Adichunchanagiri University

Regulations Governing
Master of Technology (M. Tech)
2024-26

BGS Institute of Technology

B G Nagara, Nagamangala Taluk, Mandya
District, Karnataka-571448

ADICHUNCHANAGIRI
UNIVERSITY

Adichunchanagiri University Logo

The heraldic design of the logo brings out the heritage look & feel of Adichunchanagiri. The teachings from our past, from our nature and surroundings - that has evolved through generations are being taught here to the next generation in a disciplined way from an institution that has a rich traditional foundation.

The colours Maroon and Purple give the logo a royal touch while distinguishing it clearly from the many shades of clichéd blue that is generally associated with education. The colours also symbolise courage, power, nobility, luxury and ambition. Purple colour of the logo is inspired from a shade of purple spotted on a peacock by The University Chancellor Swami Sri Sri Sri Dr. Nirmalanandanatha Maha Swamiji and is also a colour associated with wisdom, dignity, independence, creativity, mystery and magic.

The globe icon used within the shield symbolises Global standards of education, with India part of the map strategically fitting within the "U" as though it is being highlighted, for it is today an education destination for students from world over.

ADICHUNCHANAGIRI UNIVERSITY

"Sa Vidya Ya Vimuktaye - that which liberates is knowledge"

Article titled 'The Science in Spirituality' Gopal C Bhar ***Source – Prabuddha Bharata – April 2017 Issue***

Knowledge or Vidya gives power, pleasure, and honor. Both science and spirituality enrich us with knowledge, but that knowledge is superior, which leads us to liberation. Liberation from physical, mental, and external bonds is attained through the control of external nature with the help of science; while liberation from internal bonds is attained through ethics and religion. Hindu scriptures say: 'Sa vidya ya vimuktaye; that which liberates is knowledge.'

But the main role of knowledge is to free us from all these bondages: fear, doubts, inadequacy, and uncertainty. Total knowledge is apara and para, lower and higher, according to the Mundaka Upanishad.

Despite the assertion that spiritual knowledge is higher, it is emphasized that cultivating both of them (science and spirituality) is required for our full-fledged development. The former knowledge is about doing, while the latter is about being.

It is basically a way of developing a holistic way of life — living a mature and balanced life and achieving the integration of personality. It is a way of turning away from a 'having mode' of life to a 'being mode' of life.

Experience is present in both science and spirituality, but two additional features such as moral and psychological transformation are required in spirituality, but are optional in science. It is possible to be simultaneously immoral and scientific, but it is impossible to be simultaneously immoral and spiritual.

Truth is the regime of both science and spirituality; they have mutual kinship, although the roads they follow are different. Science is objective knowledge while spirituality is subjective knowledge. The former is of the external world while the latter is of the internal world of our body-mind complex.

ADICHUNCHANAGIRI UNIVERSITY

Vision Statement

Education for all with Value Systems of **Empathy, Enrichment, Equity, Excellence, Empowerment** & **Enlightenment** to Serve the Society

Mission Statement

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 & Research to produce Graduates of Global Standards **Equity** for Fairness & Social Justice by providing Equal Opportunities

Empowerment of Graduates to become Intuitive, Innovative & Inventive

Enlightenment to attain Wisdom & Virtues in Life to think beyond Self

ADICHUNCHANAGIRI
UNIVERSITY
(Estd. under Karnataka Act No. 18 of 2013)
B.G. Nagara - 571448

Ref: ACU/AUTY/293(A)/2018-19 Date: 29 NOV 2018

NOTIFICATION

Sub: Regulations, Curricula, and Syllabi of Postgraduate Engineering courses in Master of Technology (VLSI & Embedded systems), Computer science & Engineering, Structural Engineering subjects-reg.

Ref: 1. Minutes of the 1st meeting of the Academic Council held on 21-10-2018.
2. Minutes of the 2nd meeting of the Board of Management held on 27-10-2018.

The Adichunchanagiri University was declared as state private University under ACU Act, 2012 (Karnataka Act No.18 of 2013). In accordance with the resolutions of the various Boards of Studies, Faculty of Engineering, Technology and Management, Academic Council and Board of Management it was decided to approve the regulations, curricula & syllabi for Postgraduate Engineering courses in Master of Technology (VLSI & Embedded systems), Computer science & Engineering, Structural Engineering subjects courses prepared by the University.

In exercise of the powers conferred under section 7 & 8 rules of the ACU Act No.2012, the university has been pleased to approve the regulations, Curricula, & Syllabi of Postgraduate Engineering courses (M.Tech).

These Regulations, Curricula, & Syllabi shall be effective for students admitted to Postgraduate Engineering courses (M.Tech) from the academic year 2018-19 onwards.

By order,

Registrar
ADICHUNCHANAGIRI UNIVERSITY
BG NAGARA-571 448
NAGAMANGALA TALUK
MANDYA DIST., KARNATAKA

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, Govt.of Karnataka
5. PS to the Registrar(Evaluation), ACU
6. Dean, Research, ACU
7. Dean, Academics, ACU
8. Principal, AIMS, B.G.Nagara-571448, Nagamangala (Tq), Mandya (Dist)
9. Office Copy

B.G. Nagara - 571448, NH-75, Nagamangala Tq., Mandya Dist., Karnataka, India.
Tel: 08234 287285 | Email: info@acu.edu.in, registrar@acu.edu.in | www.acu.edu.in

Definitions of Keywords

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

1) **Programme:** 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 M.Tech Degree Programme, like VLSI Design & Embedded Systems, Power Electronics, Structures, Machine Design, etc.
3) **Semester:** Refers to one of the two sessions of an academic year (vide: serial number 4), each session being of sixteen weeks duration. The odd semester may be scheduled from August and even semester from February of the year.
4) **Academic Year:** Refers to the sessions of two consecutive semesters (odd followed by an even) including periods of vacation.
5) **Course:** Refers to usually referred to as 'papers' and is a component of a programme. All Courses need not carry the same weight. The Courses should define learning objectives and learning 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.
6) **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.
7) **Audit Courses:** Means Knowledge / Skill enhancing Courses without the benefit of a grade or credit for a Course.
8) **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.
9) **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, Counsellor etc.,) in each Semester for the Institution to maintain proper record.
10) **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.
11) **Continuous Internal Evaluation (CIE):** Refers to evaluation of students' achievement in the learning process. CIE shall be by the tests, assignments, problem solving, group discussion, quiz, mini-project and seminar throughout the Semester, with weightage for the different components being fixed at the University level.
12) **Semester end examinations (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.

