1,L2)**	04	CO2
III	**Integral Calculus**: Statement of reduction formulae for $\sin^n x$, $\cos^n x$, and $\sin^m x\cos^n x$ and evaluation of these with standard limits-Examples. Double and triple integrals-Simple examples.	02	CO3
IV	**Vector Differentiation**: Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl (Definitions only). Solenoidal and ir-rotational vector fields-Problems.	02	CO4
V	**Ordinary differential equations (ODE's):** Introduction- solutions of first order and first-degree differential equations: homogeneous, exact, linear differential equations of order one. Equations reducible to exact only and Bernoulli's equation.	02	CO5

5.CO–PO Mapping Matrix

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

(Mapping: 1 – Low, 2 – Medium, 3 – High)

6.Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	
2	
3	
...	

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B. S. Grewal	Higher Engineering Mathematics	43rd Edition, Khanna Publishers, New Delhi 2015

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	E. Kreyszig	Advanced Engineering Mathematics	10th edition, John Wiley & Sons, 2015.
2	N. P. Bali and Manish Goyal	Engineering Mathematics	7th Edition, Laxmi Publishers, 2007

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Dakshayini G	**Name:** Dr.Yuvaraja B K	**Name:** Dr.M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Engineering Mathematics - IV
Course Code	22MAT41
Program	Common to all Branch
Academic Year/Semester	2025-2026 / 4th Semester
Course Type	✓ Core ☐Elective ☐ Lab
Prerequisite (If any)	Calculus, Differential Equations, Linear Algebra, Probability and Statistics (Basics)
Contact Hours per Week	Lecture: 2 Tutorial: 1 Practical: 0 Total: 3
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces complex variables and analytic functions, with applications in potential theory and field problems. It covers numerical methods for solving algebraic, transcendental, and differential equations relevant to engineering. Students will explore statistical techniques such as correlation, regression, and curve fitting for data analysis. The course also develops an understanding of probability distributions, joint distributions, and stochastic processes with applications in engineering and applied sciences.

2. Course Objectives

1. To provide an insight into applications of complex variables and special functions arising in potential theory, quantum mechanics, heat conduction and field theory.
2. To develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, design engineering and microwave engineering.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.	L2	PO1.PO2.
CO2	Solve first and second order ordinary differential equations arising in engineering problems by applying single step and multistep numerical methods.	L3	PO1.PO2

CO3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data	L2	PO1.PO2
CO4	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering applications and Construct joint probability distributions and demonstrate the validity of testing the hypothesis.	L4	PO1.PO2

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Calculus of complex functions:** Review of function of a complex variable, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms and consequences. Construction of analytic functions (Milne Thomson method problems).	10	CO1
II	**Numerical solution of algebraic and transcendental equation:** Bisection method & Birge-Vieta Method. Numerical solution of second order ODE's**:** Runge-Kutta method of 4^{th} order and Milne's Predictor and Corrector method, Finite difference method–Simple problems.	10	CO2
III	**Statistical Methods:** Correlation and regression-Karl Pearson's coefficient of correlation -problems. Regression analysis- lines of regression –problems. Curve Fitting**:** Curve fitting by the method of least squares- fitting the curves of the form - $y = ax + b$, $y = ax^b$, $y = ab^x$ and $y = ax^2 + bx + c$.	10	CO3
IV	**Probability Distributions:** Basic concepts of probability theory. Random variables (discrete and continuous), probability mass/density functions. Binomial, Poisson, exponential and normal distributions, problems.	10	CO4
V	**Joint probability distribution:** Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient. Stochastic Theory**:** Stochastic process: Probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov chains, higher transition probability – simple problems.	10	CO4

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Demonstration regarding "calculus, differential equation and linear algebra.
2	Demonstration on " quantum mechanics, heat conduction and field theory.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	E. Kreyszing, John Wiley & Sons	Advanced Engineering Mathematics	10th Edition, 2016
2	B.S. Grewal, Khanna Publishers,	Higher Engineering Mathematics	44th Edition, 2017

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B.V. Ramana, McGraw-Hill	Higher Engineering Mathematics	11th Edition, 2010.
2	N. P. Bali and Manish Goyal	A Text Book of Engineering Mathematics,	Laxmi Publications, 2014.
3	Rajesh Kumar Thakur	The essential of Vedic Mathematics	Rupa Publications, New Delhi.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Dr.Yuvraj B K	**Name:** Dr. Shruthi R	**Name:**Dr Shankar M	**Name:** Dr. Shobha B N
Designation: Asst Professor	**Designation:**HOD & Associate Professor	**Designation:** IQAC,Director	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Structural Analysis
Course Code	22CV42
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Strength of Materials
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	It covers essential processes, techniques, and tools for effective project planning, scheduling, and resource management. Students will explore how project management integrates with other disciplines, modern trends, and organizational strategies. The course also includes cost estimation methods and the use of software for network analysis and resource planning. Practical exercises and real-world applications ensure a comprehensive understanding of managing projects successfully.

2.Course Objectives

1. Understand different forms of structural systems.
2. Determine slope and deflections in beams.
3. Analyse arches and cable structures.
4. Analyse different structural systems and interpret data using slope deflection method and Kani‘s method.
5. Apply matrix operations in analysing structures.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify the different forms of structural systems.	L2	PO1,PO2,PO3,PO5
CO2	Evaluate the slope and deflections in beams by using moment area method.	L4	PO1,PO2,PO3,PO5
CO3	Analyse and determine the stress resultants in arches and cables	L4	PO1,PO2,PO3,PO4

CO4	Analyse the indeterminate structures and construct BMD & SFD using slope deflection method and Kani's method.	L4	PO1,PO2,PO3,PO4.
CO5	Analyse the indeterminate beams, truss and frames using stiffness Method of Analysis.	L4	PO1,PO2,PO4,PO5.

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction: Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and nonlinear analysis, Static and kinematic indeterminacies of structural systems. Deflection of Beams: Moment area method: Derivation, Mohr 's theorems, Sign conventions, Application of moment area method for determinate prismatic beams, Beams of varying section, Use of moment diagram by parts	10	CO1
II	Arches and Cable Structures: Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels.	10	CO3
III	Slope Deflection Method: Introduction, sign convention, development of slope deflection equation, Analysis of continuous beams with and without settlements, Analysis of orthogonal rigid plane frames with and without sway with kinematic indeterminacy ≤ 3.	10	CO2
IV	Kani's Method: Introduction, Concept, Relationships between bending moment and deformations, Analysis of continuous beams with and without settlements, Analysis of frames with and without sway.	10	CO4
V	Matrix Method of Analysis: Stiffness Method: Stiffness matrix, Analysis of continuous beams and plane trusses using system approach; Analysis of simple orthogonal plane frames using system approach with kinematic indeterminacy up to 3.	10	CO5

5.CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6.Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Local site visit on Arches
2	Demonstration video on ‘ Cable structures’.

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Thandavmoorthy	Structural Analysis	1ST Edition, Oxford & 2011
2	Hibbeler R C	Structural Analysis	11th Edition, Pearson Publication

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Reddy C S	Basic Structural Analysis	3rdEdition,Tata McGraw Hill
2	Wang C K	Intermediate structural analysis	1STEdition,McGraw Hill

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	**Vetted by**		**Confirmed by**
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:**Dr.Shruthi R	**Name:**Dr M Shankar	**Name:**Dr B N Shobha
Designation: Asst Professor	**Designation:**HOD &Associate Professor	**Designation:**Director, IQAC	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Hydrodynamics
Course Code	22CV43
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of Physics and Mathematics, Engineering Mechanics
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive understanding of hydrodynamics, focusing on the fundamental principles of fluid mechanics, pressure measurement, kinematics, dynamics, and their applications in civil engineering. Students will explore fluid flow in pipes and open channels, flow measurement techniques, and the design and operation of hydraulic machines such as turbines and pumps. The course emphasizes problem-solving and the application of theoretical concepts to practical scenarios, ensuring alignment with industry standards and engineering practices.

2. Course Objectives

1. To understand the fundamentals of fluid pressure and hydrostatic laws.
2. To apply principles of kinematics, hydrodynamics, and basic design of pipes.
3. To perform flow measurements using various devices.
4. To design open channels and apply energy concepts.
5. To understand the working principles of hydraulic machines.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand fundamental properties of fluids and solve problems on Hydro-statics	L2	PO1,PO2,PO3,PO4
CO2	Apply Principles of Mathematics to represent Kinematics and Bernoulli ‘s principles	L3	PO1,PO2,PO3,PO4

CO3	Compute discharge through pipes, notches and weirs	L3	PO1,PO2,PO3,PO4
CO4	Design of open channels of various cross sections	L4	PO1,PO2,PO3,PO4
CO5	Design of turbines for the given data and understand their operation characteristics	L4	PO1,PO2,PO3,PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Fluids and their properties: Introduction, Concept of fluid, Definition of Mass Density, Specific weight, Specific Gravity, Viscosity, Surface Tension, Capillarity, Cohesion, Adhesion, Newton‘s Law of viscosity, Classification of fluids. (No problems) Fluid Pressure and its Measurements: Introduction, Types of Pressures, Pressure at a point Pascal Law Proof, Hydrostatic lawstatement and proof, Measurement of pressure using simple and Differential manometers. Problems on Manometers only Hydrostatic forces on surfaces: Introduction, Total pressure and center of pressure on vertical and Inclined plane surfaces. (No problems)	10	CO1
II	Kinematics: Introduction, Types of fluid flow, Continuity equation in 3D Cartesian coordinates, Flow nets. (No problems) Dynamics: Introduction, Euler ‘s and Bernoulli‘s equation, (no problems) Applications: Venturi meter, Orifice meter, Pitot Tube, problems only on application	10	CO2
III	Orifices and Mouth pieces: Introduction, Classification, Hydraulic Coefficients (No problems) Notches: Introduction, Discharge over Rectangular, Triangular and Cipoletti Notches, problems Flow through pipes: Introduction, Major and Minor losses, DarcyWeisbach equation for head loss due to friction, Pipes in series, pipes in parallel, problems on frictional losses in pipes - concepts of water hammer and Surge Tank	10	CO3
IV	Open Channel Hydraulics: Introduction, Classification of flow through channels (Uniform and Non-Uniform flows) (No problems) Most economical channel sections: Rectangular, Triangular, Trapezoidal, problems Non-Uniform flow: Equation for Hydraulic jump, Gradually varied flow equation, Specific energy, Specific energy curve Problems	10	CO4
V	Impact of jet on curved vanes: Introduction, Momentum equation, Impact of jet on Stationary and moving curved vanes-problems. Turbines: Introduction, Pelton wheel and its components, Velocity triangle (No problems) Reaction Turbines: Francis turbine and its components, Working Proportions (No problems) Centrifugal Pumps: Components, work done and efficiency, Multi stage pumps (No Problems)	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1.	Demonstration video on " Pumps and their types".

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	P.N. Modi, S.M. Seth	Hydraulics and Fluid Mechanics, Including Hydraulic Machines	Standard Book House, 2015
2	R.K. Bansal	A Textbook of Fluid Mechanics and Hydraulic Machines	Laxmi Publications, 2018

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Frank M. White	Fluid Mechanics	9TH Edition,McGraw Hill Education, 2016
2	John F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack	Fluid Mechanics	6TH Edition,Pearson Education, 2011

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:**Dr.Shruthi R	**Name:**Dr.M Shankar	**Name:**Dr B N Shobha
Designation: Asst Professor	**Designation:** HOD &Associate professor	**Designation:**IQAC,Director	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Transportation Infrastructure Design
Course Code	22CV44
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Engineering Geology, and Surveying techniques
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive understanding of the design and evaluation of transportation infrastructure, including highways, railways, and airports. It covers geometric design, drainage systems, economic analysis, material properties, and construction techniques for pavements and railway tracks. Students will learn to design runway and taxiway geometrics, Analyze engineering properties of materials, and apply standards such as IRC, IS, and ICAO for transportation infrastructure projects. The course emphasizes practical design applications and compliance with regulatory and environmental standards.

2. Course Objectives

1. Get the advance knowledge about geometric design, drainage and economics of highway
2. Understand various aspects of geometrical elements, points and crossings, significance of maintenance of tracks
3. Learn different types of structural components, engineering properties of the materials ,to calculate the material quantities required for construction

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Design road geometrics, structural components of pavement and drainage.	L3	PO1,PO2, PO3,PO4
CO2	Evaluate the highway economics by few select methods and also will have a basic knowledge of highway drainage concepts.	L4	PO1,PO2, PO4, PO5

CO3	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction	L4	PO1,PO2, PO4, PO5
CO4	Suggest and estimate the material quantity required for laying a railway track	L3	PO1,PO2, PO3, PO4
CO5	Understand the design geometric aspects of runway and taxiway.	L2	PO1,PO2, PO3, PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Highway Geometric Design Highway Geometric Design of horizontal alignment elements: Cross sectional elements–width, surface, camber, Sight distances–SSD, OSD, ISD, HSD, Radius of curve, Transition curve, Design of horizontal and vertical alignment–curves, super-elevation, widening, gradients summit and valley curves.	10	CO1
II	Highway Drainage & Economics Highway Drainage: Significance and requirements, Surface drainage system and design- Examples, sub surface drainage system, design of filter materials, Types of cross drainage structures, their choice and location. Highway Economics: Highway user benefits, VOC using charts only Examples, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods- Examples, Highway financing-BOT-BOOT concepts.	10	CO2
III	Pavement Construction: Uses and properties of bituminous mixes and cement concrete in pavement construction. Earthwork; cutting and Filling, Preparation of subgrade Specification and construction of i) Granular Sub base, ii) WBM Base iii) WMM base, iv) Bituminous Macadam v) Dense Bituminous Macadam vi) Bituminous Concrete, vii) Dry Lean Concrete sub base and PQC viii) concrete roads.	10	CO3
IV	Design of Railways Track Stress, coning of wheels modern methods, Soil suitability analysis – Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings. Train resistance and hauling power; track components: rails, sleepers, fastenings, ballast and formation. Railways systems– Role of railways in transportation, Advantages of railways, Indian railways, classification, present scenario of railway development in India, Modernization of railways, development of high and super high speed railways	10	CO4
V	Airport Design: Overview of air transportation, Role of FAA and ICAO, air transport in India, types of airports, Heliports, STOL ports, complexities in airport planning, elements of airport planning, airport master plan, environmental impact Runway Design: Orientation, Wind Rose Diagram, Runway length, Geometric design of runways, Configuration and Pavement Design Principles, Elements of Taxiway Design, Airport Zones, Passenger Facilities and Services, Runway and Taxiway Markings and lighting.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Local site visit on Railway track .
2	Demonstration video on ‘ Modernization of railways’.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Satish Chandra and Agarwal M.M	Railway Engineering‖	2nd Edition,Oxford University,2013
2	Khanna S K, Arora M G and Jain S S	Airport Planning and Design‖	6th Edition,Nemchand brothers, Roorkee,1999

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	L.R. Kadiyali	Traffic Engineering and Transport Planning	8thedition,Khanna Publishers, 2013.
2	Robert Horonjeff, Francis X. McKelvey	Planning and Design of Airports	5thEdition,McGraw Hill Education, 2010.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:**Dr.Shruthi R	**Name:**Dr M Shankar	**Name:**Dr.B N Shobha
Designation: Asst Professor	**Designation:**HOD &Associate Professor	**Designation:**IQAC, Director	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Computer Aided Building Planning and Drawing
Course Code	22CVL45
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Basic knowledge of building components and Engineering Graphics
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	This course introduces students to the concepts and applications of computer-aided design (CAD) tools in the field of architectural and civil engineering planning. It focuses on the use of industry-standard software for planning, designing, and drafting architectural and structural elements of residential, commercial, and public buildings. Students will gain hands-on experience in developing 2D plans, elevations, sections, 3D modeling, and rendering. The course also includes planning principles, building bylaws, space utilization, and the preparation of submission and working drawings in compliance with regulatory standards.

2. Course Objectives

1. Achieve skill sets to prepare computer aided engineering drawings
2. Understand the details of construction of different building elements.
3. Visualize the completed form of the building and the intricacies of construction based on the engineering drawings.
4. Get familiarization of practices used in Industry.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Prepare, read and interpret the drawings in a professional set up.	L3	PO1,PO2,PO3,PO5.
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building.	L3	PO1,PO2,PO3,PO5.

CO3	Plan a residential or Public building as per requirement	L4	PO1,PO2,PO3,PO5

4. Course Content (Experiment-Wise)

Unit	Topics	Hours	COs
I	Drawing Basics: Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962 2 Simple engineering drawings with CAD Drawing Tools: Lines, Circle, Arc, Polyline, Multiline, Polygon, Rectangle, Spline, Ellipse, Modify tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet, Using Text: Single line text, Multiline text, Spelling, Edit text, Special Features: View tools, Layers concept, Dimension tools, Hatching, Customizing toolbars, Working with multiple drawings	14	CO1
II	Drawings of Different Building Elements: Following drawings are to be prepared for the data given using CAD Software a) Cross section of Foundation and masonry wall. b) Different types of bonds in brick masonry. c) Different types of staircases – Dog legged, Open well. d) Lintel and chejja. Note: Students should sketch to dimension the above in a sketch book before doing the computer drawing.	14	CO2
III	Building Drawings : Principles of planning, Planning regulations and building bye-laws, factors affecting site selection, Functional planning of residential and public buildings, design aspects for different public buildings. Recommendations of NBC. Drawing of plan, elevation and sectional elevation. 1. Single and double story residential building. 2. Hostel building. 3. Hospital building. 4. School building. Submission drawing (sanction drawing) of two storied residential building with access to terrace including all details and statements as per the local bye-laws Industry Applications: 3D Modelling and Rendering.	14	CO3

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	-	-	-	-	-	-	-
CO2	3	2	2	-	2	-	-	-	-	-	-	-

CO3	3	2	2	-	2	-	-	-	-	-	-	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Draw G+3 floor simple residential buildings.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	James D. Bethune	Engineering Design and Graphics with AutoCAD	1stEdition,Pearson Education, 2022
2	N. Kumara Swamy, A. Kameswara Rao	Building Planning and Drawing	9th Edition,Charotar, Publishing House, 2019

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	M. Chakraborty	Civil Engineering Drawing	Khanna Publishers, 2015
2	George Omura, Brian C. Benton	Mastering AutoCAD and AutoCAD LT	Wiley, 2021

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Records	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	**Vetted by**		**Confirmed by**
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:** Dr.Shruthi R	**Name:**Dr M Shankar	**Name:**Dr.B N.Shobha
Designation: Assisstant Professor	**Designation:**Associate professor	**Designation:**IQAC, Director	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Concrete and Highway material Testing Lab
Course Code	22CVL 46
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Knowledge of basic material properties from Engineering Materials and Elements of Civil Engineering
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	2
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	The Concrete and Highway Material Testing Lab provides hands-on experience in testing and evaluating the properties of cement, concrete, aggregates, bituminous materials, and soils used in civil engineering projects. The course focuses on standard testing procedures as per relevant IS codes to determine material characteristics, ensuring compliance with quality and performance standards for construction and highway applications. Students will perform experiments to assess material strength, durability, and workability, and analyse the results to understand their practical implications in civil engineering.

2. Course Objectives

1. To conduct standard tests on cement and concrete to evaluate their properties and performance.
2. To perform tests on aggregates and bituminous materials to assess their suitability for highway construction.
3. To analyse soil properties through standard tests for pavement design and construction.
4. To develop skills in interpreting test results and applying them to real-world civil engineering projects.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Able to interpret the experimental results of concrete and highway materials based on laboratory tests.	L4	PO1,PO2, PO4,PO5
CO2	Determine the quality and suitability of cement.	L3	PO1,PO2, PO4,PO5

CO3	Design appropriate concrete mix Using Professional codes.	L3	PO1,PO2, PO3,PO4, PO5
CO4	Determine strength and quality of concrete	L3	PO1,PO2, PO4,PO5.
CO5	Test the soil for its suitability as sub grade soil for pavements.	L3	PO1,PO2, PO4,PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Module 1: Experiments on Cement and Concrete a. Test on cement: Fineness, Consistency, Setting time, strength and Specific gravity test. b. Concrete mix design as per IS-10262-2019 c. Tests on fresh concrete: Slump cone test, Compaction factor test and Vee-Bee consistometer test d. Tests on hardened concrete: Compressive strength test, Split tensile strength test and Flexural strength test	20	CO1
II	Module 2: Experiments on Highway materials a. Tests on Aggregates: Crushing strength test, Los Angeles abrasion test, Impact test, Aggregate shape tests (combined index and angularity number) b. Tests on Bituminous Materials: Penetration test, Ductility test, Softening point test, Specific gravity test and Viscosity test by tar viscometer, Flash and fire point test c. Tests on Soil: Wet Sieve analysis and CBR test on soil.	20	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1.	Demonstration Video on ‘ Tests on Soil’

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	M.L. Gambhir	Concrete Manual	Dhanpat Rai and Sons, 2014
2	S.K. Khanna, C.E.G. Justo, A. Veeraragavan	Highway Material Testing and Quality Control	5TH Edition,Nem Chand & Bros, 2013

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	M.S. Shetty	Concrete Technology	23rd Edition,S. Chand and Co. Ltd., 2019
2	P.K. Mehta, P.J.M. Monteiro	Concrete: Microstructure, Properties, and Materials	4th EditionMcGraw Hill Education, 2014

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Records	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	**Vetted by**		**Confirmed by**
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun CS	**Name:**Dr.Shruthi R	**Name:**Dr. Shankar M	**Name:**Dr.Shobha B N
Designation: Asst Professor	**Designation:**HOD &Associate Professor	**Designation:**IQAC ,Director	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Hydrodynamics Lab
Course Code	22CVL47
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Basic knowledge of fluid mechanics concepts such as pressure, flow rate, continuity, Bernoulli's equation (studied in Engineering Mechanics or Fluid Mechanics Theory).
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	2
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	The Hydrodynamics Laboratory is designed to provide hands-on experience in understanding the fundamental principles of fluid mechanics and hydrodynamics through practical experiments. The course emphasizes the observation and analysis of fluid behavior under various flow conditions and the verification of theoretical concepts such as Bernoulli's principle, laminar and turbulent flow, open channel flow, flow over weirs and notches, and forces on submerged bodies.

2. Course Objectives

1. Calibrate flow measuring devices
2. Determine the force exerted by jet of water on vanes
3. Measure discharge and head losses in pipes
4. Understand the fluid flow pattern

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	During the course of study students will develop understanding Hydrodynamics Lab.	L2	PO1, PO2, PO4
CO2	Properties of fluids and the use of various instruments for fluid flow measurement.	L3	PO1, PO2, PO4, PO5
CO3	Working of hydraulic machines under various conditions of working and their characteristics.	L4	PO1, PO2, PO3, PO4, PO5.

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	1. Determination of Cd for Venturi meter 2. Determination of Cd for horizontal Orifice meter 3. Calibration of Rectangular Notch 4. Calibration of Triangular Notch 5. Experimental determination of force exerted by a jet on flat 6. Experimental determination of force exerted by a jet on curved plates (Hemispherical Vane). 7. Experimental determination of operating characteristics of Pelton turbine 8. Determination of efficiency of centrifugal pump. 9. Determination of Major losses 10.Determination of Minor losses	40	CO1

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	-	-	-	-	-	-	-	-
CO2	3	2	-	2	2	-	-	-	-	-	-	-
CO3	3	2	2	2	2	-	-	-	-	-	-	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Local visit on Water lifting projects.
2	Demonstration Video on ‘ Notches and pipes’.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R.K. Bansal	A Textbook of Fluid Mechanics and Hydraulic Machines	Laxmi Publications, 2018
2	P.N. Modi, S.M. Seth	Hydraulics and Fluid Mechanics Including Hydraulic Machines	22nd Edition,Standard Book House, 2019

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Frank M. White	Fluid Mechanics	9th Edition,McGraw Hill Education, 2022
2	John F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack	John F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack	6th Edition,Pearson Education, 2011

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Records	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:**Dr.Shruthi R	**Name:**Dr .Shankar M	**Name:**Dr.Shobha B N
Designation: Asst Professor	**Designation:**HOD &Associate Professor	**Designation:** Director,IQAC	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Design Thinking
Course Code	22AEC48A
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Build physical or digital mock-ups using simple materials
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	2
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Design Thinking is a human-centered, iterative problem-solving methodology that empowers students to understand complex problems, generate innovative solutions, and create meaningful user experiences. This course introduces the principles, frameworks, and tools of design thinking through a hands-on, project-based approach.

2. Course Objectives

1. To Explain the fundamental concept of Innovation and Design Thinking.
2. To Demonstrate how to observe and convert observation data to insights.
3. To Apply design thinking concept in functional work.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply the design thinking framework (Empathize, Define, Ideate, Prototype, Test) to real-world problems.	L3	PO1,PO2, PO3,PO9
CO2	Conduct empathetic user research to identify unmet user needs and generate user-centric insights.	L4	PO2,PO4, PO6,PO9
CO3	Formulate clear and actionable problem statements based on user research and contextual analysis.	L4	PO2,PO4, PO6, PO10
CO4	Generate a wide range of creative ideas using ideation techniques such as brainstorming and lateral thinking.	L3	PO3,PO5, PO9
CO5	Develop and evaluate low- and high-fidelity prototypes to test design concepts and gather user feedback.	L4	PO3,PO5, PO9,PO10

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction to Design Thinking: Importance of Design Thinking–Phases in design thinking process –Five stage model–non-linearity of the five-stage model.	8	CO1
II	Applications of design thinking in various domains. DTF or strategic innovations Growth–Story telling representation.	8	CO2
III	Strategic Foresight-Change–Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design-Standardization– Humanization.	8	CO3
IV	Creative Culture–Rapid prototyping, Strategy and Organization–Business Model design.	8	CO4
V	Design thinking workshop: Empathize, Design, Ideate, Prototype and Test.	8	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Demonstration video on 'Creative culture'.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Tim Brown	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Harper Business, 2009
2	Jeanne Liedtka, Tim Ogilvie	Designing for Growth: A Design Thinking Tool Kit for Managers	Columbia Business School Publishing, 2011

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Nigel Cross	Design Thinking: Understanding How Designers Think and Work	Berg Publishers, 2011
2	Tom Kelley, David Kelley	Creative Confidence: Unleashing the Creative Potential Within Us All	Crown Business, 2013

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test	10
Assignments/Seminars	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:**Dr.Shruthi R	**Name:**Dr Shankar M	**Name:**Dr.Shobha B N
Designation: Asst Prof	**Designation:**HOD &Associate Prof	**Designation:**IQAC, Director	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Yoga
Course Code	22UHV49A
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Energizing and calming techniques with mental focus.
Contact Hours per Week	Lecture: 1 Tutorial: _0 Practical: 2Total: 3
Credits	2
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Provide basic wellness principles and Yogic practices for common people. Provide fundamental principles and practices of Yoga for healthy living.

2. Course Objectives

1. To introduce basic wellness principles and Yogic practices for common people.
2. To introduce fundamental principles and practices of Yoga for healthy living.
3. To promote Yoga for disease prevention and health promotion as an approach to holistic health.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the fundamental principles of Yoga, including Ashtaanga Yoga, Shatkarma, and wellness concepts.	L2	PO6,PO9,PO12
CO2	Apply Yogic Sukshma Vyayama, Sthula Vyayama, and Surya Namaskar techniques to enhance physical well-being.	L3	PO6,PO9,PO10, PO12
CO3	Analyze the role of Yama, Niyama, and Panchakosha in promoting psychosocial and holistic well-being.	L4	PO6, PO8, PO9, PO12
CO4	Practice Pranayama, Bandha, and Mudra techniques to improve respiratory health and mental focus.	L3	PO6, PO9, PO10, PO12
CO5	Practice Pranayama, Bandha, and Mudra techniques to improve respiratory health and mental focus.	L3	PO6, PO8, PO9, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction to Yoga** Introduction, Guiding principles to be followed by Yoga practitioners. Introduction to Yogic Sukshma Vyayama & Sthula Vyayama and their relevance in Yoga Sadhana. Yogic concept of Wellness and Ashtaanga Yoga of Patanjali. Concept of Wellness and Wellbeing.	8	CO1
II	**Concept of Wellness and Wellbeing** Yogic concept of Wellness and Ashtaanga Yoga of Patanjali. Introduction to Shatkarma and their importance in Yoga Sadhana. Health benefits of Shatkarma.Role of Yama and Niyama for Psychosocial Wellbeing. Concept of Panchakosha and Panchamahabhuta	8	CO3
III	**Health benefits of Yogasana** Introduction, Surya Namaskar: Its technique and health benefits, the role ofYogasana in diseases prevention and health promotion. Health benefits of Shatkarma. Concept of Panchakosha and Panchamahabhuta.	8	CO2
IV	**Pranayama** Pranayama: Its principle and types, Mechanism of breathing, Health benefits of Pranayama, Bandha and Mudra: Techniques and their role in Yoga Sadhana. Practices of leading to Dhyana (Meditation).	8	CO4
V	**Diet and Nutrition** Yogic concepts of Aahara, Yogiclifesty (Aahara, Vihar, Aachar, Vichar). Yogic attitudes (Myhri, Karuna, Muditha and Upeksha) and practices for mental Wellbeing	8	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Practice of Surya Namaskar – Step-by-step guidance, synchronized breathing, and benefits of 12 postures.
2	Yogasanas – Standing Postures (e.g., Tadasana, Trikonasana, Vrikshasana) – Technique, alignment, and physical/mental benefits.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Swami Satyananda Saraswati	Swami Satyananda Saraswati	Yoga Publications Trust, 2008
2	Yoga Publications Trust, 2008	Light on Yoga	HarperCollins, 2005

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Swami Vivekananda	Raja Yoga	Advaita Ashrama, 2019
2	Dr. H. R. Nagendra	The Art and Science of Yoga	Vivekananda Yoga Anusandhana Samsthana, 2017

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Assignments/Seminars	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	**Vetted by**		**Confirmed by**
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Varun C S	**Name:**Dr.Shruthi R	**Name:** Dr M Shankar	**Name:**Dr.B N Shobha
Designation: Asst Professor	**Designation:**HOD &Associate Prof	**Designation:**IQAC,Director	**Designation:**Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Reinforced Cement Concrete
Course Code	22CV51
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Fundamental knowledge of structural analysis, strength of materials, and basics of reinforced concrete behaviour.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive understanding of reinforced concrete design principles, focusing on limit state methods. It covers the analysis and design of various RC structural elements such as beams, slabs, stairs, columns, and footings, incorporating relevant codes for strength, serviceability, and durability. Students will learn to apply engineering fundamentals to solve practical design problems in civil engineering contexts.

2. Course Objectives

1. Identify, formulate, and solve engineering problems of RC elements subjected to different kinds of loading.
2. Follow a procedural knowledge in designing various structural RC elements.
3. Impart the usage of codes for strength, serviceability, and durability.
4. Acquire knowledge in the analysis and design of RC elements.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply engineering fundamentals to understand design methods and terminology.	L3	PO1, PO2, PO12
CO2	Design beam elements using limit state methods and relevant codes.	L4	PO1, PO2, PO3, PO4

CO3	Design slab and stair elements using limit state methods and relevant codes.	L4	PO1, PO2, PO3, PO4
CO4	Design column and footing elements using limit state methods and relevant codes.	L4	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction to Limit State Design and Serviceability:** Introduction to working stress method, Difference between Working stress and Limit State Method of design. Philosophy and principles of limit state design with assumptions. Partial Safety factors, Characteristic load, and strength. Stress block parameters, concept of balanced section, under-reinforced, and over-reinforced section. Limiting deflection, short-term deflection, long-term deflection, Calculation of deflection of a singly reinforced beam only	10	CO1
II	**Limit State Analysis of Beams:** Analysis of singly reinforced, doubly reinforced, and flanged beams for flexure and shear.	10	CO2
III	**Limit State Design of Beams**: Design of singly reinforced beams with check for shear, check for development length, and other checks. Design of doubly reinforced beams and flanged sections without checks.	10	CO2
IV	**Limit State Design of Slabs and Stairs:** Design of one-way and two-way slabs with different end conditions. Design of dog-legged and open well stairs.	10	CO3
V	**Limit State Design of Columns and Footings**: Design of short axially loaded RC columns, with uniaxial and bi-axial moments. Footings with axial load and moment – Square and Rectangular types.	10	CO4

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field Visit- Ongoing RCC Building Construction Site – where slabs, beams, and columns are being cast.

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Unnikrishnan Pillai & Devdas Menon	Reinforced Concrete Design,	3rd Edition, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2012
2	N. Subramanian	Design of Reinforced Concrete Structures,	1st Edition, Oxford University Press, New Delhi, 2013
3	H. J. Shah	Reinforced Concrete Vol. 1 (Elementary Reinforced Concrete),	8th Edition, Charotar Publishing House Pvt. Ltd., 2005
4	Varghese P. C	Limit State Design of Reinforced Concrete	2nd Edition, PHI Learning Pvt. Ltd., New Delhi, 2008.

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Mosley, W. H. Hulse, R. & Bungey, J. H	Reinforced Concrete Design	5th Edition, Palgrave Macmillan, London, 1999.
2	Kong, F. K., & Evans, R. H., ,	Reinforced and Prestressed Concrete	4th Edition, Springer, London, 1991.
3	Beeby, A. W., & Narayanan, R. S,	Introduction to Design for Civil Engineers	1st Edition, CRC Press, London, 1995
4	Park, R., & Paulay, T	Reinforced Concrete Structures	1st Edition, John Wiley & Sons, New York, 1975.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sachin M S	**Name**: Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation**: HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Geotechnical Engineering
Course Code	22CV52
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of engineering geology, fluid mechanics, and fundamentals of mechanics of materials.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamental concepts of soil mechanics and geotechnical engineering, essential for civil engineering applications. It covers soil properties, classification, compaction, permeability, shear strength, soil exploration techniques, lateral earth pressure, and bearing capacity. The course emphasizes practical applications in foundation design and solving geotechnical problems using relevant theories and methods.

2. Course Objectives

1. To appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering. Also to become familiar broadly with geotechnical engineering problems such as foundation engineering, flow of water through soil medium, and terminologies associated with geotechnical engineering.
2. To know the basic engineering properties and the mechanical behaviour of different types of soil. This includes strength deformation characteristics under shearing stresses.
3. To determine the improvement in mechanical behaviour by densification of the soil deposit using compaction.
4. Learn introductory concepts of geotechnical investigations required for civil engineering projects, emphasizing in situ investigation.
5. Conceptually learn various theories related to earth pressure and bearing capacity of soil and their application in the design of foundations.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the basic definitions regarding the soils and their classification based on their index properties of soils.	L2	PO1, PO2, PO12

CO2	Understand the principle of compaction and its control and compute the permeability of soils	L3	PO1, PO2, PO3
CO3	Understand the concepts of shear strength of soils and able to calculate the shear strength parameters by using various methods.	L4	PO1, PO2, PO3, PO4
CO4	Understand the methods of soil exploration techniques and able to examine the properties of soil for different civil engineering projects.	L4	PO1, PO2, PO4, PO6
CO5	Will be able to analyze and determine the lateral earth pressure distribution and bearing capacity of soil under different types of foundations.	L4	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Introduction, Origin and formation of soil, Phase diagram, Phase relationships, Definitions and their interrelationships, Determination of index properties: Specific gravity, Water content, In-situ density and Particle size analysis (sieve and sedimentation analysis), Atterberg‘s limits, Consistency indices, Relative density, Unified soil classification system, Indian standard classification system, Numerical problems.	10	CO1
II	**Compaction of Soils:** Definition, Principle of compaction, Standard and Modified proctor‘s compaction tests, Factors affecting compaction, Effect of compaction on soil properties, Field compaction methods, Field compaction control, Numerical problems. **Permeability:** Introduction, Darcy ‘s Law, Factors affecting permeability, Coefficient of absolute permeability, Determination of coefficient of permeability, Field methods, Permeability of stratified soil deposit, Numerical problems.	10	CO2
III	**Shear Strength of Soil:** Introduction, Mohr‘s stress circle, Mohr-Coulomb failure theory, Effective stress principle, Measurement of shear strength: Direct shear test, Triaxial shear test, Unconfined compression test, Vane shear test, Test under different drainage conditions, Numerical problems.	10	CO3
IV	**Soil Exploration:** Introduction, Objectives, Methods of exploration, Types of samples, Types of samplers, Sample disturbance, Bore hole log, Depth of boring, Penetrometer Test, Drainage and dewatering: methods, estimation of depth of GWT (Hvorselev‘s method), Numerical problems.	10	CO4

V	**Lateral Earth Pressure:** Introduction, Plastic equilibrium in soils, Earth pressure theories: Rankine's theory, Coulomb's theory, Rebhann's and Culmann's graphical construction, Numerical problems. Bearing Capacity: Introduction, Definitions, Types of bearing capacity failures, Terzaghi's bearing capacity equations, Effect of groundwater table on bearing capacity, Eccentric loading, Factors affecting, Field methods, Numerical Problems.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Group Quiz: Classify soils using Unified Soil Classification System (USCS) and ISCS

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	B. C. Punmia & Ashok K. Jain	Soil Mechanics and Foundations	16th Edition, New Delhi, 2005
2	V. N. S. Murthy	Principles of Soil Mechanics and Foundation Engineering	1st Edition, Sangam Books Limited, New Delhi, 2001
3	Murthy, V. N. S	Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering	1st Edition, CRC Press, New York, 2002
4	Ranjan, G., & Rao, A. S.	Basic and Applied Soil Mechanics	1st Edition, New Age International (P) Ltd., New Delhi, 1991

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Lambe, T. W., & Whitman, R. V.	Soil Mechanics	1st Edition, John Wiley & Sons, New York, 1969

2	Coduto, D. P.	Geotechnical Engineering: Principles and Practices	2nd Edition, PHI Learning Pvt. Ltd., New Delhi, 2008.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sachin M S	**Name**: Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation**: HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Hydrology & Irrigation Engineering
Course Code	22CV53
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of fluid mechanics, engineering mathematics, and introductory environmental science
Contact Hours per Week	Lecture: 2 Tutorial: 0 Practical: 2 Total: 4
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive understanding of hydrology and irrigation engineering principles. It covers the hydrologic cycle, precipitation, evaporation, infiltration, runoff, and hydrographs, alongside irrigation methods, water requirements for crops, canal design, and reservoir capacity determination. Students will develop skills to analyze hydrological data and design irrigation systems for civil engineering applications.