13) **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.

14) **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 CBS, the requirement for awarding degree is prescribed in terms of total number of credits to be earned by the students.

15) **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).

16) **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 and F.

Table 1: Credit Values

Theory / Lectures (L) (hours/week/Semester)	Tutorials (T) (hours/week/Semester)	Laboratory / Practical (P) (hours/week/Semester)	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, practical training, study tour and participation in guest lectures not to carry Credits.

17) **Semester Grading System:** Refers to qualitative measure of achievement of a student in each Course, based on the percentage of marks secured in (CIE + SEE). Absolute Grading System is folowed. The rubric attached to Performance Level, Letter grades, Grade Points and Percentage of Marks Scored in a course are as follows:

18) **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

Performance Level	Outstanding	Excellent	Very Good	Good	Average	Fail
Letter Grade	S	A	B	C	D	F
Grade Points	10	9	8	7	6	0
Percentage of Marks Scored in a course	≥ 90	≥ 80 < 90	≥ 70 < 80	≥ 60 < 70	≥ 50 < 60	< 50

19) **Passing Standards:** Refers to passing a Course only when getting GP greater than or equal to 06 (as per serial number 18).

20) **Credit Point:** Is the product of grade point (GP) and number of credits for a Course i.e.,

Credit Point (CrP) = GP X **Credits for the Course**

21) **Semester Grade Point Average (SGPA):** Refers to a measure of the academic performance of a student in a semester. It is the ratio of the total credit points secured by the student in all courses of that semester to the total credits of the courses registered (earned) in that semester. [Refer: MT6.0]
22) **Cumulative Grade Point Average (CGPA):** CGPA is a measure of the overall cumulative academic performance of a student across all semesters. It is calculated as the ratio of the total credit points earned by the student in all courses of all semesters to the sum of the total credits of all those courses. The CGPA shall be expressed up to two decimal places. [Refer: MT6.0]
23) **Transcript or Grade Card:** A transcript or grade card is the official certificate showing the grades earned by a student. A grade certificate shall be issued to every registered student after the only after the completion of each semester. It shall display the programme details (Course Code, Course Title, Credits, Grades secured, and Credit Points) along with the Semester Grade Point Average (SGPA) of that semester and the Cumulative Grade Point Average (CGPA) earned up to that semester.
24) **University:** Adichunchanagiri University (ACU), BG Nagara.

Regulations

24MT1.0	**Title, Duration and Credits of the Programme of Study**
24MT1.1	The Programme shall be called as Master of Technology (Subject of Specialization), abbreviated as M. Tech. (Subject of Specialization).
24MT1.2	The Programme shall extend over a period of four semesters and each semester shall have 16 weeks duration.
24MT1.3	A candidate shall be allowed a maximum duration of 4 years from the first semester of admission to become eligible for the award of Master's Degree, failing which he/she may discontinue the programme or register once again as a fresh candidate to I semester of the programme.
24MT1.4	Prescribed Number of Credits for the Programme for the award of degree shall be 80 to 86.
24MT1.5	The Calendar of Events in respect of the programme shall be notified by the University in advance.
24MT2.0	**Eligibility for Admission (As per the Government orders issued from time to time)**
24MT2.1	Admission to I year/ I semester Master of Technology Programme shall be open to all the candidates who have passed B.E./ B. Tech. Examinations of ACU or any other recognized University/ Institution. The decision of the Equivalence committee shall be final in establishing the eligibility of candidates for a particular Programme. For the foreign degrees, equivalence certificate from the Association of Indian Universities is a must. The candidates who have completed their degree through the distance mode education from any University (National or International) are not eligible for admission to M. Tech. Programs under any quota.
24MT2.2	AMIE in respective branches shall be equivalent to BE Program of ACU for admission to M. Tech.
24MT2.3	Admission to M. Tech. Programme shall be open to the candidates (as per MT 2.1 and 2.2) who have passed the prescribed qualifying examination with not less than 50% of the marks in the aggregate of all the years of the degree examination. However, in the case of candidates belonging to SC/ST and Category I, the aggregate percentage of marks in the qualifying examinations shall not be less than 45%. Rounding off of percentage secured in qualifying examination is not permissible.
24MT2.4	**For admissions under GATE/ PGCET qualification and Roaster system of Government of Karnataka:** The candidates should be GATE qualified or should have appeared for the Entrance Examination conducted by an authority recognized by Government of Karnataka (PGCET)/ACU/ any other University on approval by Government of Karnataka. **For admissions under Management Quota:** The candidates should be GATE qualified or should have appeared for the Entrance Examination conducted by an authority recognized by Government of Karnataka PGCET/ACU/any other University on approval by Government of Karnataka. Further, there shall be an Admissions Committee for PG Programme in each college for each branch of PG studies consisting of the Principal of the College as the Chairman, Head of the concerned Department, one senior faculty of the concerned Department as members. The Admissions Committee shall conduct the interview and select the candidates for admissions. **For admissions under Sponsored Quota:**