2. Course Objectives

1. Understand the concept of hydrology and components of the hydrologic cycle, such as precipitation, infiltration, evaporation, and transpiration.
2. Quantify runoff and use the concept of the unit hydrograph.
3. Demonstrate different methods of irrigation, methods of application of water, and irrigation procedures.
4. Design canals and canal networks based on the water requirements of various crops.
5. Determine the reservoir capacity.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand water availability and the hydrologic cycle	L2	PO1, PO2, PO12
CO2	Analyze rainfall and estimate water losses.	L4	PO1, PO2, PO4

CO3	Evaluate runoff and develop hydrographs.	L4	PO1, PO3, PO4
CO4	Explain irrigation systems and crop water needs.	L3	PO1, PO6, PO7, PO8
CO5	Design canals and assess reservoir capacity.	L4	PO1, PO2, PO3, PO6

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Hydrology:** Introduction, Importance of hydrology, Global distribution of water and Indian water availability, Practical application of hydrology, Hydrologic cycle (Horton's) qualitative and engineering representation. **Precipitation:** Definition, Forms and types of precipitation, measurement of rain fall using Symon's and Syphon type of rain gauges, optimum number of rain gauge stations, consistency of rainfall data (double mass curve method), computation of mean rainfall, estimation of missing data, mass curve, rainfall hyetographs.	10	CO1
II	**Losses: Evaporation:** Introduction, Process, factors affecting evaporation, measurement using IS class-A Pan, estimation using empirical formulae (Meyer's and Rohwer's equations), Reservoir evaporation and control. **Evapo-transpiration:** Definition, AET, PET, factors affecting. Estimation by the Blaney-Criddle equation. Infiltration: Introduction, factors affecting infiltration capacity, measurement by double ring infiltrometer, infiltration indices.	10	CO2
III	**Runoff:** Definition, concept of catchment, factors affecting runoff, rainfall–runoff relationship using regression analysis. **Hydrographs:** Definition, components of hydrograph, unit hydrograph, assumption, application and limitations, derivation from simple storm hydrographs, S curve and its computations.	10	CO3
IV	**Irrigation:** Definition. Benefits and ill effects of irrigation. System of irrigation: surface and groundwater, flow irrigation, lift irrigation. **Water Requirements of Crops:** Duty, delta, and base period, relationship between them, factors affecting the duty of water crops and crop seasons in India, irrigation efficiency, frequency of irrigation.	10	CO4
V	**Canals:** Types of canals. Alignment of canals. Definition of gross command area, cultural command area, intensity of irrigation, time factor,	10	

	crop factor. Unlined and lined canals. Standard sections. Design of canals by Lacey's and Kennedy's method. **Reservoirs:** Definition, investigation for reservoir site, storage zones determination of storage capacity using mass curves, economical height of dam.		CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field visit to irrigational structures

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Subramanya, K.	Engineering Hydrology	3rd Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.
2	Reddy, P. Jaya Rami	A Textbook of Hydrology	2nd Edition, University Science Press, New Delhi, 2019
3	Punmia, B. C., & Pandey, Lal	Irrigation and Water Power Engineering	16th Edition Laxmi Publications, New Delhi, 2009

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	H. M. Raghunath	Hydrology: Principles, Analysis & Design,	2nd Edition, Wiley Eastern Ltd., New Delhi, 1996
2	R. K. Sharma	Irrigation Engineering and Hydraulic Structures	1st Edition, Oxford & IBH Publishing Co., New Delhi, 1984
3	Ven Te Chow	Applied Hydrology	2nd Edition, Tata McGraw-Hill Education, New Delhi, 2010

4	P. N. Modi,	Irrigation Water Resources and Water Power Engineering	9th Edition, Standard Book House, New Delhi, 2019

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sachin M S	**Name**: Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation**: HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Repair and Rehabilitation of Structures
Course Code	22CV54
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of reinforced concrete design, material properties, and structural behaviour under loads and environmental conditions.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course focuses on the principles and practices of repairing and rehabilitating concrete structures. It covers the identification of deterioration causes, damage assessment techniques, maintenance strategies, and the selection of appropriate materials and methods for repair and retrofitting. Students will gain skills to evaluate structural integrity and apply suitable techniques to enhance the durability and serviceability of structures.

2. Course Objectives

1. Investigate the cause of deterioration of concrete structures.
2. Strategies different repair and rehabilitation of structures.
3. Evaluate the performance of the materials for repair.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the causes for deterioration in concrete structures.	L2	PO1, PO2, PO6
CO2	Assess the type and extent of damage and carry out damage assessment of structures through various types of tests.	L4	PO1, PO2, PO4, PO5
CO3	Recommend maintenance requirements of the buildings and preventive measures against influencing factors.	L4	PO1, PO3, PO6, PO7
CO4	Select suitable material and suggest an appropriate method for repair and rehabilitation.	L4	PO1, PO3,

			PO5, PO7

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**General:** Introduction and Definition for Repair, Retrofitting, Strengthening and rehabilitation. Physical and Chemical Causes of deterioration of concrete structures, Evaluation of structural damages to the concrete structural elements due to earthquake.	8	CO1
II	**Damage Assessment:** Purpose of assessment, Investigation of damage, Damage assessment procedure, destructive, non- destructive and semi destructive testing systems	8	CO2
III	**Influence on Serviceability and Durability:** Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, Effects of cover thickness and cracking, corrosion mechanism, methods of corrosion protection - corrosion inhibitors, coatings, and cathodic protection.	8	CO3
IV	**Maintenance and Retrofitting Techniques:** Definitions: Maintenance, Facts of Maintenance and importance of Maintenance, Need for retrofitting, retrofitting of structural members i.e., column and beams by Jacketing technique, externally bonding (ERB) technique, near surface mounted (NSM) technique, External post tensioning.	8	CO4
V	**Materials for Repair and Retrofitting:** Artificial fibre reinforced polymer like CFRP, GFRP, AFRP and natural fibre like Sisal and Jute. Adhesive like, Epoxy Resin, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Techniques for Repair: Gunite and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.	8	CO4

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Case Study Discussion – Students analyze real-life examples of damaged structures and suggest suitable retrofitting techniques.

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Varghese, P. C	Maintenance, Repair & Rehabilitation and Minor Works of Buildings	2nd Edition, PHI Learning Pvt. Ltd., New Delhi, 2014.
2	Bungey, J. H., Millard, S. G., & Grantham, M. G.	Testing of Concrete in Structures	4th Edition, CRC Press, 2006
3	Shetty, M. S., & Jain, A. K	Concrete Technology: Theory and Practice	6th Edition, S. Chand Publishing, New Delhi, 2019
4	Emmons, Peter H.	Concrete Repair and Maintenance Illustrated: Problem Analysis, Repair Strategy, Techniques,	1st Edition, R.S. Means Company Inc., Massachusetts, 1994

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Johnson, Sidney M.	Deterioration, Maintenance, and Repair of Structures	1st Edition, Longman Scientific and Technical, 1992.
2	Campbell, Denison, Allen, & Roper, Harold	Concrete Structures – Materials, Maintenance, and Repair	1st Edition, Longman Scientific and Technical, 1991
3	Morgan, D. R.	Concrete Repair: A Practical Guide	1st Edition, CRC Press, 2019.
4	Freyermuth, C. L	Structural Repair of Buildings: Methods and Materials	1st Edition, McGraw-Hill, New York, 1980.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Sachin M S	**Name**: Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. B N Shobha
Designation: Assistant Professor	**Designation**: HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Alternate Building Materials
Course Code	22CV551
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 5th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Basic knowledge of conventional construction materials and their properties
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces sustainable and cost-effective alternatives to conventional building materials. It covers the properties, applications, and performance of materials such as stabilized mud blocks, fly ash bricks, bamboo, recycled aggregates, and lime-based products. Students will learn design considerations, construction techniques, and testing methods. The course emphasizes environmental benefits, energy efficiency, and affordability in building practices.

2. Course Objectives

1.Understand environmental issues due to building materials and the energy consumption in manufacturing building materials

2. Study the various masonry blocks, masonry mortar and structural behavior of masonry under compression.

3. Study the alternative building materials in the present context.

4. Understand the alternative building technologies which are followed in present construction field.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the properties and environmental impacts of building materials	L2	PO1,PO2,PO6,PO7
CO2	Analyze the behavior and strength of masonry units and mortars..	L3	PO1,PO2,PO6
CO3	Evaluate alternate building materials from wastes for sustainability.	L3	PO1,PO2,PO6,PO7

CO4	Apply alternate building technologies, roofing systems, and equipment.	L3	PO1,PO2,PO6

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Building materials:** sources, methods of production and environmental Implications, Energy in building materials, Embodied energy in building materials, Transportation Energy for building materials and Maintenance Energy for Buildings, Environmental issues concerned to building materials, Global warming and construction industry, Green concepts in buildings, Framed Construction, Masonry Construction, Biomass Resources for buildings.	08	CO1
II	**Elements of Structural Masonry** Elements of Structural Masonry, Masonry materials, requirements of masonry units' characteristics of bricks, stones, clay blocks, concrete blocks, stone boulders, laterite blocks, Fal- G blocks and Stabilized mud block. Manufacture of stabilized blocks. **Structural Masonry Mortars:** Mortars, cementations materials, sand, natural & manufactured, types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar. Uses of masonry, masonry bonding, Compressive strength of masonry elements, Factors affecting compressive strength, Strength of Prisms/wallets and walls, Effect of brick bond on strength, Bond strength of masonry: Flexure and shear, Elastic properties of masonry materials and masonry.	08	CO2
III	**Alternate Building Materials:** Lime, Pozzolana cements - Raw materials, Manufacturing process, Properties and uses. Fibers- metal, organic and synthetic - properties and applications. Fiber reinforced plastics, Building materials from agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes.	08	CO3
IV	**Alternate Building Technologies:** Use of arches in foundation, alternatives for wall constructions, composite masonry, confined masonry, cavity walls, rammed earth, Ferro cement construction - building components, Materials and specifications, Properties, Construction methods, Applications. Top down construction, Mivan Construction Technique, 3D Printing and Additive Manufacturing Technologies.	08	CO4
V	**Alternate Roofing Systems:** Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes. **Equipment for Production of Alternate Materials:** Machines for manufacture of concrete, Equipment's for production of stabilized blocks, Moulds and methods of production of precast elements.	08	CO4

5.CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Field visit to concrete block manufacturing plant.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	K S Jagadish, B V Venkatarama Reddy K S Nanjunda Rao	Alternative Building Materials and Technologies	3rd Edition, New Age International pub-2020
2	Charles Helier	Handbook of Nondestructive Evaluation	3rd Edition, McGraw-Hill-2020.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	RJS Spence DJ Cook	Building Materials in Developing Countries	1st Edition, Wiley pub-2019
2	Peter J. Shull	Non-Destructive Evaluation: Theory, Techniques and Application	1st Edition, Marcel Dekker, Inc. New York, 2020

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10.Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr.Akshay kumar H S	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation**:HOD and Associate professor	**Designation:** Director, IQAC	**Designation**:Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Matrix Method of Structural Analysis
Course Code	22CV552
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 5th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Fundamental understanding of structural analysis and knowledge of engineering mechanics.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course focuses on the application of matrix algebra to structural analysis of determinate and indeterminate structures. It covers the stiffness and flexibility methods for beams, frames, and trusses. Students will learn formulation of element and global matrices, load vectors, and solution techniques using computer methods. Emphasis is placed on systematic structural modeling and numerical solution approaches. Practical examples and software applications are integrated to enhance problem-solving skills.

2. Course Objectives

1.Determine deflections and forces in statically determinate and indeterminate structures using force and stiffness methods

2. Use a physical interpretation of stiffness matrices to assemble stiffness matrices analytically.

3. Extend the study of linear elastic analysis to include nonlinear aspects of structure behavior

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the principles of structural systems, indeterminacy, energy concepts, stiffness and flexibility.	L2	PO1,PO2,PO3,PO4
CO2	Apply the flexibility method for analysis of beams, frames, and trusses including temperature and lack of fit effects	L3	PO1,PO2,PO3,PO4
CO3	Apply the stiffness method for analysis of beams, frames, and trusses including temperature and lack of fit effects..	L3	PO1,PO2,PO3,PO4
CO4	Use the direct stiffness method for analysis of continuous beams and trusses in global coordinates..	L3	PO1,PO2,PO3,PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Structural systems, geometric and material non-linearity, principle of superposition, equilibrium and compatibility conditions, static and kinematic indeterminacy, principle of minimum potential energy and minimum complementary energy, concepts of stiffness and flexibility, flexibility and stiffness matrices of beam and truss elements .	08	CO1
II	**Element Flexibility Method:** Force transformation matrix, global flexibility Matrix , analysis of continuous beams, rigid frames and trusses	08	CO2
III	**Element Stiffness Method:** Displacement transformation matrix, global stiffness matrix, analysis of continuous beams, rigid frames and trusses .	08	CO3
IV	**Effects of Temperature Changes and Lack of Fit:** Related numerical problems by flexibility and stiffness method as in Module 2 and Module 3	08	CO3
V	**Direct Stiffness Method:** Local and global coordinates systems, principle of contra gradience, global stiffness matrices of beam and truss elements, analysis of continuous beams and trusses.	08	CO4

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Site visit to a Nearby Truss Structure.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Godbole P N	Matrix Method of Structural Analysis	2nd Edition, PHI ltd, New Delhi-2019
2	Pundit and Gupta	Theory of Structures Vol II	1st Edition, TMH publications, New Delhi-2020

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Manikaselvam	Elements of Matrix Analysis and Stability of Structures	1st Edition, Khanna Publishers, New Delhi-2017
2	H C Martin	Introduction to Matrix Methods in Structural Analysis	2nd Edition, International textbook company, McGraw Hill-2016

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr.Akshay kumar H S	**Name:** Dr.Shruthi R	**Name:**Dr.M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation**: HOD and Associate Professor	**Designation:** Director, IQAC	**Designation**: Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Pavement Design
Course Code	22CV553
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 5th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Basic knowledge of transportation engineering and soil mechanics
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the principles and methods of pavement design for highways and airfields. It covers traffic and load considerations, material characterization, and design of flexible and rigid pavements. Students will learn about pavement evaluation, distress analysis, and overlay design techniques. Emphasis is placed on life-cycle cost, safety, and sustainability aspects of pavements. Case studies and design projects provide practical exposure to real-world pavement systems.

2.Course Objectives

1. Gain knowledge about the process of collecting data required for design, factors affecting pavement design, and maintenance of pavement.
2. Excel in the path of analysis of stress, strain and deflection in pavement.
3. Understand design concepts of flexible pavement by various methods (CBR, IRC 37- 2001, Mcleods, Kansas and also the same of rigid pavement by IRC 58-2002
4. Understand the various causes leading to failure of pavement and remedies for the same.
5. Develop skills to perform functional and structural evaluation of pavement by suitable methods

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the characteristics, components, and functions of flexible and rigid pavements.	L2	PO1,PO2,PO3,PO4
CO2	Apply principles of pavement stress, deflection, and design theories for flexible pavements.	L3	PO1,PO2,PO3,PO4
CO3	Analyze stresses and design rigid pavements including joint and reinforcement requirements.	L3	PO1,PO2,PO3,PO4

CO4	Evaluate pavement failures, maintenance, and performance assessment methods for flexible and rigid pavements	L2	PO1,PO2,PO3,PO4

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Desirable characteristics of pavement, Types and components, Difference between Highway pavement and Air field pavement, functions of sub grade, sub base, Base course, surface course, comparison between Rigid and flexible pavement. **Fundamentals of Design of Pavements:** Stresses and deflections, Principle, Assumptions and Limitations of Boussinesq's theory, Burmister theory and problems on above.	08	CO1
II	**Design Factors:** Design wheel load, contact pressure, Design life, Traffic factors, climatic factors, Road geometry, Subgrade strength and drainage,ESWL concept Determination of ESWL by equivalent deflection criteria,EWL concept, and problems on above. **Flexible pavement Design:** Assumptions, Mcleod Method, CBR method, IRC Method (old), CSA method using IRC-37-2001, problems on above	08	CO2
III	**Flexible Pavement Failures, Maintenance and Evaluation:** Types of failures, Causes, Remedial/Maintenance measures in flexible pavements, Functional Evaluation by Visual inspection and unevenness measurements, Falling weight deflectometer. Design factors for runway pavements, Design methods for Airfield pavement and problems on above .	08	CO2
IV	**Stresses in Rigid Pavement:** Types of stress, Analysis of Stresses,Westergaard's Analysis, Modified Westergaard equations,Critical stresses, Wheel load stresses, Warping stress, Frictional stress, combined stresses (using chart / equations), problems on above. **Design of Rigid Pavement:** Design of CC pavement by IRC: 58-2002 for dual and Tandem axle load, Design of Dowel bars, Design of Tie bars, Design factors for Runway pavements.	08	CO3
V	**Rigid Pavement Failures, Maintenance and Evaluation:** Types of failures, causes, remedial/maintenance measures in rigid pavements, Functional evaluation by Visual inspection and unevenness measurements, wheel load and its repetition, properties of sub grade, properties of concrete. External conditions, joints, Reinforcement, Requirements of joints, Types of joints, Expansion joint, contraction joint, warping joint, construction joint, longitudinal joint.	08	CO4

5.CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6.Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Site visit to near by Rigid and Flexible Pavement construction.

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	S K Khanna, C E G Justo A Veeraragavan	Highway Engineering	11th Edition, New Age International pub-2019
2	Yang H. Huang	Pavement Analysis and Design	2nd Edition, University of Kentucky-2018

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Yoder & wit zorac	Principles of pavement design	2nd Edition, Wiley pub.-2020
2	R Srinivasa Kumar	Pavement Design	1st Edition, University Press -2017

9.Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10.Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr.Akshay Kumar H S	**Name:** Dr.Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation**:HOD and Associate professor	**Designation:** Director, IQAC	**Designation**: Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Solid Waste Management
Course Code	22CV554
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 5th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Basic understanding of environmental science and civil engineering fundamentals
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course deals with the principles and practices of managing municipal, industrial, and hazardous solid wastes. It covers waste generation, characterization, collection, transport, treatment, and disposal methods. Students will study recycling, composting, incineration, and modern landfill design techniques. Emphasis is given to environmental impacts, sustainable practices, and legal/regulatory frameworks. Practical case studies and projects highlight innovative waste-to-energy and resource recovery approaches.

2. Course Objectives

1.Learn about solid waste characteristics, how to measure it, and methods for collecting and transporting it.
2. Explore the various techniques used to process solid waste.
3. Understand which methods are suitable for disposing of solid waste, and their pros and cons.
4. Grasp the concepts of composting, sanitary landfilling, and incineration for waste disposal.
5. Understand how to maintain different types of waste and explore options for recovering energy from solid waste..

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the characteristics, quantification, collection and transportation techniques of Solid waste Management	L2	PO1,PO2,PO4,PO7
CO2	Understand the different processing techniques used in Solid waste management.	L2	PO1,PO2,PO3,PO7

CO3	Understand the suitability of different methods for the disposal of the solid waste management with its merits and demerits.	L2	PO1,PO2,PO7
CO4	Understand the concept of Composting, Sanitary landfilling and Incineration types of waste disposal.	L2	PO1,PO2,PO3,PO7
CO5	Understand the basics concepts in maintenance of different types of waste and option of energy recovery from solid waste	L2	PO1,PO2,PO7

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Sources:** Sources of Solid waste, Types of solid waste, Physical and Chemical Composition of municipal solid waste. Generation rate, Numerical Problems. Collection: Collection of solid waste- services and systems, equipment, Transportation: Need of transfer operation, transfer station, transport means and methods, route optimization. Solid waste management 2000 rules with, 2016 amendments .	08	CO1
II	**Processing techniques:** Purpose of processing, Chemical volume reduction (incineration) – Process description, , Air pollution control ,Mechanical volume reduction (compaction), Mechanical size reduction (shredding), component separation (manual and mechanical methods)	08	CO2
III	**Disposal Methods:** Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolysis, composting, sanitary land filling, merits and demerits ,biomedical wastes and disposal **Incineration** - types of incinerations, design criteria for incineration, 3T's, principal components, Pyrolysis.	08	CO3
IV	**Composting-** Aerobic and anaerobic method -process description, process design consideration, Mechanical composting, Vermicomposting, **Sanitary landfilling:-** Definition, advantages and disadvantages, site selection, methods, reaction occurring in landfill- Gas and Leachate movement, Control of gas and leachate movement, Design factors of sanitary landfill.	08	CO4
V	Energy recovery technique from solid waste management Sources, collection, treatment and disposal of - Biomedical waste ,E-waste Hazardous waste and construction waste.	08	CO5

5.CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6.Details of Practical's Sessions

Sl.No	Title of Experiment / Activity
1	Site visit to Bio gas plant in BGSIT Boys hostel campus.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	George Tchobanoglous,,Hilary Theisen , Samuel A Vigil	Integrated Solid Waste Management : Engineering principles and management issues	2nd Edition, Graw hill Education. Indian edition -2017
2	Howard S Peavy, Donald R Rowe and George Tchobanoglous	Solid waste management	2nd Edition,Tata Mcgraw Hill Publishing Co ltd -2018

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Ministry of Environment and Forests Notification, New Delhi	Municipal Solid Wastes (Management and Handling) Rules, 2000	25th September, 2000. Amendment – 1357(E) – 08- 04-2016
2	George Tchobanoglous, Frank Kreith	Handbook of Solid waste management	2nd Edition, Graw hill Education, 2002, ISBN-13 978-0071356237

9..Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10.Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.

Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr.Akshay kumar H S	**Name:** Dr.Shruthi R	**Name:** Dr.M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation**:HOD and Associate professor	**Designation:** Director, IQAC	**Designation**: Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Geotechnical Engineering Lab
Course Code	22CVL56
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	☐Core ☐ Elective ✓ Lab
Prerequisite (If any)	Basic knowledge about soil
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This laboratory course provides hands-on experience in conducting standard geotechnical tests to determine the physical, index, and engineering properties of soils as per IS codal procedures. Students will perform experiments to classify soils, assess compaction, permeability, and shear strength characteristics, enabling them to apply geotechnical engineering principles to real-world civil engineering problems.

2. Course Objectives

1. To carry out laboratory tests and to identify soil as per IS codal procedures.
2. To understand the determination of physical, index and Engineering properties of soil.
3. To perform the tests to determine shear strength characteristics of soils. Number of Lecture Hours / Week.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the visual soil classification and able to determine the physical and index properties of soil.	L3	PO1, PO2, PO4, PO5
CO2	Able to identify and classify soil based on standard geotechnical engineering practice.	L3	PO1, PO2, PO4
CO3	Able to perform the in-situ density and compaction test for field quality control.	L3	PO1, PO4, PO5

CO4	Able to perform and analyze laboratory coefficient of permeability test.	L4	PO1, PO2, PO4, PO5
CO5	Able to perform the shear strength test to assess strength and deformation characteristics.	L4	PO1, PO2, PO4, PO5

4. Course Content (Experiment-Wise)

Unit	Topics	Hours	COs
I	Determination of the specific gravity of soil.	3	CO1
II	Determination of water content of soil by oven drying method.	3	CO1
III	Grain size analysis.	3	CO2
IV	Field density determination by core cutter method.	3	CO3
V	Field density determination by sand replacement method.	3	CO3
VI	Determination of liquid limit of soil.	3	CO3
VII	Determination of plastic limit of soil.	3	CO2
VIII	Determination of shrinkage limit of soil.	3	CO2
XI	Standard proctor compaction test.	3	CO3
X	Modified proctor compaction test.	3	CO3
XI	Determination of permeability of soil by constant head method.	3	CO4
XII	Determination of permeability of soil by variable head method.	3	CO4
XIII	Determination of shear strength of soil by direct shear method.	3	CO5
XIV	Determination of shear strength of soil by triaxial shear method.	3	CO5
XV	Determination of shear strength of soil by unconfined compression test.	3	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Report preparation on consultancy works using core cutter

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Punmia B. C.	Soil Mechanics and Foundations,	16th Edition, Laxmi Publications (P) Ltd., New Delhi, 2005
2	Murthy, V. N. S.	Principles of Soil Mechanics and Foundation Engineering	4th Edition, UBS Publishers and Distributors, New Delhi, 1992
3	Ranjan, Gopal, & Rao, A. S. R.	Basic and Applied Soil Mechanics	2nd Edition, New Age International (P) Ltd., New Delhi, 2000

8. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Record	40
End Semester Examination	50

9. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sachin M S	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	CAED-RCC
Course Code	22CVL57
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	☐Core ☐ Elective ✓ Lab
Prerequisite (If any)	Basic knowledge of building elements, structural design principles, CAD drafting, and Excel operations is required
Contact Hours per Week	Lecture: 1 Tutorial: 0 Practical: 2 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This laboratory course focuses on developing skills in computer-aided engineering drawing (CAED) for reinforced cement concrete (RCC) structures. Students will learn to create, interpret, and analyze detailed engineering drawings for various building elements using CAD software and Excel spreadsheets. The course emphasizes practical applications in planning, designing, and visualizing construction details, aligning with industry practices.

2. Course Objectives

1. Achieve skill sets to prepare computer-aided engineering drawings
2. Understand the details of construction of different building elements.
3. Visualize the completed form of the building and the intricacies of construction based on the engineering drawings.
4. Get familiarization of practices used in the industry.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Gain a broad understanding of planning and designing of buildings	L2	PO1, PO2, PO5
CO2	Prepare, read, and interpret the drawings in a professional setup	L3	PO1, PO2, PO5, PO10
CO3	Know the procedures of submission of drawings and develop working and submission drawings for building	L3	PO1, PO3, PO5, PO10

CO4	Prepare detailed working drawings	L3	PO1, PO3, PO5, PO10

4. Course Content (Experiment-Wise)

Unit	Topics	Hours	COs
I	**Drawings Related to Different Building Elements:** The Following drawings are to be prepared for the data given using CAD Software a) Beams – Simply supported, Cantilever, and Continuous.	12	CO1
	b) Slab – One-way, Two-way, and One-way continuous.	6	CO2
	c) Footings and Columns.	3	CO3
	d) Cross-section of a pavement.	3	CO2
	e) Septic Tank and sedimentation Tank	3	CO3
	f) Cross-sectional details of a road for a residential area with provision for all services. Note: Students should sketch to dimension the above in a sketch book before doing the computer drawing.	3	CO4
II	**Use of EXCEL spreadsheets:** a) Design of singly reinforced and doubly reinforced rectangular beams	6	CO4
	b) Design of one-way and two-way slabs	6	CO4

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field visit to the RC construction site

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Tickoo, Sham,	AutoCAD 2022: A Problem-Solving Approach,	26th Edition, CADCIM Technologies, USA, 2022
2	Yasmin, Nighat	Civil Engineering Drawing,	2nd Edition, McGraw-Hill Education, New Delhi, 2018.
3	Venugopal, K., & Prabhu Raja, V.	Engineering Drawing + AutoCAD, New Age	5th Edition, International Publishers, New Delhi, 2011

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Bhatt, N. D.,	Engineering Drawing,	53rd Edition, Charotar Publishing House, Anand, 2014
2	Choudhury, M. A.	Engineering Drawing and Graphics Using AutoCAD	2nd Edition, Pearson Education, New Delhi, 2017.
3	Chakraborti, M.	Engineering Graphics with AutoCAD	4th Edition, CBS Publishers & Distributors, New Delhi, 2015
4	Omura, George, & Benton, Brian C.	Mastering AutoCAD 2021 and AutoCAD LT 2021	1st Edition, Sybex (Wiley), USA, 2021.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Record	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sachin M S	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Constitution of India and Professional Ethics (CIP)
Course Code	22UHV59
Program	Civil Engineering
Academic Year/Semester	2025-2026/ 5th Semester
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic understanding of Indian history, governance, and societal structure, along with awareness of professional responsibilities and ethics.
Contact Hours per Week	Lecture: 0 Tutorial: 2 Practical: 0 Total: 2
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces students to the structure and key components of the Indian Constitution, including Fundamental Rights, Duties, and Directive Principles of State Policy. It covers the functioning of Union and State Governments, electoral processes, and constitutional amendments. Additionally, it explores professional ethics, emphasizing values, responsibilities, and ethical challenges in engineering practice, equipping students to understand their civic and professional roles.

2. Course Objectives

1. To know about the basic structure of the Indian Constitution.
2. To know the Fundamental Rights, DPSP ‘s and Fundamental Duties of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the Constitution.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Analyze the basic structure of Indian Constitution.	L3	PO6, PO8, PO12
CO2	Remember their Fundamental Rights, DPSP‘s and Fundamental Duties of our constitution.	L2	PO6, PO8, PO12

CO3	Know about our Union Government, political structure & codes, procedures.	L2	PO6, PO8, PO12
CO4	Understand our State Executive & Elections system of India.	L2	PO6, PO8, PO12
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the Constitution.	L2	PO6, PO8, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction to Indian Constitution: The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.	4	CO1
II	FR's, FD's and DPSP's: Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building	4	CO2
III	Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.	4	CO3
IV	State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important Constitutional Amendments till today. Emergency Provisions.	4	CO4
V	Professional Ethics: Ethics & Values. Types of Ethics. Scope & Aims of Professional & Engineering Ethics. Positive and Negative Faces of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Trust & Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.	4	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	**Group Debate / Quiz** Topics: "Are Fundamental Duties enforceable?" or "Relevance of DPSPs in modern India". Organize a quiz on key Articles, Amendments, and Constitutional bodies.

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Naidhruva Edutech Learning Solutions, Bengaluru, **2022**.	Constitution of India (for Competitive Exams),	1st Edition, Naidhruva Edutech Learning Solutions, Bengaluru, 2022.
2	Govindarajan, M., Natarajan, S., & Senthilkumar, V. S	Engineering Ethics	1st Edition, Prentice-Hall of India, New Delhi, 2004.
3	Nagamohan Dhas, H. N., & Sahayana Kerekon	Samvidhana Odu – For Students & Youths,	1st Edition, Jana Prakashana, Bengaluru, 2005.

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Kashyap, Subhash C.	Our Constitution: An Introduction to India's Constitution and Constitutional Law	6th Edition, National Book Trust, New Delhi, 2011.
2	Basu, Durga Das,	Introduction to the Constitution of India,	24th Edition, LexisNexis, New Delhi, 2018
3	Harris, Charles E., Pritchard, Michael S., Rabins, Michael J.	Engineering Ethics: Concepts and Cases	6th Edition, Cengage Learning, USA, 2019

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	25
Internal Assessment Test II	25
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sachin M S	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Construction Management & Entrepreneurship
Course Code	22CV61
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	✓Core ☐ Elective ☐ Lab
Prerequisite (If any)	Fundamental knowledge of construction materials, equipment's, machinery, quality of materials, Entrepreneurship.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	03
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides an overview of construction management principles, including planning, scheduling, resource allocation, and equipment management. It emphasizes quality control, safety practices, and professional ethics in construction projects. Students learn concepts of engineering economics, covering cost analysis, time value of money, and decision-making methods. The course also introduces entrepreneurship and MSME development, highlighting business planning, financing, and government schemes. Practical applications focus on managing construction projects effectively with a balance of technical, economic, and ethical considerations.

2. Course Objectives

1. Understand the concept of management, construction organization, construction planning and scheduling.
2. Understand importance of resource management, construction equipment and materials.
3. Understand concept of construction quality, safety and human values.
4. Understand importance of economics, time value money and factors governing.
5. Ability to understand the concepts of entrepreneurship, MSME and business planning process.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Prepare a project plan based on requirements and schedule of a project by understanding the activities and their sequence.	L3	PO1, PO2, PO6, PO11
CO2	Understand labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety.	L2	PO1, PO6, PO11
CO3	Understand the economics of alternatives and evaluate	L2	PO1, PO6, PO8,

	benefits and profits of a construction activity based on monetary value and time value.		PO11
CO4	Understand an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies.	L2	PO1, PO2, PO11

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Management:** Characteristics of management, functions of management, importance and purpose of planning process, types of plans Construction **Project Formulation**: Introduction to construction management, project organization, management functions, management styles Construction Planning and Scheduling - Introduction, types of project plans, work breakdown structure, Grant Chart, preparation of network diagram- event and activity based and its critical path-critical path method, concept of activity on arrow and activity on node.	10	CO1
II	**Resource Management:** Basic concepts of resource management, class of labour, Wages & statutory requirement, Labour Production rate or Productivity, Factors affecting labour output or productivity. **Construction Equipment's:** classification of construction equipment, estimation of productivity for: excavator, dozer, compactors, graders and dumpers. Selection of construction equipment and basic concept on equipment maintenance. Materials - Material management functions, inventory management.	10	CO2
III	**Construction Quality, safety and Human Values**: Construction quality process, inspection, quality control and quality assurance, cost of quality, ISO standards. Introduction to concept of Total Quality Management HSE: Introduction to concepts of HSE as applicable to Construction. Importance of safety in construction, Safety measures to be taken during Excavation, Explosives, drilling and blasting, hot bituminous works, scaffolds / platforms / ladder, form work and equipment operation. Storage of materials. Safety through legislation, safety campaign. Insurances. **Ethics** : Morals, values and ethics, integrity, trustworthiness , work ethics, need of engineering ethics, Professional Duties, Professional and Individual Rights, Confidential and Proprietary Information, Conflict of Interest Confidentiality, Gifts and Bribes, Price Fixing, Whistle Blowing.	10	CO2
IV	**Introduction to engineering economy:** Principles of engineering economics, concept on Micro and macro analysis, problem solving and decision making. Interest and time value of money: concept of simple and compound interest, interest formula for: single payment, equal payment and uniform gradient series. Nominal and effective interest rates, deferred annuities, capitalized cost. **Comparison of alternatives**: Present worth, annual equivalent, capitalized and rate of return methods, Minimum Cost analysis and break even analysis.	10	CO3
V	**Entrepreneurship**: Evolution of the concept, functions of an entrepreneur, concepts of entrepreneurship, stages in entrepreneurial process, different	10	CO4

	sources of finance for entrepreneur, central and state level financial institutions. Micro, Small & Medium Enterprises (MSME): Definition, characteristics, objectives, scope, role of MSME in economic development, advantages of MSME, Introduction to different schemes: TECKSOK, KIADB, KSSIDC, DIC, Single Window Agency: SISI, NSIC, SIDBI, KSFC. **Business Planning Process**: Business planning process, marketing plan, financial plan, project report and feasibility study, guidelines for preparation of model project report for starting a new venture. Introduction to international entrepreneurship opportunities , entry into international business , exporting , direct foreign investment , venture capital		

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field Visit to construction Equipment yard/Factory/Industry.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	H.S Vishwanath	Construction Management & Entrepreneurship.	1st edition, Sapna book house –Feb 2018
2	Chitkara, K.K.	Construction Project Management: Planning, Scheduling and Control.	3rd Edition, Tata McGraw Hill, 2014.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Harris, F. and McCaffer, R	Modern Construction Management.	7th Edition, Wiley-Blackwell, 2013.
2	Peurifoy, R.L., Schexnayder, C.J., Shapira, A.	Construction Planning, Equipment and Methods.	8th Edition, McGraw Hill, 2011.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Design of Steel Structures
Course Code	22CV62
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	✓Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic understanding of Strength of Materials.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the design of steel structures using the limit state method in accordance with IS code provisions. It covers plastic behaviour of steel, bolted and welded connections, tension and compression members, and column bases. Emphasis is given to failure modes, design considerations, and stability requirements of structural members. The course also addresses the design of beams, connections, and splices with focus on strength and serviceability aspects. Overall, it equips students with the knowledge to analyse and design safe and efficient steel structural systems.

2. Course Objectives

1. Understand advantages and disadvantages of steel structures, steel code provisions, and plastic behaviour of structural steel.
2. Learn Bolted connections and Welded connections.
3. Design of compression members, built-up columns and columns splices.
4. Design of tension members, simple ‘s lab base and gusseted base.
5. Design of laterally supported and un-supported steel beams.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the fundamentals of steel structures, limit state design, failure criteria, and IS code provisions.	L2	PO1, PO2, PO3, PO4
CO2	Analyze plastic behaviour of steel structures and apply plastic analysis methods to continuous beams.	L4	PO1, PO2, PO3, PO4
CO3	Design bolted and welded connections based on joint behaviour and code guidelines.	L4	PO1, PO2, PO3, PO4

CO4	Design tension and compression members, including laced, battened, and gusseted components.	L4	PO1, PO2, PO3, PO4
CO5	Evaluate and design beams, column bases, and structural connections considering stability and strength.	L4	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Advantages and Disadvantages of Steel Structures, Limit state method Limit State of Strength, Structural Stability, Serviceability Limit states, Failure Criteria of steel, Design Consideration, Loading and load combinations, IS code provisions, Specification and Section classification. **Plastic Behaviour of Structural Steel:** Introduction, Plastic theory, Plastic Hinge Concept, Plastic collapse load, load factor, Shape factor, Theorem of plastic collapse, Methods of Plastic analysis, Plastic analysis of Continuous Beams.	10	CO1
II	**Bolted Connections:** Introduction, Types of Bolts, Behaviour of bolted joints, Design of High Strength Friction Grip (HSFG) bolts, Design of Simple bolted Connections (Lap and Butt joints) and bracket connections. **Welded Connections:** Introduction, Types and properties of welds, Effective areas of welds, Weld Defects, Simple welded joints for truss member and bracket connections, Advantages and Disadvantages of Bolted and Welded Connections.	10	CO2
III	**Design of Compression Members:** Introduction, Failure modes, Behaviour of compression members, Sections used for compression members, Effective length of compression members, Design of compression members and built up Compression members, Design of Laced and Battened Systems.	10	CO3
IV	**Design of Tension Members:** Introduction, Types of Tension members, Slenderness ratio, Modes of Failure, Factors affecting the strength of tension members, Design of Tension members and Lug angles, Splices, Gussets. **Design of Column Bases**: Design of Simple Slab Base and Gusseted Base.	10	CO4
V	**Design of Beams:** Introduction, Beam types, Lateral Stability of beams, factors affecting lateral stability, Behaviour of Beams in Bending, Design strength of laterally supported beams in Bending, Design of Laterally Unsupported Beams [No Numerical Problems], Shear Strength of Steel Beams. Beam to Beam Connections, Beam to Column Connection and Column Splices [No Numerical Problems]	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Debate Competition ("Steel vs Concrete – Which is better for High-Rise Structures?")

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	N Subramanian	Design of Steel Structures	2nd Edition, Oxford University Press, New Delhi, 2016
2	Duggal, S.K.	Limit State Design of Steel Structures	2nd Edition, Tata McGraw Hill Education, 2017

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Ramchandra and Virendra Gehlot	Limit State Design of Steel Structures	1st Edition, Scientific Publishers, 2010
2	Arya, A.S. and Ajmani, J.L.	Design of Steel Structures	6th Edition, Nem Chand & Bros, 2014.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Water & Wastewater Engineering
Course Code	22CV61
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	✔Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic Knowledge of Environmental studies.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	4
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course focuses on the principles of water supply, treatment, distribution, wastewater collection, treatment, and disposal. It introduces concepts of water demand, population forecasting, intake structures, and BIS standards. Students learn various treatment processes such as aeration, coagulation, filtration, softening, and disinfection along with water distribution methods. The course also covers wastewater conveyance, sewer design, effluent disposal, and advanced treatment methods. Emphasis is placed on sustainable and economical solutions for safe water supply and sanitation systems.

2. Course Objectives

1. Analyse concept of water demand, conveyance systems of raw and treated water.
2. Design primary and secondary water treatment methods to ensure safe and potable water Supply.
3. Estimated the quantity of wastewater generation and understand sewerage network.
4. Under the self-purification of rivers when wastewater is discharged into receiving water.
5. Understand and design different unit operations involved in primary and secondary wastewater treatment process.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify the various water demand, sources and the conveyance of water in municipal water supply scheme	L3	PO1, PO2, PO3, PO6, PO7
CO2	Design the water supply treatment units by understanding the basic principle.	L3	PO1, PO2, PO3, PO6, PO7
CO3	Study the estimation of wastewater generation and method of sewage collection & conveyance systems.	L3	PO1, PO2, PO3, PO6, PO7

CO4	Design the sewer for wastewater collection and review the effect of wastewater disposal to water bodies	L3	PO1, PO2, PO3, PO6, PO7
CO5	Understand and apply the criteria in designing wastewater treatment units	L3	PO1, PO2, PO3, PO6, PO7

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Water Demand & Conveyance Introduction:** Need for protected water supply. Demand of Water, Factors affecting per capita demand, Peak demand, Design period and factors governing design period. Different methods of population forecasting -with merits and demerits. Numerical Problems. **Sources:** Surface and subsurface sources suitability with regard to quality and quantity, Collection and Conveyance of water: Intake structures - types of intakes – Factors to be considered in selection of intake structures. Economical diameter for the rising main; Numerical Problems. BIS' Drinking water quality standard.	10	CO1
II	**Water Treatment & Distribution:** Objectives, Treatment flow chart – significance of each unit, Aeration- types, Sedimentation- types, Coagulation -types of coagulants, Filtration-theory, types of filters - construction, operation, cleaning. Operational problems in filters. Design of filter without under drainage system. **Softening:** Overview of Lime soda, Zeolite process, RO and Nano filtration Disinfection: Methods of disinfection with merits and demerits, Method of Fluoridation and De-fluoridation treatment of water. Method of distribution system.	10	CO2
III	**Wastewater & Its Conveyance:** Introduction, need for sanitation, methods of sewage disposal, types of sewerage systems, definition & estimation of dry weather flow, wet weather flow. **Sewer materials:** Material of sewers, shape of sewers, laying and testing of sewers, ventilation of sewers. Sewer appurtenances - manholes, catch basins, basic principles of house drainage, Low-cost waste treatments; oxidation pond, septic tank.	10	CO3
IV	**Sewer Design & Effluent Disposal:** Hydraulic elements for sewer design - design of hydraulic elements for circular sewers for full flow and partial flow conditions. Disposal of effluents by dilution, self-purification phenomenon, oxygen sag curve, zones of purification, sewage farming, sewage sickness, numerical problems on disposal of effluents.	10	CO4
V	**Wastewater Treatment:** Wastewater sampling, significance and techniques, BIS Effluent standards of wastewater, flow diagram for municipal waste water treatment, unit operations; screens - types, design, grit chambers, skimming tanks, equalization tanks. **Secondary treatment:** Suspended growth and fixed film bio process, design of trickling filters, activated sludge process, Introduction to sequential batch reactors, moving bed bio reactors, sludge digesters.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Conduct field visits to water treatment plants, wastewater treatment facilities, or multipurpose river valley projects.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	S.K.Garg	Environmental Engineering vol-I, Water supply Engineering	20th Revised Edition, M/s Khanna Publishers, New Delhi 2010.
2	Metcalf and Eddy	Wastewater Engineering - Collection, Treatment, Disposal and Reuse	5th Edition, McGraw Hill Pub.Co., 2009

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	B.C. Punmia and Ashok Jain	Environmental Engineering I-Water Supply Engineering	2nd Edition, Laxmi Publications (P)Ltd., New Delhi 2010
2	Mark.J Hammer,	Water & Waste Water Technology,	6th Edition, John Wiley & Sons Inc., New York, 2008.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Extensive Survey Project
Course Code	22CVL66
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	☐Core ☐ Elective ✔ Lab
Prerequisite (If any)	Fundamental knowledge of surveying, basic civil Engineering drawing.
Contact Hours per Week	Lecture: 01 Tutorial: 00 Practical: 02 Total: 3
Credits	1
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	The course aims to provide practical exposure to surveying, planning, design, and execution of civil engineering projects such as tanks, water supply systems, highways, and town layouts. It develops the ability to conduct reconnaissance, detailed surveys, and prepare drawings/reports using modern instruments like Total Station. Students will gain skills in analysing and designing water supply, sanitation, highway, and irrigation components. It fosters teamwork, problem-solving, and professional competence in project planning and execution.

2. Course Objectives

1. To enable students to conduct reconnaissance and detailed surveys.
2. To develop students' skills in planning, alignment, and capacity analysis.
3. To impart knowledge on the design principles and preparation of engineering drawings and reports.
4. To train students in project conceptualization and site selection techniques.
5. To prepare students to integrate survey data with engineering design and regulatory standards.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Conduct reconnaissance and detailed topographic surveys using total Station.	L3	PO1, PO2, PO3, PO5, PO9, PO10, PO11
CO2	Analyse site conditions for conceptualizing and planning infrastructure projects.	L3	PO1, PO2, PO3, PO5, PO9, PO10, PO11
CO3	Apply civil engineering design principles to develop feasible solutions.	L3	PO1, PO2, PO3, PO5, PO9, PO10, PO11

CO4	Prepare accurate engineering drawings and technical reports.	L3	PO1, PO2, PO3, PO5, PO9, PO10, PO11
CO5	Integrate multidisciplinary knowledge to surveying, hydraulics, transportation, and urban planning.	L3	PO1, PO2, PO3, PO5, PO9, PO10, PO11

4. Course Content (Unit-Wise)

Sl No	Topics	Hours	COs
I	**1.New Tank Projects** a. Reconnaissance survey for selection of site and conceptualization of project. b. Alignment of centre line of the proposed bund, Longitudinal and cross sections of the centre line. c. Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement d. Design and preparation of drawing with report.	10	CO1
II	**2.Water Supply and Sanitary Project** a. Reconnaissance survey for selection of site and conceptualization of project. b. Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population. c. Preparation of village map by using total station. d. Survey work required for laying of water supply and UGD. e. Location of sites for water tank. Selection of type of water tank to be provided. (ground level, overhead and underground). f. Design of all elements and preparation of drawing with report.	10	CO2
III	**3. Highway Project** a. Reconnaissance survey for selection of site and conceptualization of project. b. Preliminary and detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Surveying by using total station. c. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. d. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road.	10	CO3
IV	**4. Restoration of Existing Tank** a. Reconnaissance survey for selection of site and conceptualization of project. b. Alignment of centre line of the existing bund, Longitudinal and cross sections of the centre line. c. Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement.	10	CO4

	d. Design of all elements and preparation of drawing with report.		
V	**5. Town/Housing/ Layout Planning** a. Reconnaissance survey for selection of site and conceptualization of project. b. Detailed survey required for project execution like contour surveys. c. Preparation of layout plans as per regulations. d. Centreline marking-transfer of centre lines from plan to ground. e. Design of all elements and preparation of drawing with report as per regulations.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Video Demonstration on construction of new Bund

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	K.R. Arora	Surveying Vol. 1 & Vol. 2	15th Edition, Standard Book House, 2010.
2	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Surveying (Vol. 1 & 2)	18th Edition, Laxmi Publications, 2014.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Dr. B.C. Punmia, Ashok Kumar Jain	Town Planning and Surveying	17th Edition, Laxmi Publications, 2010.
2	M.N. Raju	Urban Planning and Development	McGraw Hill Education, 2010

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Drawing File Report	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Computer Aided Engineering Drawing – Steel Structures
Course Code	22CVL67
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	☐Core ☐ Elective ✔ Lab
Prerequisite (If any)	Fundamental knowledge of structural analysis & design principles of RCC.
Contact Hours per Week	Lecture: 01 Tutorial: 00 Practical:02 Total: 03
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the principles and practices of structural detailing for RCC and steel structures. Students will learn detailing of beams, slabs, and staircases in reinforced concrete. It covers detailing of steel connections, built-up members, and column bases with bolted and welded joints. Emphasis is placed on preparing structural drawings as per IS codes and standards. The course bridges design concepts with practical drafting and execution skills required in construction.

2. Course Objectives

1. Provide a comprehensive understanding of detailing requirements for RCC structures.
2. Enable students to interpret structural drawings and prepare bar bending schedules for different types of reinforced concrete elements.
3. Impart knowledge of structural steel detailing, including preparation of connection details.
4. To familiarize students with the detailing of built-up steel members.
5. Develop the ability to produce accurate and complete fabrication and erection drawings.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Interpret and prepare reinforcement detailing for RCC structures	L4	PO1, PO2, PO3, PO4, PO5
CO2	Prepare detailed drawing for Steel structures	L3	PO1, PO2, PO3, PO4, PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Detailing of RCC Structures** • Beams– Simply supported Cantilever and Continuous. • Slab– One way, Two way and One-way continuous. • Staircase–Doglegged.	25	CO1
II	**Detailing of Steel Structures** • Connections–Beam to beam, Beam to Column by Bolted and Welded Connections. • Built-up Columns with lacings and battens. • Column bases and Gusseted bases with bolted and welded connections. • Compression member. • Tension member.	25	CO2

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field Visit to construction site.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	N Subramanian	Design of Steel Structures	2nd Edition, Oxford University Press, New Delhi, 2016
2	P.C. Varghese	Limit State Design of Reinforced Concrete	2nd Edition, PHI Learning Pvt. Ltd., 2017.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Ram Chandra & Virendra Gehlot	Limit State Design of Reinforced Concrete	1st Edition, Scientific Publishers, 2016.
2	N. Krishna Raju,	Design of Reinforced Concrete Structures	5th Edition, CBS Publishers, 2019.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. Shankar M	**Name:** Dr. B N shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Research Methodology
Course Code	22AEC68
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	☐Core ☐ Elective ✔ Lab
Prerequisite (If any)	A basic understanding of ethics in research, time management skills, and familiarity with academic referencing styles.
Contact Hours per Week	Lecture: 00 Tutorial: 00 Practical: 02 Total: 02
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the fundamentals, objectives, and significance of research. It enables students to identify and define research problems systematically. Emphasis is given to research design, data collection, and analysis methods. Students gain exposure to literature review, referencing, and research ethics. The course trains students in report writing, technical documentation, and presentation. By the end, learners will be equipped to undertake and communicate independent research.

2. Course Objectives

1. Understand the fundamentals, objectives, and significance of research.
2. Identify and define research problems systematically.
3. Apply suitable research designs and data collection methods.
4. Demonstrate ethical practices, literature review, and proper referencing.
5. Develop skills in technical writing, report preparation, and presentation.

2. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the fundamentals, objectives, and significance of research	L2	PO1, PO2, PO4
CO2	Identify and define research problems systematically.	L3	PO1, PO2, PO4
CO3	Apply suitable research designs and data collection methods	L3	PO1, PO2, PO4
CO4	Demonstrate ethical practices, literature review, and proper referencing.	L4	PO1, PO2, PO4

CO5	Develop skills in technical writing, report preparation, and presentation of research	L5	PO1, PO2, PO4

3. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Research Methodology**: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research Importance of Knowing How Research is Done, Research Process, Criteria of Good Research	05	1
II	**Defining the Research Problem:** Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration improving research methodology	05	1
III	**Research Design:** Meaning of Research Design, need for Research Design, features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs	05	2
IV	**Data Collection:** Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection	05	2
V	**Report Writing**: Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports	05	3

4. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

5. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Oral Presentation (Present mini research proposals)

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	C.R. Kothari, Gaurav Garg	Research Methodology: Methods and Techniques	4th Edition New Age International, 2019
2	Ranjit Kumar	Research Methodology: A Step-by-Step Guide for Beginners	4th Edition, Sage Publications, 2014

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Norman Blaikie	Designing Social Research	2nd Edition, Polity Press, 2010
2	Theresa L. White, Donald H. McBurney	Research Methods	9th Edition, Cengage Learning, 2012

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment	50
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. Shankar M	**Name:** Dr. B N shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Environmental Studies
Course Code	22UHV69
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 6th Semester
Course Type	☐Core ☐ Elective ✔ Lab
Prerequisite (If any)	A foundational understanding of biology, including basic ecological concepts, environmental science principles
Contact Hours per Week	Lecture: 02 Tutorial: 00 Practical: 00 Total: 02
Credits	01
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces environmental components, ecosystems, and impacts of human activities on natural resources. It covers energy sources, material cycles, pollution types, and global environmental challenges with public health aspects. Emphasis is given to waste management methods, air and water quality, and sustainable development practices. Students also learn GIS, remote sensing applications, environmental acts, and the role of government and NGOs in protection.

2. Course Objectives

1. Understand the basic concept of environment and Ecosystem.
2. Understand the availability of Natural resources and different types of Energies.
3. Understand the harmful effect of Environmental pollution and their solution.
4. Understand the concept of Environmental issues and its mitigation measures.
5. Get the knowledge of role of Government and NGO in protecting the Environment.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the structure and function of various ecosystems such as forest, desert, wetlands, riverine, oceanic, and lake systems.	L2	PO1, PO6, PO7
CO2	Understand types of biodiversity and their ecological and economic value	L2	PO1, PO6, PO7
CO3	Understand the merits, demerits, global status, and applications of emerging energy systems.	L2	PO1, PO6, PO7
CO4	Understand the concept of natural resource management and case studies related to	L2	PO1, PO6, PO7

	sustainable		
CO5	Understand waste management techniques and their public health implications.	L2	PO1, PO6, PO7

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Ecosystems (Structure and Function):** Forest, Desert, Wetlands, Riverine, Oceanic and Lake. **Biodiversity:** Types, Value; Hot spots; Threats and Conservation of biodiversity, Forest Wealth, and Deforestation.	05	CO1
II	**Advances in Energy Systems (Merits, Demerits, Global Status and Applications):** Hydrogen, Solar, OTEC, Tidal and Wind. **Natural Resource Management (Concept and case-studies):** Disaster Management, Sustainable Mining, Cloud Seeding and Carbon Trading	05	CO2
III	**Environmental Pollution (Sources, Impacts, Corrective** and Preventive measures, Relevant Environmental Acts, Case studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution. **Waste Management & Public Health Aspects:** Bio-medical Wastes; Solid waste; Hazardous wastes; E-wastes; Industrial and Municipal Sludge.	05	CO3
IV	**Global Environmental Concerns (Concept, policies and case studies):** Ground water depletion/recharging, Climate Change; Acid Rain; Ozone Depletion; Radon and Fluoride problem in drinking water; Resettlement and rehabilitation of people, Environmental Toxicology.	05	CO4
V	**Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications):** G.I.S. & Remote Sensing, Environment Impact Assessment, Environmental Management Systems, ISO14001; Environmental Stewardship- NGOs. **Field work:** Visit to an Environmental Engineering Laboratory or Green Building or Water Treatment Plant or Waste water treatment Plant; ought to be Followed by understanding of process and its brief documentation	05	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Awareness program on "Protecting Our Planet Begins with Our Own Neighbourhood."

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Benny Joseph	Environmental Studies	2nd Edition, Tata Mc Graw – Hill. 2012
2	S M Prakash	Environmental Studies	3rd Edition, Pristine Publishing House, Mangalore 2018

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Raman Sivakumar	Principals of Environmental Science and Engineering	2nd Edition, Cengage learning, Singapur., 2005
2	G.Tyler Miller Jr.	Environmental Science – working with the Earth	11th Edition, Thomson Brooks 2006

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	50
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Anusha P	**Name:** Dr. Shruthi R	**Name:** Dr. Shankar M	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Project Management + PM Software
Course Code	22CV71
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 7th Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic Civil Knowledge, Engineering Math Skills, Construction Process Understanding
Contact Hours per Week	Lecture: 02 Tutorial: 00 Practical: 02 Total: 04
Credits	4
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	It covers essential processes, techniques, and tools for effective project planning, scheduling, and resource management. Students will explore how project management integrates with other disciplines, modern trends, and organizational strategies. The course also includes cost estimation methods and the use of software for network analysis and resource planning. Practical exercises and real-world applications ensure a comprehensive understanding of managing projects successfully.

2. Course Objectives

1. The course deals with some more types of materials used in the construction industry.
2. Various factors affecting the selection of materials for given situations are also discussed.
3. This course thus helps the student to understand the application of modern materials.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the fundamentals of project management and relate them to other management practices.	L2	PO1
CO2	Apply project scheduling techniques to organize activities and manage project timelines.	L3	PO1, PO2, PO3
CO3	Analyse different organizational structures and assess their impact on project execution.	L4	PO1, PO2
CO4	Demonstrate methods of resource allocation and examine their influence on project performance.	L3	PO1, PO2, PO3

CO5	Evaluate various cost estimation approaches to judge their suitability for construction projects.	L4	PO1, PO2, PO3

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Project Management process, Project Management techniques, Relationship to other management disciplines, Concentric project management, Project formulation and development, importance of Project Management	10	CO1
II	**Project Planning & Time Management:** Purpose, Project scheduling, activity definition, activity sequencing, activity duration, schedule development, schedule control, project management using CPM\PERT- Network basics, Network development, PERT analysis, advantages. Computerized network analysis- features of PM software, capabilities of PM software, multi project analysis	10	CO2
III	**Organizing for Project Management:** Project Management – modern trends - Strategic Planning - Effects of Project, Risks on Organization - Organization of Project Participants – Traditional Designer-Constructor Sequence – Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team.	10	CO3
IV	**Resource Planning:** Introduction, Inputs, Tools, Outputs, Resource scheduling, Resource levelling, Resource restrained scheduling, strategies for shortening the schedule Assigning resources: Work, duration, resources, Effort driven scheduling, create a resource list, Exercise on resource planning using software, Level now command, levelling Gantt chart, assigning rate to resources, techniques of duration cost trade-off.	10	CO4
V	**Cost Estimation:** Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint C	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Introduction to Project Management Software's.
2	Defining custom data items, Planning resources and costs.
3	Resource levelling, Quantity and Cost Estimation.
4	Using MS Project software Working on Practical Projects.
5	Using Primavera Software Working on Practical Projects.
6	Modelling / Handling actual practical project management projects.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Chitkara K K	Construction Project Management: Planning, Scheduling and Control	15th Reprint Edition, Tata McGraw Hill Publishing Company, New Delhi, 2008
2	Harold Kerzner	Project Management – Systems approach to Planning, Scheduling and Controlling	7th Edition, John Wiley and Sons, 2000

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Alan Twort and Gordon Rees	Civil Engineering Project Management	4th Edition, CRC Press, 2003
2	K G Krishnamurthy and S V Ravindra	Construction and Project Management	2nd Edition, CBS Publishers and Distributors Pvt Ltd, 2017

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sunil R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Estimation and Costing
Course Code	22CV72
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 7th Semester
Course Type	✔ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Familiarity with construction materials, fundamentals structural principles and interpretation of engineering drawings
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	4
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Estimation and Costing course, provides a comprehensive understanding of quantity estimation, rate analysis, and contract management for civil engineering projects. Students learn to estimate quantities for buildings, roads, manholes, and septic tanks using various methods. The course covers writing specifications, tender procedures, and analysing rates for construction components like RCC slabs and beams. It also explores valuation techniques, including land and building valuation, and contract types with their administration. Practical exercises ensure proficiency in applying these concepts to real-world civil works.