	The candidates should be GATE qualified or should have appeared for the Entrance Examination conducted by an authority recognized by Government of Karnataka PGCET/ACU/any other University on approval by Government of Karnataka.
24MT2.5	The candidates, who are qualified in the GATE Examination for the appropriate branch of engineering, shall be given priority. They are exempted from taking Entrance Examination. In case a GATE qualified Candidate appears for entrance examination and become qualified to claim a seat under entrance examination quota, he/she will be considered in the order of merit along with other candidates appeared for the entrance examination.
24MT2.6	If sufficient numbers of GATE qualified candidates are not available, the remaining vacant seats shall be filled from amongst the candidates appeared for Entrance Examination in the order of merit.
24MT2.7	The intake under various categories (regular, sponsored candidates and SC/ST) shall be as sanctioned by the AICTE, State Government and ACU, from time to time.
24MT2.8	Subject to the provisions of 24MT2.1 and 24MT2.2, members of the Teaching/Research Staff working in any Engineering College recognized by AICTE either in the State of Karnataka or outside and who have put in a minimum of 03 years of teaching experience on full-time basis in Engineering Colleges, Polytechnic institutions / any other institutions imparting Engineering education shall be eligible for admission to PG Programs under sponsored quota, if they are sponsored by the respective Institutions / DTE.
24MT2.9	Subject to the provisions of 24MT 2.1 and 24MT 2.2, members working in the State Government / Central Government/ Quasi Government Organizations / Public Sector Industries / Reputed Private Industries, who have put in a minimum of 03 years of working experience and sponsored by the concerned Organizations, shall also be eligible to seek admissions to PG Programs against sponsored quota. Preference for admission under 24MT2.8 and 2.9 shall be given to candidates sponsored by organizations of State and Central Governments.
24MT2.10	The Engineering graduates other than the Karnataka candidates shall obtain Eligibility Certificate from ACU to seek admission to P.G. Programme in the Constituent college of ACU.
24MT2.11	**Admission to vacant seats:** Seats remaining vacant (unfilled), after the completion of PG admission process by Karnataka Examination Authority, shall be filled by the Institution by inviting applications through notification. The seats shall be filled by Candidates preferably who have valid GATE/ PGCET/ACU score. In the absence of such Candidates, admission shall be based on merit in the entrance test conducted at the Institution level. An Admissions Committee, consisting of the Principal of the College, Head of the concerned Department and the subject experts, shall be in charge of admissions.
24MT3.0	**Courses**
24MT3.1	The curriculum of the Programme shall be any combination of following type of courses: i) Professional Core Courses (PC) - relevant to the chosen specialization / branch [May be split into Hard (no choice) and Soft (with choice), if required]. The core course is to be compulsorily studied by a student and is mandatory to complete the requirements of a programme in a said discipline of study. ii) Professional Electives Courses (PE) - relevant to the chosen specialization/ branch: these are the courses, which 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 / nurturing student skills.

	iii) Open Electives Courses (OE), from other technical and/ or emerging specialization areas. iv) Project Work, Seminar. v) Audit Courses (AC): a) The Audit course can be any credit course offered by the program to which the Candidate is admitted (other than the courses considered for completing the prescribed program credits) or other programs offered in the institution, where the student is studying. b) The students who are interested in audit courses can register for one audit course at a time during II and IV semesters. Students who have registered to audit the courses, considered on par with students registered to the same course for credit, have to satisfy attendance and CIE requirements. However, they need not have to appear for SEE. c) Registration for any audit course, in writing, shall be completed at the beginning of II and IV 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. vi) Internship: Preferably at an industry / R & D organization / IT company/ Government organization of significant repute for a specified period mentioned in Scheme of Teaching and Examination.
24MT4.0	**Internship**
24MT4.1	**Internship:** The student shall undergo Internship for 16 weeks as per the Scheme of Teaching and Examination. 1. The internship can be carried out in any industry/R&D Organization/Research Institute/Institute of repute. 2. (a) The Department/college shall nominate a faculty to facilitate, guide and supervise students under internship. (b) The Internal Guide has to visit work place at least once during the student's internship. 3. The students shall report the progress of the internship to the internal guide in regular intervals and seek his/her advise. 4. The Internship shall be completed during the period specified in Scheme of Teaching and Examination. 5. After completion of Internship, students shall submit a report to the Head of the Department with the approval of both internal and external guides. 6. There will be 100 marks for CIE (Seminar: 75, Internship report: 25) and 100 marks for Viva – Voce conducted during SEE. [To be read along with MT 8.8 and 8.9] 7. The internal guide shall award the CIE marks for seminar and internship report after evaluation. He/she will also be the internal examiner for Viva – Voce conducted during SEE. 8. The external guide from the industry has to be an examiner for the viva voce on Internship. Viva-Voce on internship shall be conducted at the college and the date of Viva-Voce shall be fixed in consultation with the external Guide. The Examiners shall jointly award the Viva - Voce marks. 9. In case the external Guide expresses his inability to conduct viva voce, the Chief Superintendent is permitted to make alternate arrangements with the permission of the concerned BOE Chairperson.

	10. 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 internship and for the conduct of Viva-Voce on internship.
24MT4.2	**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.
24MT5.0	**Seminar and Project**
24MT5.1	**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 for about 30 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 faculty from the Department and the senior most acting as the Chairman/Chairperson. [To be read along with 24MT8.8]
24MT5.2	**Project Work:** Project is one of the head of passing. Project work shall preferably be on individual basis. The candidate shall submit a soft copy (CD) of the dissertation work to the University. The CD should contain the entire Dissertation in monolithic form as a PDF file (not separate chapters). The Guide, after checking the report for completeness shall upload the Dissertation along with name, University Seat Number, address, mobile number of the candidate, etc., as prescribed in form available on online Dissertation evaluation portal. The guide shall submit a panel of four approved University Examiners for evaluation of dissertation.
24MT5.3	**Plagiarism Check** Once the Guide uploads the dissertation, the same shall be linked for plagiarism check. The allowable plagiarism index is less than or equal to 25%. If the check indicates a plagiarism index greater than 25%: (i) For the first time, the candidate has to resubmit the dissertation, to the Registrar (Evaluation), ACU along with the penal fees of Rs. 1000/- (Rupees One thousand only) in person. (ii) For the second time, the candidate has to resubmit the dissertation along with the penal fees of Rs. 2000/- (Rupees Two thousand only) in person. (iii) If the dissertation is rejected again during second resubmission with reference to plagiarism index, the candidate shall redo the project and submit after a semester's time subject to provisions of 24MT1.5.
24MT5.4	The dissertation shall be sent through email for evaluation to two examiners - one internal examiner (guide/co-guide) and one external examiner (first) appointed by the University. The evaluation of the dissertation shall be made independently by each examiner.
24MT5.5	Examiners shall evaluate the dissertation normally within a period of not more than two weeks from the date of receipt of dissertation through email.
24MT5.6	The examiners shall independently submit the marks through the specified link.
24MT5.7	Average of the marks awarded by the two Examiners shall be the final evaluation marks for the Dissertation.
24MT5.8	(a) Viva-voce examination of the candidate shall be conducted as per 24MT5.10, if the dissertation work and the reports are accepted by the external examiner (first).