2. Course Objectives

1. Estimate the quantities of work, develop the bill of quantities and arrive at the Cost of Civil Engineering Project.
2. Preparation of rate analysis, valuation of properties and preparation of reports for estimation of various items.
3. Understand and apply methods of valuation of building.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the principles of quantity estimation and connect them to different types of estimates.	L2	PO1, PO2, PO3
CO2	Apply standards methods to compute earthwork quantities in road project.	L3	PO1, PO2
CO3	Interpret specifications and analyse tender documents for construction works.	L4	PO1

CO4	Analyse rate determination and valuation methods for civil engineering works.	L4	PO1, PO2
CO5	Evaluate different types of contracts and assess their role in project execution and management.	L4	PO1

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Quantity Estimation:** Important terms, Units of measurement, Purpose, Methods of estimation, Types of estimates, Approximate estimates, Detailed estimate, Estimation of quantities for buildings, manhole, and septic tank and soak pit.	10	CO1
II	**Quantity Estimation for Roads:** Computation of volume of earthwork fully in banking, cutting, partly cutting and partly Filling by mid-section, trapezoidal and Prismoidal Methods.	10	CO1
III	**Specifications and Tenders:** Objective of writing specifications essentials in specifications, general and detail specifications of different items of works in buildings and roads. Tenders, Tender notices – types – tender procedures – Features / elements of standard Tender document (source: PWD / CPWD / International Competitive Bidding – NHAI / NHEPC / NPC).	10	CO2
IV	**Analysis of Rates:** Factors Affecting Cost of Civil Works, Rate analysis and preparation of bills, Data analysis of rates for various items of Works, Substructure components, Rate analysis for R.C.C. slabs, columns and beams. **Valuation:** Definitions of terms used in valuation process, Purpose of valuation, Various, Valuation methods, Necessity, Capitalized value , Depreciation, Escalation, Valuation of land, Buildings, Calculation of Standard rent , Mortgage, Lease.	10	CO3
V	**Contracts:** Contract, Types of contracts , Formation of contract, Basic understanding on definitions- Performance security, Mobilization and equipment advances, Secured Advance, Suspension of work, Time limit for completion, Liquidated damages and bonus, measurement and payment, additions and alterations or variations and deviations, breach of contract, Contract management and administration.	10	CO4

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Develop an Excel worksheet for preparing estimates of various construction items.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	B N Dutta	Estimating & Costing in Civil Engineering (Theory and Practice)	28th Edition, CBS Publishers & Distributors Pvt Ltd, 2020
2	B S Patil	Civil Engineering Contracts & Estimates	3rd Edition, Universities Press, 2006

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	D D Kohli and R C Kohli	A Textbook of Estimating & Costing	13th Edition, S Chand Publishing, 2013
2	S P Chandola and V N Vazirani	Civil Engineering Estimating, Costing & Valuation	6th Edition, Khanna Publishers, 1968

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sunil R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Urban Transportation Planning
Course Code	22CV732
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 7th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Transportation Engineering, Traffic Engineering.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	Urban Transport Planning is an interdisciplinary course focusing on the principles, methodologies, and practices for designing and managing efficient transportation systems in urban areas. It addresses challenges posed by urbanization, including congestion, environmental impacts, and accessibility.

2. Course Objectives

This course will enable students to,
1. Concepts and methods of urban transportation planning, including urbanization, problems, impacts, and planning process.
2. Techniques of designing, conducting, and administering surveys for transportation data collection.
3. Principles of trip generation and distribution modelling in urban transport systems.
4. Approaches for modal split and travel demand forecasting.
5. Techniques of traffic assignment and land use–transport interaction models.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain concepts and methods of urban transportation planning.	L2	PO1, PO2, PO3,
CO2	Apply survey methods and data collection techniques required for transportation planning.	L3	PO1, PO2, PO3, PO4
CO3	Analyze mathematical modelling approaches for trip generation and distribution.	L4	PO1, PO2, PO3, PO4
CO4	Apply models for modal split and forecasting of urban travel demand.	L3	PO1, PO2, PO3

CO5	Analyze traffic assignment techniques and land use–transport interaction models.	L4	PO1, PO2, PO3

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Urban Transport Planning:** Urbanization, urban class groups, transportation problems and identification, impacts of transportation, urban transport system planning process, modeling techniques in planning. Urban mass transportation systems: urban transit problems, travel demand, types of transit systems, public, private, para-transit transport, mass and rapid transit systems, BRTS and Metro rails, capacity, merits and comparison of systems, coordination, types of coordination.	10	CO1
II	**Data Collection & Inventories:** Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.	10	CO2
III	**Trip Generation & Distribution:** UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution by Growth Factor Methods. Problems on above.	10	CO3
IV	**Trip Distribution:** Gravity Models, Opportunity Models, Time Function Iteration Models. Travel demand modeling: gravity model, opportunity models, Desire line diagram. Modal split analysis. Problems on above.	10	CO4
V	**Traffic Assignment:** Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment. Numerical problems on Traffic Assignment. Introduction to land use planning models, land use and transportation interaction.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Conduct a simple traffic volume count at a nearby junction using tally method.

7. Textbooks

SL. No.	Author(s)	Title	Publisher & Year
1	Kadiyali L.R	Traffic Engineering and Transportation Planning.	9th Edition, Khanna Publishers, New Delhi, 2019.
2	Khisty C.J & Lall B.K	Transportation Engineering – An Introduction.	4th Edition, Pearson, 2018.

8. Reference Books

SL. No.	Author(s)	Title	Publisher & Year
1	Mayer M & Miller E	Urban Transportation Planning: A decision oriented Approach.	2nd Edition, McGraw Hill, 2022.
2	D. Johnson & Victor S. Ponnuswamy	Urban Transportation: Planning, Operation and Management.	5th Edition, Tata McGraw Hill Education 2012.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mrs. Uma A	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Advanced Concrete Technology
Course Code	22CV733
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 7th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Concrete Technology, Strength of Materials
Contact Hours per Week	Lecture:03 Tutorial:01 Practical:00 Total:04
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides an in-depth study of advanced concrete materials and technologies, focusing on the properties, behavior, and applications of special concretes such as fiber-reinforced, lightweight, high-performance, polymer, and self-compacting concrete. Students will explore the principles of concrete mix design, testing methods, and the use of industrial waste in concrete production.

2. Course Objectives

This course will enable students to,

1. Provides a comprehensive treatment of the constituent materials of concrete.
2. Learn the principles of Concrete mix design, and assess the performance of various cement-based materials including normal and high strength concrete as well as special cement composites.
3. Differentiate between different types of concrete and Learn characterize and predict the behaviour of special concrete.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the properties and applications of fiber-reinforced concrete, Ferro cement, and other special concretes.	L2	PO1, PO2, PO5
CO2	Apply testing methods and mix design principles to analyze the performance of advanced concrete materials.	L3	PO1, PO2, PO3, PO5
CO3	Analyze the use of industrial waste materials in sustainable concrete production.	L4	PO1, PO2, PO7

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Fibre Reinforced Concrete:** History, mechanism, different types of fibres, Aspect ratio, Volume of fibres orientation o fibres, balling effect, properties of fibre reinforced concrete, and applications of fibre reinforced concrete. Types of Fibre reinforced concrete. Ferro cement: Definition, different materials used, casting techniques, properties of Ferro cement, applications.	10	CO1
II	**Light Weight Concrete:** Introduction, classification, properties, strength and durability, mix proportioning and problems **High Density Concrete:** Radiation shielding ability of concrete, materials for high density concrete, mix proportioning, properties in fresh and hardened state, placement methods.	10	CO1
III	**Ready Mix Concrete:** Concept, ready mix concrete plants, difficulties faced and their solution, use of admixtures in ready mix concrete, economics and quality control aspects of ready mix concrete. **High Performance Concrete:** Constituents, mix proportioning, properties infresh and hardened states, applications & limitations	10	CO2
IV	**Polymer Concrete:** Polymers, resins, polymerization, different types of polymer concrete like polymer impregnated concrete, polymer concrete (Resin concrete) and polymer modified concrete, their properties and applications. **Self-Compacting Concrete:** Development of SCC, basic principles and requirements , workability tests for SCC, mix design of SCC, acceptance criteria for SCC, adoption of SCC in the precast industry, present status of SCC.	10	CO2
V	**Concrete From Industrial Wastes:** Blast furnace slag cement concrete, Fly-ash concrete, Silica fume concrete, Recycled aggregate Concrete.	10	CO3

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	1	-	-	-	-	-	-	-
CO2	3	3	2	-	2	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	2	-	-	-	-	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Organize site visit to RMC Plant.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Santhakumar A R	Concrete Technology	2nd Edition, Oxford University Press, 2019.
2	M S Shetty	Concrete Technology: Theory and Practice	8th Edition, S. Chand Publishing, New New Delhi 2019.
3	Rafat Siddique	Special Structural Concretes	2nd Edition, Galgotia publications, New Delhi 2017.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Neville A.M.	Properties of Concrete	5th Edition, Pearson Education 2012.
2	Raghuvir Singh	Fibre Reinforced Concrete	1st Edition, 2017 New Age International Publishers.
3	P.C. Aïtcin	High Performance Concrete	2nd Edition, Taylor & Francis (E & FN Spon), London 2008.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mrs. Uma A	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Advanced Design of RCC
Course Code	22CV734
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 7th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Design of Reinforced Concrete Structures, Structural Analysis
Contact Hours per Week	Lecture:03 Tutorial:01 Practical:00 Total:04
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course focuses on advanced principles and techniques for designing reinforced concrete (RCC) structures, including slabs, beams, chimneys, flat slabs, silos, bunkers, and formwork. Students will learn to apply limit state design methods, analyze structural performance, and detail complex RCC structures to meet safety and serviceability requirements.

2. Course Objectives

This course will enable students to,
1. Learn principles of Structural Design.
2. Design different types of structures and to detail the structures.
3. Evaluate performance of the structures.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Achieve Knowledge of design and development of problem solving skills.	L3	PO1, PO2, PO3, PO4
CO2	Explain the principles of Structural Design.	L2	PO1, PO2, PO3
CO3	Design and develop analytical skills.	L4	PO1, PO2, PO3, PO4
CO4	Summarize the principles of Structural Design and detailing.	L3	PO1, PO2, PO3
CO5	Describe the structural performance.	L2	PO1, PO2, PO3

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	1. Design of RC slabs by yield line method. 2. Design of grid or coffered floors.	10	CO1
II	1. Design of continuous beams with redistribution of moments.	10	CO2
III	1. Design of RC Chimneys. 2. Design of flat slabs.	10	CO3
IV	1. Design of RC silos. 2. Design of RC bunkers.	10	CO4
V	**Formwork:** Introduction, Requirements of good formwork, Materials for forms, choice of formwork, Loads on formwork, Permissible stresses for timber, Design of formwork, Shuttering for columns, Shuttering for slabs and beams, Erection of Formwork, Action prior to and during concreting, Striking of forms. Recent developments in form work.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Visit to ongoing construction sites to observe advanced RCC detailing, shuttering methods, and curing techniques.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R. Park & T. Paulay	Reinforced Concrete Structures.	1st Edition, John Wiley & Sons, 2008.
2	Bungale S. Taranath	Structural Analysis and Design of Tall Buildings.	2nd Edition, McGraw Hill Education, New York, 2016.
3	Krishnamurthy K.	Limit Design of Reinforced	8th Edition, Khanna

	T Gharpure S. C Kulkarni A. B.	Concrete Structures.	Publishers, New Delhi 2010.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Unnikrishna Pillai and Devdas Menon	Reinforced concrete Design', Tata McGraw Hill Publishers Company Ltd.	4th Edition, McGraw Hill Education, New Delhi New Delhi, 2021.
3	Varghese P. C	Advanced Reinforced Concrete Design.	2nd Edition, Prentice- Hall of India, New Delhi, 2014.
4	Krishna Raju. N	Advanced Reinforced Concrete Design.	3rd Edition, CBS Publishers & Distributors 2016.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mrs. Uma A	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Environmental Impact Assessment
Course Code	22CVOE741
Program	Civil Engineering
Academic Year/Semester	2022-23 / 7th Semester
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite	Basic knowledge of environmental science, ecology and civil engineering project concepts.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Environmental Impact Assessment introduces the principles, methods and procedures for evaluating the environmental consequences of developmental projects. It covers screening, scoping, baseline studies and impact prediction and mitigation measures. Emphasis is placed on environmental management plans, sustainability considerations, and legal frameworks governing EIA. Students learn to assess impacts on air, water, land, ecology and socio-economic systems. The course equips learners with analytical skills to promote sustainable development and responsible decision-making.

2. Course Objectives

1. Understand the basic principles and steps of EIA
2. Select appropriate methods for identifying environmental impacts in different types of projects.
3. Learn to predict how proposed projects could affect various aspects of the environment
4. Recognize the importance of involving the public in EIA decision- making.
5. Examine how Environmental Impact Assessment works for important environmental projects

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the basic concept and step wise structure of Environmental impact assessment.	L2	PO1, PO2, PO7
CO2	Select appropriate methodology to be apply for the identification of environmental impacts of different project.	L3	PO1, PO2, PO3, PO5, PO7

CO3	Acquire knowledge of predicting impact of proposed project on Air, Water, Noise, Land, Ecology, Soil, Cultural and Socio-economic Environment conditions.	L2	PO1, PO2, PO3, PO4, PO7
CO4	Understand the role of Public Participation in Decision making process of Environmental Impact Assessment.	L2	PO1, PO2, PO7
CO5	Understand the Environmental Impact Assessment for some Major Environmental projects.	L2	PO1, PO2, PO3, PO7

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information	08	CO1
II	Step-by-step procedures for conducting EIA, Limitations of EIA. Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	08	CO2
III	Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.	08	CO3
IV	Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements.	08	CO4
V	EIA for Water resource developmental projects, Highway projects: Nuclear Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.	08	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions

Practical	Title of Experiment / Activity
1	EIA Video Analysis and Discussion

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R.K. Jain, L.V. Urban, G.S. Stacey	Environmental Impact Analysis	Van Nostrand Reinhold Co., 1981
2	Y. Anjaneyulu and Valli Manickam	Environment Impact Assessment	BS Publications, 2020

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Larry W. Canter	Environment Impact Assessment	McGraw Hill Publication, 1996
2	Dr. V.S. Kulkarni, Dr. S.N. Kaul, Dr. R.K. Trivedy	A Handbook of Environment Impact Assessment	Scientific Publishers (India), 2002
3		Guidelines for EIA of developmental Projects Ministry of Environment and Forests	Government of India

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr Gagan Krishna R R	**Name:** Dr Shruthi R	**Name:** Dr M Shankar	**Name:** Dr B N Shobha
Designation: Assistant Professor	**Designation:** HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Basics of Transportation Engineering
Course Code	22CVOE742
Program	Civil Engineering
Academic Year/Semester	2022-23 / 7th Semester
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite	Fundamental knowledge of Engineering mechanics, Surveying and basic mathematics.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Basics of Transportation Engineering introduces the fundamental concepts of transportation systems across roadways, railways, tunnels, and harbors, highlighting their role in economic and social development. It covers geometric design, construction materials, and maintenance practices for roads, railways and tunnels. Students learn traffic engineering principles, harbor operations and safety management for multi-modal transport systems. Emphasis is placed on sustainable transportation planning, traffic studies and integration of different transport modes. The course equips learners with practical knowledge to design, operate and manage safe, efficient and multimodal transportation infrastructure.

2. Course Objectives

1. Gain knowledge of different modes of transportation systems and to learn the introductory concepts on Highway Engineering.
2. Get insight to different highway materials and pavement design elements of a highway network.
3. Realize the significance of road safety by incorporating the concepts of Traffic Engineering.
4. Understand to different aspects of geometric elements of railway system and evaluate the material quantity required for track laying
5. Gain knowledge about various components of an Airport and its runway design.
6. Apply design features of tunnels, harbors, dock and necessary navigational aids; also expose them to various methods of tunnelling and tunnel accessories.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Select the appropriate pavement materials for construction and interpret the experimental results of highway materials based on laboratory tests	L3	PO1, PO2, PO3, PO4, PO7
CO2	Conduct traffic studies and analyse traffic data for practical applications.	L3	PO1, PO2, PO3, PO4, PO7
CO3	Identify the Components parts of Railway Track and design the suitable runway for an Airport.	L4	PO1, PO2, PO3, PO4, PO7
CO4	Apply the knowledge gained to conduct surveying, understand the tunneling activities.	L3	PO1, PO2, PO3, PO4, PO7

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Highway Engineering**: Classifications, Characteristics of road transport, Importance of Roads in India, Cross sectional elements of a road. Pavement: types, component parts of flexible and rigid pavements and their functions. Highway Materials: tests and properties of aggregates & Bitumen.	08	CO1
II	**Railway Engineering**: Permanent way and its requirements, Gauges and types, Typical cross sections single and double-line BG track, Coning of wheels and tilting of rails. Track components: rails, sleepers, fastenings, ballast and formation, Track fitting and fasteners, Points & crossings, Railway Station and Yards.	08	CO3
III	**Traffic Engineering**: Objectives, Road Characteristics - Road user and vehicular characteristics, Urban Traffic problems in India, Road signs and Markings in Safety - types and roles, Types of intersections. Road accidents - Causes, effects and prevention, Air and Noise pollution.	08	CO2
IV	**Airport Engineering**: Introduction, Layout of an airport with component parts and functions of each - Characteristics – Airport Classifications - Airport Zones - Site selection - Runway – Taxiway - Comparison between Runway and Highway.	08	CO3
V	**Harbour and Tunnel Engineering**: Definition of Basic Terms: Planning of Harbours: Requirements, Classification, Location – Harbour Layout and Terminal Facilities. Tunnelling: Introduction, size and shape of the tunnel, tunnelling methods in soils, tunnel lining, tunnel drainage and ventilation.	08	CO4

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions

Practical	Title of Experiment / Activity
1	Exercise on Traffic Volume and Speed Survey

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Dr L R Kadiyali.	Traffic Engineering and Transport Planning	Khanna Publishers, Delhi, 1999
2	S K Khanna and CEG Justo	Highway Engineering	Nem Chand and Bros., 2021
3	Satish Chandra and M.M. Agarwal	Railway Engineering, 2nd Edition	Oxford University Press, New Delhi, 2013

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	S. K. Khanna, M. G. Arora & S. S. Jain	Airport Planning and Design	Nem chand and Brothers, Roorkee, 2019
2	C Venkatramaiah	Transportation Engineering Volume II: Railways, Airports, Docks and Harbours, Bridges and Tunnels,	Universities Press, 2016
3	Dr S P Bindra	A Course in Docks and Harbour Engineering	Dhanpat Rai and Sons, New Delhi, 2012

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20

Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr Gagan Krishna R R	**Name:** Dr Shruthi R	**Name:** Dr M Shankar	**Name:** Dr B N Shobha
Designation: Assistant Professor	**Designation:** HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Remote Sensing and GIS
Course Code	22CVOE743
Program	Civil Engineering
Academic Year/Semester	2022-23 / 7th Semester
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite	Basic knowledge of geography, surveying and computer fundamentals.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2022-23
Approved in AC on	23 Jan 2023
Course Description	Remote Sensing and GIS introduces the principles of electromagnetic radiation, satellite sensors and image interpretation techniques for earth observation. It covers the fundamentals of digital image processing, classification methods and integration of remote sensing data with GIS. Students learn spatial data models, database creation and spatial analysis tools for mapping and decision-making. Emphasis is placed on applications in natural resource management, urban planning, agriculture and disaster monitoring. The course equips learners with practical skills to apply geospatial technologies for scientific research and societal development.

2. Course Objectives

1. To introduce the concepts of remote sensing processes and its components.
2. To expose the various remote sensing platforms, sensors and of data interpretation
3. To introduce concepts of Cartography and GIS
4. To introduce GIS data structures, data input and data presentation

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the concepts and laws related to remote sensing.	L2	PO1, PO2, PO5, PO9, PO11
CO2	Acquire knowledge about satellites and sensors.	L2	PO1, PO2, PO5, PO9, PO11
CO3	Gain knowledge about the concepts of interpretation of satellite imagery.	L2	PO1, PO2, PO5, PO9, PO11

CO4	Understand the basic concepts and components of GIS.	L2	PO1, PO2, PO5, PO9, PO11
CO5	Understand the concepts of spatial data quality and spatial data inputs.	L2	PO1, PO2, PO5, PO9, PO11

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Remote Sensing and Electromagnetic Radiation:** Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum **EMR Interaction:** Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere, Atmospheric windows - Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectrora diometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.	08	CO1
II	**Orbits and Platforms:** Motions of planets and satellites –Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites **Sensing Techniques** : Classification of remote sensors – Resolution concept : spatial, spectral, radiometric and temporal resolutions - Orbital and sensor characteristics of live Indian earth observation satellites	08	CO2
III	**Data Products and Interpretation:** Photographic and digital products – Types, levels and open source satellite data products –- selection and procurement of data– Visual interpretation: basic elements and interpretation keys-Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification.	08	CO3
IV	**Fundamentals of GIS:** Introduction to GIS – Definitions – History of GIS – Components of a GIS – Hardware, Software, Data, People, Methods – Introduction to data quality – Types of data – Spatial, Attribute data – types of attributes – scales/levels of measurements – spatial data models – Raster Data Structures – Raster Data Compression – Vector Data Structures – Raster Vs Vector Models – TIN and GRID data models	08	CO4
V	**Data Quality and Output:** Assessment of Data Quality - Basic Aspects - Completeness, Logical Consistency, Positional Accuracy, Temporal Accuracy, Thematic Accuracy and Lineage – Metadata – GIS Standards – Interoperability – OGC - Spatial Data Infrastructure – Data Output – Map Compilation – Chart / Graphs.	08	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical Sessions

Practical	Title of Experiment / Activity
1	Technical talk on Introduction to GIS Software: Tools, Applications, and Future Trends

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Thomas M. Lilles Ralph W. Kiefer and Jonathan W. Chipman	Remote Sensing and Image interpretation	John Wiley and Sons, Inc, New York, 2015
2	George Joseph and C Jeganathan	Fundamentals of Remote Sensing, Third Edition	Universities Press (India) Private limited, Hyderabad, 2018
3	Arthur H. Robinson	Elements of Cartography	Wiley, 1995
4	Kang – T sung Chang	Introduction to Geographic Information Systems	McGraw Hill Publishing, 2018
5	Ian Heywood, Sarah Cornelius, Steve Carver	An Introduction to Geographical Information Systems	Pearson Education, Fourth Edition, 2011

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Janza, F.Z., Blue H.M. and Johnson J.E	Manual of Remote Sensing. Vol.I	American Society of Photogrametry, Virginia, USA, 2002
2	Basudeb Bhatta	Remote Sensing and GIS	Oxford University Press,2020
3	John Campbell	Introductory Cartography	Wm. C. Brown Publishers, 1991

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr Gagan Krishna R R	**Name:** Dr Shruthi R	**Name:** Dr M Shankar	**Name:** Dr B N Shobha
Designation: Assistant Professor	**Designation:** HOD and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Technical Seminar
Course Code	22CVTS75
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 7th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Basic knowledge of civil engineering subjects and communication skills
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 06 Total: 10
Credits	3
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Technical Seminar course in civil engineering enables students to explore advanced topics and emerging trends in the field through research and presentation. Students investigate specialized areas such as structural engineering, transportation, or environmental engineering, and present their findings. The course enhances technical knowledge, critical thinking, and communication skills. It involves literature reviews, case studies, and discussions on real-world applications. This seminar prepares students for professional challenges by fostering independent learning and presentation skills.

2. Course Objectives

1. The objective of the seminar is to inculcate self-learning, face audience confidently, enhance communication skill, involve in group discussion and present and exchange ideas. Each student, under the guidance of a Faculty, is required to.
2. Choose, preferably through peer reviewed journals, a recent topic of his/her interest relevant to the Course of Specialization.
3. Carryout literature survey, organize the Course topics in a systematic order.
4. Prepare the report with own sentences.
5. Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.
6. Present the seminar topic orally and/or through power point slides.
7. Answer the queries and involve in debate/discussion.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify relevant civil engineering topics and summarize knowledge from literature sources.	L2	PO1, PO9
CO2	Organize technical information and prepare structured seminar documentation.	L3	PO1, PO9, PO10
CO3	Demonstrate effective oral and visual communication while presenting technical content.	L3	PO1, PO9, PO10

4. Course Content (Guideline)

Sl. No.	Content	Hours	COs
1	Submit two copies of the typed report with a list of references. The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident. The CIE marks for the seminar shall be awarded (based on the relevance of the topic, presentation skill, participation in the question and answer session and quality of report) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculties from the department with the senior most acting as the Chairperson	40	

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	3	-	-	-
CO2	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	-	-	-	-	-	-	-	3	3	-	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Review of recent topics in civil engineering.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1			
2			

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1			
2			

9. Assessment Scheme

Component	Weightage (%)
Seminar Report	30
Presentation Skill	50
Question & Answer	20
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Assessment, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sunil R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Software Application Lab
Course Code	22CVL76
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 7th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Basic knowledge of computers and civil engineering concepts
Contact Hours per Week	Lecture: 01 Tutorial: 00 Practical: 02 Total: 03
Credits	1
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Software Application Lab course, provides hands-on training in civil engineering and project management software. Students learn to use ETABS/STAD PRO for analysing plane trusses, beams, and multi-storeyed frame structures. The lab covers project planning and scheduling using project management software, including creating WBS, tasks, and network diagrams. Students explore critical path analysis, resource allocation, and activity constraints. Practical exercises ensure proficiency in applying these tools to real-world civil engineering projects.

2. Course Objectives

1. Use industry standard software in a professional set up.
2. Understand the elements of finite element modelling, specification of loads and boundary condition, performing analysis and interpretation of results for final design.
3. Develop customized automation tools

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply structural analysis methods using ETABS/STAAD Pro for trusses, beams, frames and multi-storeyed structures.	L3	PO1, PO2, PO3, PO5, PO11
CO2	Construct project schedules with WBS, activities, dependencies and network diagram using project management software.	L3	PO1, PO2, PO3, PO5, PO11
CO3	Analyse project duration, critical paths, resource allocation and constraints for effective project control.	L4	PO1, PO2, PO3, PO5, PO11

4. Course Content (Experiment-Wise)

Sl. No.	List of Experiments	Hours	COs
1	**Use of civil engineering software's: ETABS / STAD PRO** Use of software's for: 1. Analysis of plane trusses, continuous beams, portal frames. 2. 3D analysis of multi-storeyed frame structures.	25	CO1
2	**Project Management- Exercise on Project planning and scheduling of a building project using any Project Management Software:** a) Understanding basic features of Project management software. b) Constructing Project: create WBS, Activities, and tasks and Computation Time using Excel spread sheet and transferring the same to Project management software. c) Identification of Predecessor and Successor activities with constrain. d) Constructing Network diagram (AON Diagram) and analysing for Critical path, Critical activities and Other non-Critical paths, Project duration, Floats. e) Study on various View options available. f) Basic understanding about Resource Creation and allocation. g) Understanding about Splitting the activity, Linking multiple activity. h) Constrains, Merging Multiple projects, Creating Baseline Project.	25	CO2, CO3

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	3	-	-	-	-	-	2	-
CO2	2	2	3	-	3	-	-	-	-	-	3	-
CO3	2	3	2	-	3	-	-	-	-	-	3	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Video presentation on different software in civil engineering.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1			
2			

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1		Training manuals and User manuals and Relevant course reference books.	
2			

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sunil R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Environmental Engineering Lab
Course Code	22CVL77
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 7th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Environmental concepts and knowledge of water and wastewater
Contact Hours per Week	Lecture: 01 Tutorial: 00 Practical: 02 Total: 03
Credits	1
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Environmental Engineering Lab course provides hands-on training in analysing water and wastewater quality through practical experiments. Students learn to measure parameters like pH, turbidity, hardness, chloride, fluoride, iron, dissolved oxygen, and BOD using standard laboratory techniques. Experiments include determining solids in sewage and optimizing alum dosage with jar tests. The lab enhances skills in environmental testing and data analysis for real-world applications. This course equips students to address environmental challenges in water and wastewater management.

2. Course Objectives

1. Learn different methods of water & waste water quality.
2. Conduct experiments to determine the concentrations of water and waste water.
3. Determine the degree and type of treatment.
4. Understand the environmental significance and application in environmental engineering practice.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Determine physicochemical characteristics of water.	L3	PO1. PO2, PO3, PO7
CO2	Determine physicochemical characteristic of wastewater.	L3	PO1. PO2, PO3, PO7
CO3	Interpret experimental results to assess water and wastewater quality as per standards.	L4	PO1. PO2, PO3, PO7

4. Course Content (Experiment-Wise)

Sl. No.	List of Experiments	Hours	COs
1	Determination of pH, Acidity and Alkalinity.	05	CO1, CO2, CO3
2	Determination of Turbidity by Nephelometer and Optimum Dosage of Alum using Jar test apparatus.	05	CO1, CO2, CO3
3	Determination of Calcium Hardness and Total Hardness.	05	CO1, CO3
4	Determination of Chloride content in water.	05	CO1, CO3
5	Determination percentage of available chlorine in bleaching powder, residual chlorine in water.	05	CO1, CO3
6	Determination of Solids in Sewage: I) Total Solids. II) Suspended Solids, Dissolved Solids. III) Volatile Solids, Fixed Solids.	05	CO2, CO3
7	Determination of fluoride content in water.	05	CO1, CO3
8	Determination of Iron content in water.	05	CO1, CO3
9	Determination of Dissolved Oxygen.	05	CO1, CO2, CO3
10	Determination of BOD in wastewater.	05	CO2, CO3

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	-	-	1	-	-	-	-	-
CO2	2	2	1	-	-	-	1	-	-	-	-	-
CO3	2	1	-	-	-	-	2	-	-	-	-	-

(*Mapping: 1 –1 Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Video demonstration on Water and Wastewater treatment plant.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1			
2			

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Milton P Dentch	Lab Manual, ISO 14001 Environmental Management, Regulatory Standards for Drinking Water and Sewage disposal.	3rd Edition, 2016
2	Clair Sawyer, Perry Mccarty and Gene Parkin	Chemistry for Environmental Engineering and Science, McGraw-Hill Series in Civil and Environmental Engineering	5th Edition, 2002

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	10
Lab Record Marks	40
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sunil R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Project Work Phase - I
Course Code	22CVPW78
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 7th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Basic knowledge of civil engineering subjects and research methods
Contact Hours per Week	Lecture: 01 Tutorial: 00 Practical: 03 Total: 03
Credits	2
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Project Work Phase - I course in civil engineering initiates students into a comprehensive project, focusing on planning and preliminary design. Students identify a real-world civil engineering problem, conduct literature reviews, and formulate objectives. The course emphasizes teamwork, research, and application of engineering principles to develop feasible solutions. Activities include project proposal preparation and feasibility studies for structures, transportation, or environmental systems. This phase builds foundational skills for executing civil engineering projects effectively.

2. Course Objectives

1. Project is an important part of the engineering curriculum covered in the final year.
2. It is divided into Project Stage I and Project Stage II at Semesters I and II of the Final Year.
3. This project is a substantial piece of work that will require creative activity and original thinking.
4. The project aims to provide students with a transitional experience from the academic world to the professional world.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify a suitable project topic related to civil engineering.	L3	PO1, PO2
CO2	Collect and study information from journal papers.	L2	PO1, PO2, PO3, PO4
CO3	Prepare a clear synopsis with project objectives and scopes.	L3	PO1, PO2, PO3, PO10
CO4	Plan the methods and resources needed for carrying out the project.	L4	PO1, PO2, PO11

CO5	Present and discuss the proposed project work with proper documentations.	L3	PO1, PO9, PO10

4. Course Content (Guidelines)

Sl. No.	Content	Hours	COs
1	1. Form a group of 3-4 students. 2. 2. Select a project problem statement based on an industrial or societal issue and ideate on it. 3. Research on the project topic through existing theories, literature, technology, patents, etc. 4. Define objectives, scope, and outcomes of the project in the 1st presentation. 5. Maintain a notebook to keep records of all the meetings, discussions, notes, etc. This is to be done by the individual student. 6. Some of the parameters mentioned in the above table will be evaluated and assessed at the group level and some at an individual level.	50	

5. CO–PO Mapping Matrix

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

(*Mapping: 1 –1 Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Literature Review Mapping.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1			
2			

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1			
2			

9. Assessment Scheme

Component	Weightage (%)
Project Synopsis Report	30
Presentation Skill	50
Question & Answer	20
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Presentation, End Semester Exams.
Indirect	Course Exit Survey, Student Feedback.

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Sunil R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD & Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Pre – Stressed Concrete
Course Code	22CV81
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 8th Semester
Course Type	☐√ Core ☐ Elective ☐ Lab
Prerequisite (If any)	A sound knowledge of strength of materials, structural analysis, RCC design basics, concrete technology, properties of materials, and load concepts.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides fundamental knowledge of Prestressed concrete, covering concepts, systems, and applications. It emphasizes analysis for flexure, losses, and deflection, along with strength evaluation in flexure and shear. Students learn IS code-based design of reinforcement, anchorage zone stresses, and practical problem-solving with numerical applications.

2. Course Objectives

1. Understand the concept and behaviour of Prestressed concrete members.
2. Explain the fundamental concepts of stress analysis.
3. Apply systems of pre-stressing for various sections of structural elements.
4. Evaluate and analyse the stresses under various conditions.
5. Design and detail the Prestressed concrete members for various loading conditions.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped

CO1	Demonstrate the basic concept of pre-stressing and analyse the Prestressed concrete members under transfer and working conditions	L2	PO1,PO2, PO3,PO12
CO2	Compute the different types of losses in Prestress and deflection of the Prestressed concrete members.	L3	PO1,PO2, PO3,PO12
CO3	Analyze the pre-stressed concrete members for flexure.	L4	PO1,PO2, PO3,PO12
CO4	Analyze and design pre-stressed concrete members for shear and shear reinforcement	L4	PO1,PO2, PO3,PO12
CO5	Design the anchorage zone reinforcement to withstand the bursting tension.	L4	PO1,PO2, PO3,PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction: Basic concepts of pre-stressing, Historical Development, Need for high strength steel and concrete, Terminology, Advantages of prestressed concrete, Applications of prestressed concrete, tensioning devices, pre- tensioning systems, post- tensioning systems. Analysis of Section for Flexure: Analysis of concrete beams with straight, parabolic cable profiles, Concentric and Eccentric pre-stressing, Numerical Problems.	10	CO1
II	Losses in Pre-stress: Loss of pre-stress in pre-tensioned and post-tensioned due to Elastic deformation, Creep of concrete, Shrinkage of concrete, Relaxation of stress in steel, Anchorage slip, Friction and Total loss, Numerical Problems. Deflection: Introduction, Factors influencing deflection, Evaluation of short term and long term deflection for Straight, Parabolic, Linear and Trapezoidal cable profiles, Deflection limits as per IS 1343, Numerical problems.	10	CO2
III	Flexural Strength of Pre-stressed Concrete Sections: Introduction, Types of flexural failures, Evaluation of ultimate moment resistance for rectangular and flanged section (I and T sections) using IS code provisions.	10	CO3

IV	Shear Resistance of Prestressed Concrete Members: Introduction, Types of shear cracks, Analysis of shear for parabolic cable profile using IS code provisions, Numerical problems. Design of Shear Reinforcement: Design of shear reinforcement using IS code provisions.	10	CO4
V	Anchorage Zone Stresses in Post-Tensioned Members: Introduction, Stress distribution in end block, Design of anchorage zone reinforcement using IS code provisions.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Site visit to PEB structures

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Krishna Raju N	Pre Stressed Concrete‖,	Tata McGraw Hill Publishing Company, New Delhi
2	Krishna Raju N,	Pre Stressed Concrete Problems and Solutions	CBS Publishers and Distributors, Pvt. Ltd., New Delhi.
3.	Rajagopalan N	Pre Stressed Concrete.	Narosa Publishing House, New Delhi

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Praveen Nagarajan	Advanced Concrete Design	Person Publishers
2	P. Dayaratnam	Pre stressed Concrete Structures	Scientific International Pvt. Ltd.

3.	Lin T Y and Burns N H,	Design of Pre stressed Concrete Structures J	John Wiley and Sons, New York
4.	Pundit G S and Gupta S P	Pre - stressed Concrete	C B S Publishers, New Delhi
5.		IS: 1343: Indian Standard code of practice for Pre stressed concrete,	BIS, New Delhi
6.		IS: 3370-Indian Standard code of practice for concrete structures for storage of liquids,	BIS, New Delhi.

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	HOD	IQAC, ACU	Principal
Name: Dr. Mahalingegowda H R	Name: Dr. Shruthi R	Name: Dr. Shankar M	Name: Dr. B N Shobha
Designation: Associate Professor	Designation: Associate professor &HOD	Designation: Director, IQAC	Designation: Principal
Signature:	Signature:	Signature:	Signature:

1. Course Information

Section	Details
Course Title	Remote Sensing and GIS
Course Code	22CV821
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 8th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of Surveying and Engineering Graphics, mathematical concepts & basic computer applications.
Contact Hours per Week	Lecture:03 Tutorial:01 Practical:00 Total:04
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course introduces the principles and applications of remote sensing and geographic information systems (GIS) in civil engineering. It covers remote sensing processes, platforms, sensors, and data interpretation techniques, along with GIS concepts, data structures, and spatial data management.

2. Course Objectives

1. To introduce the concepts of remote sensing processes and its components.
2. To expose the various remote sensing platforms, sensors and of data interpretation.
3. To introduce concepts of Cartography and GIS.
4. To introduce GIS data structures, data input and data presentation.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the concepts and laws related to remote sensing.	L2	PO1,PO2,PO5,PO12
CO2	Acquire knowledge about satellites and sensors.	L2	PO1,PO2,PO5,PO12
CO3	Gain knowledge about the concepts of interpretation of satellite imagery.	L3	PO1,PO2,PO5,PO12
CO4	Understand the basic concepts and components of GIS.	L2	PO1,PO2,PO5,PO12
CO5	Understand the concepts of spatial data quality and spatial data inputs.	L2	PO1,PO2,PO5,PO12

3. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Remote Sensing And Electromagnetic Radiation:** Definition – components of rs – history of remote sensing – merits and Demerits of data collation between conventional and remote sensing methods- electromagnetic spectrum. **Emr Interaction:** Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere, atmospheric windows - energy balance equation – specular and diffuse reflectors – spectral reflectance & emittance – spectrora diometer – spectral signature concepts – typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.	10	CO1
II	**Orbits And Platforms:** Motions of planets and satellites –types of remote sensing platforms - ground based, airborne platforms and space borne platforms – classification of satellites – sun synchronous and geosynchronous satellites. **Sensing techniques:** classification of remote sensors – resolution concept : spatial, spectral, radiometric and temporal resolutions - orbital and sensor characteristics of live indian earth observation satellites.	10	CO2
III	**Data Products And Interpretation:** Photographic and digital products – types, levels and open source satellite data products –- selection and procurement of data– visual interpretation: basic elements and interpretation keys-digital interpretation – concepts of image rectification, image enhancement and image classification.	10	CO3
IV	**Fundamentals of GIS:** Introduction to GIS – Definitions – History of GIS – Components of a GIS – Hardware, Software, Data, People, Methods – Introduction to data quality – Types of data – Spatial, Attribute data – types of attributes – scales/levels of measurements – spatial data models – Raster Data Structures – Raster Data Compression – Vector Data Structures – Raster Vs Vector Models – TIN and GRID data models.	10	CO4
V	**Data Quality And Output:** Assessment of Data Quality - Basic Aspects - Completeness, Logical Consistency, Positional Accuracy, Temporal Accuracy, Thematic Accuracy and Lineage – Metadata – GIS Standards – Interoperability – OGC - Spatial Data Infrastructure – Data Output – Map Compilation – Chart / Graphs.	10	CO5

4. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

5. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Image Interpretation Exercise

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Thomas M.Lilles and, Ralph W.Kiefer and Jonathan W.Chipman	Remote Sensingand Image interpretation	7th Edition John Wiley and Sons, Inc, New York,2015
2	George Joseph and CJeganathan,	Fundamentals of Remote Sensing	3rd Edition Universities Press (India) Private limited, Hyderabad, 2018
3	Arthur H. Robinson et al,	Elements of Cartography	7th Edition, Wiley, 2002
4	Kang – T sung Chang	Introduction to Geographic Information Systems‖, McGraw Hill Publishing	5th Edition, 2017
5	Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju	An Introduction to Geographical Information Systems, Pearson Education	4th Edition, 2011

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Janza, F.Z., Blue H.M. and Johnson	J.E.Manual of Remote Sensing.Vol.I, American Society of Photogrammetry	Reprint Virginia, USA, 2002
2	C.P. Lo & Albert K.W. Yeung	Concepts and Techniques of Geographic Information Systems	2nd Edition Pearson Education 2007

3	Paul Curran P.J	Principles of Remote Sensing. Longman	Reprint Edition Longman RLBS, UK 2002
4	Basudeb Bhatta	Remote Sensing and GIS	Oxford University Press,2011
5	J.B. Campbell & Randolph H. Wynne	Introduction to Remote Sensing	5th Edition Guilford Press, New York 2011

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Uma A	**Name:** Dr.Shruthi R	**Name:** Dr.M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD &Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Advanced Constructional Materials
Course Code	22CV822
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 8th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of Building Materials and Construction
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course explores advanced construction materials used in civil engineering, focusing on their properties, applications, and selection criteria. It covers floor and wall finishes, ceiling and roofing materials, building fixtures, paints, varnishes, clay, cement products, and metals (ferrous and non-ferrous).