<table>
<tr><td></td><td>(b) If the external examiner (first) finds that the dissertation work and the report are not up to the expected standard and the minimum passing marks cannot be awarded, the dissertation shall not be accepted for SEE.
The external examiner (first) can recommend for modifications/suggestions of dissertation or totally reject the dissertation. The examiner shall offer suggestions for improvement of the dissertation for resubmission or list the reasons for rejection of the dissertation.
(c) The resubmitted Dissertation incorporating the modifications/suggestions [as per 24MT5.8 (b)] of the external examiner (first) and satisfying the provision 24MT5.3 shall be sent again to the external examiner (first) for evaluation. If the dissertation and the report are accepted by the external examiner (first), Viva-voce examination of the candidate shall be conducted as per 24MT5.10.
(d) In case of rejection of Dissertation with reasons, by the external examiner (first), the same will be sent to a Second Examiner (external) approved by the University. The decision of the Second Examiner (external) is final. If the dissertation and the report are accepted by the Second Examiner (external), Viva-voce examination of the candidate shall be conducted as per 24MT5.10. If the Second Examiner (external) rejects the dissertation and the report, the candidate shall have to carry out the dissertation work once again and submit the dissertation subject to provisions of 24MT1.5. In such cases of rejection, the candidate, whose Dissertation is rejected, can rework on the same topic or choose another topic of dissertation after discussion with the guide. In such an event, the report shall be submitted within the next ensuing examination.</td></tr>
<tr><td>24MT5.9</td><td>The external examiner and internal examiner / guide shall conduct viva-voce examination of the candidate as per the date notified by the University Evaluation Section. In case one of the examiners express his/her inability to attend the viva-voce, the senior faculties can be appointed as substitute examiner in his/her place.</td></tr>
<tr><td>24MT5.10</td><td>The relative weights for the evaluation of dissertation and the performance at the viva voce shall be as per the scheme of teaching & examination.</td></tr>
<tr><td>24MT5.11</td><td>The marks awarded by both the Examiners at the viva voce Examination shall be sent jointly to the University immediately after the examination.</td></tr>
<tr><td>24MT5.12</td><td>Examination fee as fixed from time to time by the University for evaluation of dissertation report and conduct of viva voce shall be remitted through the Head of the Institution as per the instructions of Registrar (Evaluation) from time to time.</td></tr>
<tr><td>24MT5.13</td><td>The candidates who fail to submit the dissertation work within the stipulated time have to submit the same at the time of next ensuing examination.</td></tr>
<tr><td>24MT6.0</td><td>Computation of SGPA and CGPA</td></tr>
<tr><td>24MT6.1</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>Performance Level</td><td>Outstanding</td><td>Excellent</td><td>Very Good</td><td>Good</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>F</td></tr>
<tr><td>Grade Points</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>0</td></tr>
<tr><td>Percentage of Marks Scored in a course</td><td>≥ 90</td><td>≥ 80 < 90</td><td>≥ 70 < 80</td><td>≥ 60 < 70</td><td>≥ 50 < 60</td><td>< 50</td></tr>
</table>
</td></tr>
</table>

(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. However, the number of attempts taken to clear a Course shall be indicated in the grade cards/ transcripts.

24MT6.2 **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.,

$$\mathbf{SGPA} = \frac{\sum(\mathbf{C_i} \times \mathbf{G_i})}{\sum \mathbf{C_i}}$$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} 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.,

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

where S_i is the SGPA of the i^{th} semester and C_i 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

Illustration				
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**				

Semester	**I**	**II**	**III**	**IV**
Credits of the semester	20	20	20	20
SGPA	7.00	8.50	9.20	6.86

$$Thus\ CGPA = \frac{20 \times 7.00 + 20 \times 8.50 + 20 \times 9.20 + 20 \times 6.86}{80} = 7.89$$

24MT6.3 **Transcript Format:** Based on the secured letter grades, grade points, SGPA and CGPA,

<table>
<tr><td></td><td>the transcript for each semester and a consolidated transcript indicating the performances in all semesters shall be issued.</td></tr>
<tr><td>22MT 7.0</td><td>Conversions of Grades into Percentage and Declaration of Class</td></tr>
<tr><td>22MT 7.1</td><td>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%</td></tr>
<tr><td>24MT7.2</td><td>Class Declaration:
A graduating student is declared to have passed in
<table>
<tr><th>Declaration of Class</th><th>CGPA</th></tr>
<tr><td>First Class with Distinction</td><td>≥ 7.5</td></tr>
<tr><td>First Class</td><td>≥ 6.5 < 7.5</td></tr>
<tr><td>Second Class</td><td>≥ 6.0 < 6.5</td></tr>
</table></td></tr>
<tr><td>24MT8.0</td><td>Continuous Internal Evaluation and Semester End Evaluation</td></tr>
<tr><td>24MT8.1</td><td>For each theory, practical paper and Internship the CIE marks shall be 40.
For seminar, the CIE marks shall be 100.
For Project Phase –I and Project Phase – II the CIE marks shall be 50 respectively.
[To be read along with 24MT8.8]</td></tr>
<tr><td>24MT8.2</td><td>CIE Marks shall be based on
a) Tests (for 50 Marks) and
b) Assignments, Quiz, Simulation, Experimentation, Mini project, oral examination, field work etc., (for 10 Marks) conducted in respective courses.</td></tr>
<tr><td>24MT8.3</td><td>The CIE marks in a theory course, for 50 marks, shall be based on two tests covering the entire syllabus. An additional test may be conducted for the needy students to provide an opportunity to improve their CIE Marks before the end of the semester. The CIE marks shall be the average of the best of two test marks scored. [To be read along with 24MT8.8]</td></tr>
<tr><td>24MT8.4</td><td>The candidates shall write the Tests in Blue Book/s. The Blue book/s and other documents relating to award of CIE marks under 24MT8.2 (b) shall be preserved by the Principal / Head of the Department for at least six months after the announcement of University results and made available for verification at the directions of the Registrar (Evaluation).</td></tr>
<tr><td>24MT8.5</td><td>Every page of the CIE marks list shall bear the signatures of the concerned Teacher, Head of the Department and the Principal.</td></tr>
<tr><td>24MT8.6</td><td>The CIE marks list shall be displayed on the Notice Board and corrections, if any, shall be incorporated before submitting to the University.</td></tr>
<tr><td>24MT8.7</td><td>The CIE marks shall be sent to the university by the Principal well in advance before the commencement of Semester End Examinations.</td></tr>
<tr><td>24MT8.8</td><td>Candidates obtaining less than 50% of the CIE marks in any course (Theory/Laboratory/Seminar/Internship/Project) shall not be eligible to appear for the University examination in that course/s. In such cases, the Head of the Department shall arrange for the improvement of CIE marks in the course/ Laboratory when offered in the subsequent semester subject to the provision of 24MT1.5.</td></tr>
<tr><td>24MT8.9</td><td>Semester End Evaluation: There shall be a University Examination at the end of each semester.</td></tr>
<tr><td>24MT8.10</td><td>There shall be double valuation of theory papers. The theory Answer booklets shall be valued independently by two examiners appointed by the University.</td></tr>
</table>

24MT8.11	If the difference between the marks awarded by the two Examiners is not more than 15 % of the maximum marks, the marks awarded to the candidate shall be the average of two evaluations.
24MT8.12	If the difference between the marks awarded by the two Examiners is more than 15 percent of the maximum marks, the answer booklet shall be evaluated by a third Examiner appointed by the university. The average of the marks of nearest two valuations shall be considered as the marks secured by the candidate. In case, if one of the three marks falls exactly midway between the other two, then the highest two marks shall be taken for averaging.
24MT9.0	**Eligibility for Passing and Award of Degree**
24MT9.1	(1) A student shall be declared successful in the program, if they secure any grade from 'S' to 'D' in the Semester End Examinations and obtain a CGPA greater than or equal to 6.00, and shall be considered as having passed the programme. (2) If a student secures 'F' grade in any of the courses, then he/she has to reappear in that course in the next ensuing examination. (3) In case, if the student is not satisfied with the obtained CGPA, then the candidate may withdraw the SEE results of the previous attempt and obtain written permission from the Registrar (Evaluation) to re-appear in the subsequent SEE to improve CGPA. (4) Students shall not be allowed to re-appear for any individual Course/s again, unless they opt for rejection of results of entire semester.
24MT9.2	For a pass in a Theory/ Internship/ Technical Seminar/ Practical/Project/ Dissertation/ Viva-voce examinations, the student shall secure minimum of 50% of the maximum marks prescribed in the Semester End Examination and 50% of marks in CIE and 50% in the aggregate of CIE and SEE marks.
24MT9.3	IV (Final) semester candidates having backlog courses are permitted to upload the dissertation report and to appear for SEE. The IV semester grade card shall be released only when the candidate completes all the backlog courses and become eligible for the award of degree. [To be read along with 24MT11.2]
24MT9.4	A candidate shall be allowed to reject the total performance of a semester (including CIE marks). Hence, the student must re-register for the said semester. However, in the IV semester the rejection shall not include the Project work. The rejection is permitted only once during the entire programme of study. However, the rejection of performance of IV (Final) Semester project shall not be permitted.
24MT9.5	If the rejection of the University examination results of the semester happens to be of an odd semester, the candidate can take admission to the immediate next even semester. However, if the rejection of the University result is of even semester, the candidate cannot take admission to the next odd semester.
24MT9.6	Application for approval of readmission shall be sent to the Registrar through the Dean/ Principal of the College within 15 days from the date of the announcement of the results after paying the prescribed fee for the semester.
24MT9.7	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 will be counted with reference to old Register Number.
24MT9.8	University Vertical Progression (Promotion / Eligibility to higher Semesters) rules will be applicable for readmitted students.
24MT9.9	A candidate, who opts for rejection of results of a semester shall be eligible for the award of class and distinction, but shall not be eligible for the award of rank.
24MT9.10	**Eligibility for Award of Degree:** A student shall be declared to have completed the degree of Master of Technology,