2. Course Objectives

1. Types of advanced materials used in construction.
2. Factors influencing the selection of materials for different conditions.
3. Performance of modern and traditional construction materials.
4. Knowledge of material properties in practical civil engineering applications.
5. Industry practices and innovations in construction materials.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify various building materials according to their properties and applications.	L2	PO1, PO2, PO9
CO2	Select appropriate construction materials based on functional requirements and aesthetics.	L3	PO1, PO2, PO3, PO5, PO9
CO3	Explain the use of modern finishing, roofing, and fixture materials in construction.	L2	PO1, PO2, PO9
CO4	Compare the properties and applications of clay, cement, and composite materials.	L3	PO1, PO2, PO3, PO9
CO5	Analyze the advantages and limitations of ferrous and non-ferrous metals in construction.	L4	PO1, PO2, PO3, PO5, PO9

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Floor and Wall finishes:** Factors affecting the selection of floor finishes, Types of flooring and the iruses Wood - Strip flooring, block flooring, Timber board, Timber Sheet, etc Tiles – Vitrified, Mosaic, Ceramic, Linoleum, Thermoplastic tiles, Flexible PVC Tiles, Cork tiles, quarry tiles, rubber tiles Terrazzo, marble finish, IPS, Kota, Granite, Cement Concrete Tile, Asbestos tile, Requirements and uses of wall finishes. Materials: Wall papers. Cement mortar plaster, Tiles, Gypsum plaster, Stucco plaster, Special External Finishes for plaster surface Roughcast Smooth cast Barium plaster.	10	CO1
II	**Ceiling and Roofing Materials:** Requirements &uses of the following ceiling materials: Plywood, Hard board, Plain A.C. Sheet, Fiber board, Asbestos tiles, Glass roof tiles, Thermocole sheets, Gypsum plasterboard, Sprayed plaster, Fiber Glass. Standard sizes, uses & their requirements: G.I. Sheet, Mangalore tiles, Acrylic Sheet, PVC Sheet.	10	CO2
III	**Building fixtures, Paints & Varnishes:** Types, sizes & uses of building fixtures and hardware as per ISI-Tower bolt, Hinges, Door handles, Door springs& Floor springs ,Latches, Aldrop, Floor doorstopper. Painting and Objectives for painting Characteristics of an ideal paint. Types, Requirement & uses- Aluminium Paint, Anti Corrosive Paint, Cellulose Paint, Cement Paint, Emulsions, Oil Paints, Water based paints.	10	CO3
IV	**Clay and Cement Products:** Roofing Tiles, Earthen ware products, Stoneware products, Terra cotta and other clay wares, porcelain. As best oscement sheets, A.C.Pipes, Cement hollow blocks, cement grills (jalis) & decorative post for railing.	10	CO4
V	**Ferrous Metal and Non Ferrous metal:** Steel-Properties, uses of different types of Steel-C.I,W.I,M.S. Different forms of M.S. Sections. Various categories of steel. Advantages of Tor Steel over Mild Steel. Aluminum, Properties & uses of Aluminum, Aluminum alloys- Properties & uses. Different market forms of Aluminum.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Seminar on latest innovations in ferrous and non-ferrous metals for sustainable construction.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	S.K. Duggal	Building Materials	4th Edition New Age International, , 2017
2	P.C. Varghese	Building Materials	2nd Edition Prentice Hall of India, 2015

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	M.S. Shetty	Concrete Technology: Theory & Practice	8th Edition S. Chand Publishing, 2019
2	S. Rangwala	Engineering Materials	42nd Edition Charotar Publishing House, 2021

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Uma A	**Name:** Dr.Shruthi R	**Name:** Dr.M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD &Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Infrastructure Development & Management
Course Code	22CV823
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 8th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite (If any)	Knowledge of basics of civil engineering systems and construction practices.
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive understanding of infrastructure development and management in the context of civil engineering. It covers the overview of key infrastructure sectors (power, water, transportation, telecommunications, urban, and rural), policies, e-governance, and sustainable development principles. Students will develop skills to analyze infrastructure challenges, apply management strategies, and propose sustainable solutions for infrastructure development in India.

2. Course Objectives

1. Understanding the role and scope of various infrastructure sectors in India.
2. Analysis of policies, agencies, and strategies for infrastructure development and management.
3. Application of e-governance principles and sustainable development concepts to infrastructure projects.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain basic concepts and scope of infrastructure sectors in India.	L2	PO1, PO2, PO9
CO2	Analyze infrastructure policies and agencies in relation to development.	L4	PO1, PO2, PO6, PO10
CO3	Apply principles of e-governance for infrastructure management.	L3	PO1, PO2, PO3, PO7

CO4	Evaluate status of infrastructure and sustainability issues in India.	L4	PO1, PO2, PO3, PO6, PO9
CO5	Interpret principles of sustainable development and their application to infrastructure projects.	L2	PO1, PO2, PO7, PO8

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**An overview of basic concepts related to infrastructure:** Introduction to Infrastructure, an overview of the Power Sector in India., an Overview of the Water Supply and Sanitation Sector in India., an overview of the Road, Rail, Air and Port Transportation Sectors in India. , an overview of the Telecommunications Sector in India. ,an overview of the Urban Infrastructure in India, an overview of the Rural Infrastructure in India	10	CO1
II	**Development of Infrastructure:** Role of infrastructure development in employment generation and improving of the National economy, Infrastructure Policies and Agencies- Indian government policy, Five year plan of government, Various Agencies associated with infrastructure development in India as regards various sectors.	10	CO2
III	**E- Governance:** The concept of management, concept of e-management & e-business, e-Government Principles, Form e-Government to e-governance, e-governance and developing countries, Designing and Implementing e-Government Strategy, E governance: Issues in implementation.	10	CO3
IV	**Status of Infrastructure in India:** Roads and buildings, communication, water supply, irrigation, power energy sectors, ports and aviation, health and educational services, rural development Urban Planning And Environment Environment and Resources, Sustainability Assessment, Future Scenarios, Form of Urban Region, Managing the change, Integrated Planning.	10	CO4
V	**Sustainable development:** principles of Sustainable Development - History and emergence of the concept of Sustainable Development - Environment and Development linkages- Globalization and environment – Millennium Development Goals: Status (global and Indian) - Impacts on approach to development policy and practice in India, future directions.	10	CO5

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	2	-	-	-
CO2	3	3	-	-	-	2	-	-	-	2	-	-
CO3	3	2	2	-	-	-	2	-	-	-	-	-

CO4	3	3	2	-	-	2	-	-	2	-	-	-
CO5	2	2	-	-	-	-	2	2	-	-	-	-

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Group assignment on sustainable development strategies in Indian infrastructure.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R. Srinivasan & S. Mukhopadhyay	Infrastructure Development in India	2nd Edition New Age International Publisher, 2020
2	P.C. Varghese	Construction Management	2nd Edition PHI Learning Pvt Ltd, 2016
3	S.C. Sharma	Infrastructure Engineering and Management	1st Edition Wiley India,2019
4	K.K. Chitkara	Construction Project Management	2nd Edition Tata McGraw Hill, 2014

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	C.S. Rao	Infrastructure Planning and Management	2nd Edition CBS Publishers & Distributors, 2017
2	G. Raghuram & N. Rangaraj	Infrastructure Development and Financing	1st Edition Macmillan Publishers India, 2015
3	B.S. Patil	Civil Engineering Contracts and Estimates	3rd Edition Universities Press, 2015
4	P.K. Joy	Total Project Management: The Indian Context	2nd Edition Macmillan Publishers India, 2010

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Uma A	**Name:** Dr.Shruthi R	**Name:** Dr.M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD &Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Design of Bridges
Course Code	22CV824
Program	Civil Engineering
Academic Year/Semester	2025-2026 / 8th Semester
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite (If any)	Structural Analysis, Design of Reinforced Concrete Structures.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2022-2023
Approved in AC on	23 Jan 2023
Course Description	This course provides a comprehensive understanding of bridge design, focusing on the analysis and design of various types of bridges as per Indian Road Congress (IRC) standards. Students will learn to compute design loads, analyze structural components, and design bridge substructures, superstructures, and ancillary components like bearings and expansion joints. The course emphasizes practical applications and compliance with IRC codes for safe and economical bridge design.

2. Course Objectives

1. Principles of bridge classification, load distribution, and IRC loading standards.
2. Design aspects of slab bridges, T-beam bridges, box culverts, and pipe culverts.
3. Analysis and design of bridge substructures including piers, abutments, bearings, and expansion joints.
4. Practical considerations and compliance with industry standards in bridge design.
5. Structural and economic aspects of bridge design for real-world applications.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understanding of bridge classification, load distribution, and IRC loading standards.	L2	PO1, PO2, PO3,PO12
CO2	Ability to design slab bridges	L3	PO1, PO2, PO3,PO12
CO3	Ability to design T-beam bridges	L3	PO1, PO2, PO3,PO12

CO4	Ability to design box culverts and pipe culverts	L3	PO1, PO2, PO3,PO12
CO5	Analysis and design of piers, abutments, bearings, and expansion joints.	L4	PO1, PO2, PO3,PO4, PO12

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction to bridges, classification, computation of discharge, linear waterway, economic span, afflux, scour depth. Design loads for bridges, introduction to I.R.C. loading standards, Load Distribution Theory, Bridge slabs, Effective width, Introduction to methods as per I.R.C.	10	CO1
II	**Design of Slab Bridges:** Straight and skew slab bridges.	10	CO2
III	Design of T beam bridges (up to three girder only) Proportioning of components, analysis of slab using IRCC lass At racked vehicle, structural design of slab, analysis of cross girder for dead load & IRC Class AA tracked vehicle, structural design of cross girder, analysis of main girder using Courbon's method, calculation of dead load BM and SF, calculation of live load B M &S Fusing IRC Class AA Tracked vehicle. Structural design of main girder.	10	CO3
IV	**Other Bridges:** Design of Box culvert (Single vent only) Design of Pipe culverts	10	CO4
V	**Substructures:** Design of Piers and abutments, Introduction to bridge bearings, Hinges and Expansion joints.	10	CO5

5. CO–PO Mapping Matrix

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

(*Mapping: 1 – Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Basic design check for a single vent box culvert under IRC Class AA vehicle load.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Johnson Victor D	Essentials of Bridge Engineering	6th Edition, Oxford Publishing Company, 2007
2	N. Krishna Raju	Design of Bridge	4th Edition, Oxford & IBH Publishing Company, 4th Edition, 2018
3	T.R. Jagadeesh, M.A. Jayaram	Design of Bridge Structures	3rd Edition,Prentice Hall of India, 2014

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Jain and Jaikrishna	Plain and Reinforced Concrete, Vol. 2	2nd Edition, Nem Chand and Brothers, 2006
2	The Concrete Association of India	Concrete Bridges	1st Edition, The Concrete Association of India, 2012
3	D.J. Victor	Bridge Engineering	2nd Edition, Tata McGraw Hill, 2001
4	S. Ponnuswamy	Bridge Engineering	3rd Edition, Tata McGraw Hill, 2008

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	20
Internal Assessment Test II	20
Assignments/Seminars	10
End Semester Examination	50

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Uma A	**Name:** Dr.Shruthi R	**Name:** Dr.M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** HOD &Associate Professor	**Designation:** Director IQAC	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Internship
Course Code	22CVINW83
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 8th Semester
Course Type	☐ Core ☐ Elective ☐ ✔ Lab
Prerequisite (If any)	Basic academic knowledge, relevant technical skills, communication and teamwork ability, problem-solving mind set, and understanding of professional ethics and workplace discipline
Contact Hours per Week	Lecture: 01 Tutorial: 00 Practical: 04 Total: 04
Credits	05
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Internship provides students with an opportunity to apply theoretical knowledge in real-world environments such as industries, research organizations, or educational institutions. It enables students to gain practical exposure, develop professional skills, and understand workplace culture. The course emphasizes problem-solving, teamwork, ethical practices, effective communication, and documentation through reports, seminars, and viva-voce examinations.

2. Course Objectives

1. Provide exposure to real-time industrial/research/academic practices and enable students to apply theoretical knowledge in practical scenarios.
2. Develop professional competencies such as teamwork, communication skills, ethical responsibility, and adaptability in diverse work environments.
3. Enhance analytical, documentation, and presentation skills through systematic reporting, seminars, and viva-voce evaluations.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped

CO1	Apply classroom knowledge to real-time problems in industry/research/academic settings.	3	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO2	Demonstrate professional skills through effective teamwork, communication, and ethical practices	4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO3	Document, analyse, and present outcomes of internship/project work through reports and seminars.	4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

4. Course Content (Guidelines)

Unit	Topics	Hours	COs
I	1) The Department/college shall nominate staff member/s to facil- itate, guide and supervise students under Internship/ Professional Practice/Practical Examinations/Project work. 2) The Internship shall be completed during the period specified for four weeks during the vacation of VI and VII semesters and/or VII and VIII Semester 3) The internship can be carried out in any industry/R & D Organi- zation/Research Institute/Educational institute of repute. 4) The students shall report the progress of the Internship/ Profes- sional Practice/Practical Examinations/Project work to the guide at regular intervals and seek his/her advice. 5) After the completion of Internship/Professional Practice/Practi- cal Examinations/Project work, students shall submit a report with completion and attendance certificates to the Head of the Depart- ment with the approval of guides. 6) There will be 50 marks for CIE (Seminar: 25 & Internship Report: 25) and 50 marks for Viva–voce conducted during SEE with two Internal		CO1, CO2, CO3

	Examiners. The minimum requirement of CIE marks shall be 50% of the maximum marks. [To be read along with 22BE8.6] 7) The guide shall award the marks for Seminar /Viva-voce on In-ternship/Professional Practice/Practical Examinations/Project work Report after evaluation. He/she will also be the internal examiner for Viva–voce conducted during SEE. 8) Viva-voce on Internship/Professional Practice/Practical Exam-inations/Project work shall be conducted at the college with two in- ternal Examiners. The Examiners shall jointly award the Viva-voce marks. 9) The students are permitted to carry out the internship anywhere in India or abroad. The University will not provide any kind of fi- nancial assistance to any student for carrying out the Internship.		

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	2	–	–	–	–	2
CO2	–	–	1	–	–	2	1	3	3	3	2	2
CO3	2	2	2	2	2	–	–	1	2	3	2	2

(*Mapping: 1 –1 Low, 2 – Medium, 3 – High*)

6. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Progress review

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	
Lab Record Marks	
End Semester Examination	

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Dr. Mahalingegowda H R	**Name: Dr. Shruthi R**	**Name: Dr. Shankar M**	**Name: Dr. B N Shobha**
Designation: Associate Professor	**Designation: Associate professor &HOD**	**Designation: Director, IQAC**	**Designation: Principal**
Signature:	**Signature:**	**Signature:**	**Signature:**

9. Course Information

Section	Details
Course Title	Project Work
Course Code	22CVPW84
Program	Civil Engineering
Academic Year/Semester	2025 – 2026 / 8th Semester
Course Type	☐ Core ☐ Elective ☐ ✔ Lab
Prerequisite (If any)	Strong subject knowledge, research and analytical skills, software/tool proficiency, teamwork, and project management ability.
Contact Hours per Week	Lecture: 0 Tutorial: 0 Practical: 6 Total: 06
Credits	10
W.e.f	2022 – 2023
Approved in AC on	23 Jan 2023
Course Description	The Project Work course in civil engineering initiates students into a comprehensive project, focusing on planning and preliminary design. Students identify a real-world civil engineering problem, conduct literature reviews, and formulate objectives. The course emphasizes teamwork, research, and application of engineering principles to develop feasible solutions. Activities include project proposal preparation and feasibility studies for structures, transportation, or environmental systems. This phase builds foundational skills for executing civil engineering projects effectively.

10. Course Objectives

1. Project is an important part of the engineering curriculum covered in the final year.
2. It is divided into Project Stage I and Project Stage II at Semesters I and II of the Final Year.
3. This project is a substantial piece of work that will require creative activity and original thinking.
4. The project aims to provide students with a transitional experience from the academic world to the professional world.

11. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped

CO1	Identify and formulate a civil engineering problem statement through literature review and preliminary investigation.	4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO2	Develop a project proposal outlining objectives, scope and methodology for a civil engineering project.	6	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO3	Analyse the feasibility of proposed civil engineering solutions considering technical, societal and environmental factors.	4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO4	Apply civil engineering principles to design preliminary solutions for the identified project problem.	3	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO5	Collaborate effectively in a team to plan and present the project proposal.	3	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

12. Course Content (Guidelines)

Unit	Topics	Hours	COs
I	1. Form a group of 3-4 students. 2. 2. Select a project problem statement based on an industrial or societal issue and ideate on it. 3. Research on the project topic through existing theories, literature, technology, patents, etc. 4. Define objectives, scope, and outcomes of the project in the 1st presentation. 5. Maintain a notebook to keep records of all the meetings, discussions, notes, etc. This is to be done by the individual student. 6. Some of the parameters mentioned in the above table will be evaluated and assessed at the group level and some at an individual level.	50	CO1, CO2, CO3, CO4, CO5

13. CO–PO Mapping Matrix

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

(*Mapping: 1 –1 Low, 2 – Medium, 3 – High*)

14. Details of Practical's Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Progress Review

15. Textbooks

S. No.	Author(s)	Title	Publisher & Year

16. Reference Books

S. No.	Author(s)	Title	Publisher & Year

9. Assessment Scheme

Component	Weightage (%)
Internal Assessment Test I	
Lab Record Marks	
End Semester Examination	

10. Course Outcome Attainment

Type	Method
Direct	Internal Tests, Assignments End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
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Signature:	**Signature:**	**Signature:**	**Signature:**