	provided the student has undergone the stipulated course work as per the regulations and has earned the prescribed Credits, as per the Scheme of Teaching and Examination, of the programme.
24MT10.0	**Attendance Requirement**
24MT10.1	**Registration and Enrolment:** I. Except for the first semester, registration for a semester will be done during a specified week before the semester end examination of the previous semester. II. The registration sheet should have the Candidate details, course name and code, number of credits and category (core/elective/audit) for each course of that semester. III. The Faculty Adviser, assigned by the Head of the Department, will counsel the students in planning their courses of study and provide guidance, motivation, emotional support, and enable the mentees to reach the desired professional and career goals.
24MT10.2	Courses of each semester shall be treated as a separate unit for calculation of the attendance.
24MT10.3	The candidate has to put in a minimum attendance of 75% in each course.
24MT10.4	In case of late admission, approved by competent authority (DTE/ACU), to I semester of the programme the attendance shall be reckoned from the date of admission to the programme.
24MT10.5	A candidate, who does not satisfy the attendance requirement (in one or more Courses) as mentioned in 24MT10.3 shall not be eligible to appear for the SEE 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.
24MT10.6	Principals of the concerned colleges shall notify regularly, the list of candidates who fall short of attendance.
24MT10.7	The list of the candidates falling short of attendance shall be sent to the University at least one week prior to the commencement of the examination.
24MT11.0	**Promotion and Eligibility**
24MT11.1	**Promotion:** There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement.
24MT11.2	a) Candidates, with a maximum of four backlog courses of first year shall be eligible for taking admission to second year (III semester). b) Each credit course shall be treated as a head of passing.
24MT11.3	The Mandatory non – credit courses, if any, shall not be considered for the Eligibility criterion prescribed for promotion, award of Class, calculation of SGPA and CGPA. However, a pass in the above courses is mandatory before the completion of Degree.
24MT12.0	**Temporary Discontinuation/ Break in the Program**
24MT12.1	(a) If a candidate, for any reason, temporarily discontinues the Programme or take a break from programme during any semester, he/she may be permitted to continue in the programme by registering to the same semester but with the prevailing scheme. The candidate shall complete all the remaining course work subject to the provision 24MT1.5. Also, the Candidates may have to 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. However, based on the

	individual cases, it is considered to decide the SGPA and CGPA to admit the student for the award of degree. Such candidate shall not be eligible for the award of rank. (b) Candidates who take admission to any semester of the existing scheme from another scheme, as a repeater/ fresher because of various reasons have to complete additional course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of Engineering, 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. However, based on the individual cases, it is considered to decide the SGPA and CGPA to admit the student for the award of degree. Such candidate shall not be eligible for the award of rank.
24MT13.0	**Award of Prizes, Medals and Ranks**
24MT13.1	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.
24MT13.2	(1) For award of rank in a Specialization of Master of Technology, the CGPA secured by the student from I to IV semester is considered. (2) A student shall be eligible for a rank at the time of award of degree of Master of Technology, provided the student; a. Is not a repeater in any semester. b. Has not rejected the results of any semester. c. Has passed First to Final semester in all the courses in first attempt only. (3) The total number of ranks awarded shall be 10% of total number of students appeared in IV semester subject to a maximum of 10 ranks in a specialization. (4) For award of ranks in a specialization, a minimum of 10 students should have appeared in the IV semester examination.
24MT13.3	Ranks are awarded based on the merit of the students as determined by 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.
24MT14.0	**Applicability and Power to Modify**
24MT14.1	The regulations governing the Degree of Master of Technology of Adichunchanagiri University shall be binding on all concerned.
24MT14.2	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.

|| Jai Sri Gurudev||

ADICHUNCHANAGIRI UNIVERSITY

Faculty of Engineering Management and Technology

BGS Institute of Technology

M.Tech in Structural Engineering

Scheme & Syllabus of Teaching and Examination 2024-25

I SEMESTER **Choice Based Credit System (CBCS) and Outcome Based Education (OBE)**

Sl. No	Course	Course Code	Course Title	Teaching Hours / Week		Examination				Credits
				Theory	Practical/ Assignment	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	24CSE11	Computational Structural Mechanics	04		03	50	50	100	4
2	PCC	24CSE12	Advanced Design of RC Structures	04		03	50	50	100	4
3	PCC	24CSE13	Structural Dynamics	04		03	50	50	100	4
4	PEC	24CSE14x	Professional Elective I	04		03	50	50	100	3
5	PCC	24RMI15	Research Methodology and IPR	02		03	50	50	100	3
6	PCC	24CSEL16	Structural Engineering Lab-I		03	03	50	50	100	2
TOTAL				**18**	**3**	**18**	**300**	**300**	**600**	**20**

Note: PCC: Professional core, PEC: Professional Elective.

Course code	*Course title*
24CSE141	Mechanics of Deformable Bodies
24CSE142	Optimization Techniques
24CSE143	Design of Masonry Structures
24CSE144	Green Building Technology

|| Jai Sri Gurudev||

ADICHUNCHANAGIRI UNIVERSITY

Faculty of Engineering Management and Technology

BGS Institute of Technology

M.Tech in Structural Engineering

Scheme & Syllabus of Teaching and Examination 2024-25

II SEMESTER **Choice Based Credit System (CBCS) and Outcome Based Education (OBE)**

Sl. No	Course	Course Code	Course Title	Teaching Hours / Week		Examination				Credits
				Theory	Practical/ Assignment	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	24CSE21	Advanced Design of Steel Structures	04		03	50	50	100	4
2	PCC	24CSE22	Finite Element Method of Analysis	04		03	50	50	100	4
3	PCC	24CSE23	Earthquake Resistant Structures	04		03	50	50	100	4
4	PEC	24CSE24x	Professional Elective II	04		03	50	50	100	3
5	PEC	24CSE25x	Professional Elective III	04		03	50	50	100	3
6	PCC	24CSEL26	Structural Engineering Lab-II		03	03	50	50	100	2
TOTAL				**20**	**3**	**18**	**300**	**300**	**600**	**20**

Note: PCC: Professional core, PEC: Professional Elective.

Course code	*Course title*	*Course code*	*Course title*
24CSE241	Advanced Design of Pre-stressed Concrete Structures	24CSE251	Advanced Structural Analysis
24CSE242	Stability of Structures	24CSE252	Composite Materials
24CSE243	Advances in Artificial Intelligence	24CSE253	Design of Industrial Structures
24CSE244	Advanced Concrete Technology	24CSE254	Repair and Rehabilitation of Structures

|| Jai Sri Gurudev||

ADICHUNCHANAGIRI UNIVERSITY

Faculty of Engineering Management and Technology

BGS Institute of Technology

M.Tech in Structural Engineering

Scheme & Syllabus of Teaching and Examination 2024-25

III SEMESTER **Choice Based Credit System (CBCS) and Outcome Based Education (OBE)**

Sl.No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Assignment	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	24CSE31	Design of Concrete Bridges	04		03	50	50	100	04
2	PEC	24CSE32x	Professional Elective IV	04		03	50	50	100	03
3	PCC	24CSE33	Project Work Phase I	-	03	-	100	-	100	03
4	INT	24CSE34	Internship	(Completed during the intervening vacation of I and II semesters and /or IIand III semesters)		03	50	50	100	10
TOTAL				**8**	**03**	**9**	**250**	**150**	**400**	**20**

Note: *PCC: Professional core, PEC: Professional Elective.*

Course code	***Course title***
24CSE321	Theory of Plates and Shells
24CSE324	Design concepts of substructures
24CSE323	Design of High Rise Structures
24CSE324	Design of formwork
24CSE325	NPTEL Certificate

Note:

1. Internship: All the students shall have to undergo mandatory internship of 16 weeks during III semesters. A University examination shall be conducted during III semester and the prescribed credit shall be counted in the same semester. Internshipshall 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 in internship course and have to complete the same during the subsequent University examination after satisfying the internship requirements.

|| Jai Sri Gurudev||

ADICHUNCHANAGIRI UNIVERSITY

Faculty of Engineering Management and Technology

BGS Institute of Technology

M.Tech in Structural Engineering

Scheme & Syllabus of Teaching and Examination 2024-25

IV SEMESTER **Choice Based Credit System (CBCS) and Outcome Based Education (OBE)**

Sl.No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Assignment	Duration in Hours	CIE Marks	SEE Marks	TotalMarks	
1	PCC	24CSE41	Technical Seminar	-	03	03	100	-	100	3
2	PCC	24CSE42	Project Work Phase - II	-	04	03	100	100	200	17
TOTAL					**07**	**06**	**200**	**100**	**300**	**20**

Note:

Technical Seminar: CIE marks shall be awarded by a committee comprising of HOD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. Participation in the seminar by all postgraduate students of the same and other semesters of the programme shall be mandatory. The CIE marks awarded for Technical Seminar, shall be based on the evaluation of Seminar Report, Presentation skill and Question and Answer session in the ratio 50:25:25.

Project Work CIE marks shall be awarded by a committee comprising of HOD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. The CIE marks awarded for project work shall be based on the evaluation of Project Report subjected to plagiarism check, Project Presentation skill and Question and Answer session in the ratio 50:25:25. SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism check, shall be as per the University norms.

1. Course Information

Section	Details
Course Title	Computational Structural Mechanics
Course Code	24CSE11
Program	Structural Engineering
Academic Year/Semester	2024-2025/ I Sem M. Tech
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of Structural Analysis and Linear Algebra
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	4
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course focuses on matrix methods for structural analysis, equipping students with skills to formulate force-displacement relationships, analyze framed structures such as plane trusses, continuous beams, and portal frames using flexibility, stiffness, and direct stiffness methods, and apply computational techniques to solve structural problems. The curriculum emphasizes theoretical foundations and practical applications to develop analytical proficiency in computational structural mechanics.

2. Course Objectives

1. To understand basic concepts of Matrix Methods of Structural Analysis.
2. To analyze the behaviour of plane trusses, continuous beams, and portal frames.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Formulate force-displacement relation by flexibility and stiffness method.	L3	PO1, PO2, PO4
CO2	Analyze the plane trusses, continuous beams, and portal frames by the transformation approach.	L4	PO1, PO2, PO3, PO5
CO3	Analyze the structures by direct stiffness method.	L4	PO1, PO2, PO3, PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Basic concepts of structural analysis and methods of solving simultaneous equations:** Introduction, Types of framed structures, Static and Kinematic Indeterminacy, Equilibrium equations, Compatibility conditions, Principle of superposition, Energy principles, Equivalent joint loads, Methods of solving linear simultaneous equations - Gauss elimination method.	10	CO1
II	**Fundamentals of Flexibility and Stiffness Methods** Concepts of stiffness and flexibility, Local and Global coordinates, Development of element flexibility and element stiffness matrices for truss, beam, and grid elements, Force-transformation matrix, Development of global flexibility matrix for continuous beams, plane trusses, and rigid plane frames, Displacement-transformation matrix, Development of global stiffness matrix for continuous beams, plane trusses and rigid plane frames.	10	CO1
III	**Analysis using Flexibility Method (Element approach)** Analysis of Continuous beams, plane trusses and rigid plane frames with static indeterminacy ≤ 3.	10	CO2
IV	**Analysis using Stiffness Method (Element approach)** Analysis of Continuous beams, plane trusses and rigid plane frames with kinematic indeterminacy ≤ 3.	10	CO2
V	**Direct Stiffness Method** Stiffness matrix for truss element in local and global coordinates, Analysis of plane trusses, Stiffness matrix for beam element, Analysis of continuous beams and plane frames.	10	CO3

5. CO–PO Mapping Matrix

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

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

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Software Demonstration / Lab Activity – Analysis of Beams and Frames using Direct Stiffness Method in STAAD/ETABS

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Weaver, W., and Gere, J.M.,	Matrix Analysis of Framed Structures,	3rd Edition, CBS Publishers and distributors Pvt. Ltd., 2004.
2	Rajasekaran, S, and Sankarasubramanian, G.	Computational Structural Mechanics	1st Edition, PHI, New Delhi, 2001
3	Martin H C.	Introduction to Matrix Methods of Structural Analysis	1st Edition, McGraw-Hill, New York, 1966.
4	Rubinstein M.F Prentice-Hall,	Matrix Computer Analysis of Structures,	1st Edition, Englewood Cliffs, New Jersey, 1966.

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Beaufait, F.W., Rowan, W. H., Jr., Hoadely, P. G., and Hackett, R. M.	Computer Methods of Structural Analysis,	1st Edition, Prentice-Hall, Englewood Cliffs, New Jersey, 1970
2	Kardestuncer H.	Elementary Matrix Analysis of Structures,	1st Edition, McGraw-Hill, New York, 1974.

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	Advanced Design of RC Structures
Course Code	24CSE12
Program	Structural Engineering
Academic Year/Semester	2024-2025/ I Sem M.Tech
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of Reinforced Concrete Design and Structural Analysis
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	4
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course focuses on advanced principles of reinforced concrete (RC) structural design, enabling students to design complex RC structures such as slabs, beams, chimneys, silos, bunkers, and formwork. It emphasizes limit state design, analytical skills, and performance evaluation of RC structures, integrating theoretical concepts with practical applications to solve real-world structural engineering problems.

2. Course Objectives

1. To make students to learn principles of Structural Design,
2. To design different types of structures and to detail the structures.
3. To 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, PO4
CO2	Understand the principles of Structural Design.	L4	PO1, PO2, PO3, PO5
CO3	Design and develop analytical skills.	L4	PO1, PO2, PO3, PO5

CO4	Summarize the principles of structural design and detailing	L4	PO1, PO2, PO3, PO5
CO5	Understands the structural performance.	L4	PO1, PO2, PO4, PO5

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	Design of continuous beams with redistribution of moments.	10	CO2
III	1. Design of R C Chimneys 2. Design of flat slabs	10	CO3
IV	1. Design of R C silos 2. Design of R C bunkers	10	CO4
V	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 formwork	10	CO5

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	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 Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Field visit – “Shuttering Practices in RCC Construction

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Bungale. S. Taranath.	Structural Analysis and Design of Tall Buildings	1st Edition McGraw-Hill Book Company, New York,1999
2	Krishnamurthy K T Gharpure S.C. and A.B.Kulkarni	Limit design of reinforced concrete structures	1st Edition Khanna Publishers,1985
3	Varghese P C. Prentice	Limit State Design of Reinforced Concrete	2nd Edition Prentice-Hall of India,2007
4	Krishna Raju N.	Advanced Reinforced Concrete Design	2nd Edition CBS Publishers & Distributors
5	Gambhir M L	Design of Reinforced Concrete Structures	3rd Edition PHI Pvt. Ltd, New Delhi, 2008

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Unnikrishnan Pillai and Devdas Menon	Reinforced Concrete Design	3rd Edition Tata McGraw-Hill Publishers Company Ltd., New Delhi,2006
2	HsuT.T.C. and MoY.L.	Unified Theory of Concrete Structures	1st Edition John Wiley Sons,2010
3	Shah H J	Reinforced Concrete	8th Edition Charotar Publishing House, 2009
4	A Park and Paulay	Reinforced and Prestressed Concrete	1st Edition 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	Structural Dynamics
Course Code	24CSE13
Program	Structural Engineering
Academic Year/Semester	2024-25 / 1st Sem
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite	Engineering Mechanics, Matrix algebra, differential equations and vibration concepts
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	04
W.e.f	2024-25
Approved in AC on	Sep 2024
Course Description	This course introduces the fundamentals of structural dynamics, beginning with single-degree-of-freedom (SDOF) systems under free and forced vibrations, including the concepts of damping, vibration isolation and measurement instruments. It extends to multi-degree-of-freedom (MDOF) systems, covering natural frequencies, mode shapes and orthogonality principles. The stiffness method is applied to analyze shear buildings subjected to harmonic loading with and without damping. Approximate solution techniques such as Rayleigh's, Dunkerley's, and Stodola's methods are emphasized for practical applications. Finally, the dynamics of continuous systems like bars and beams under various boundary conditions are studied to provide a comprehensive understanding of vibration behavior in civil engineering structures.

2. Course Objectives

1. To learn principles of Structural Dynamics.
2. To implement these principles through different methods and to apply the same for free and forced vibration of structures.
3. To evaluate the dynamic characteristics of the structures

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the principles of Structural Dynamics	L2	PO1, PO2 PO4,
CO2	Design and develop analytical skills.	L4	PO1, PO2, PO3, PO4, PO5

CO3	Summarize the Solution techniques for dynamics of Multi-degree freedom systems	L2	PO1, PO2, PO3, PO4, PO5
CO4	Understand the concepts of damping in structures	L2	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Dynamics of Single-degree freedom systems (Free vibration)** Introduction to Dynamic problems in Civil Engineering, Concept of degrees of freedom, D'Alembert's principle, principle of virtual displacement and energy principles .Dynamics of Single degree-of-freedom systems: Mathematical models of Single-degree-of-freedom systems system, Free vibration response of damped and undamped systems including methods for evaluation of damping.	10	CO1
II	**Dynamics of Single-degree freedom systems (Forced vibration)** Response of Single-degree-of-freedom systems to harmonic loading including support motion, vibration isolation, transmissibility. Principle of vibration measuring instruments– seismometer and accelerometer.	10	CO4
III	**Dynamics of Multi-degree freedom systems** Mathematical models of multi-degree-of-freedom systems, Shear building concept, free vibration of undamped multi-degree-of freedom systems – Natural frequencies and mode shapes – Orthogonality of modes.	10	CO4
IV	**Analysis using Stiffness Method (including secondary effects)** Response of Shear buildings for harmonic loading without damping using normal mode approach. Response of Shear buildings for forced vibration for harmonic loading with damping using normal mode approach.	10	CO2
V	**Approximate methods:** Rayleigh's method, Dunkarley's method, Stodola's method. Dynamics of Continuous systems: Free longitudinal vibration of bars, flexural vibration of beams with different end conditions.	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	3	2	1	-	-	-	-	-	-	-
CO3	3	2	2	2	1	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-

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

6. Details of Practical Sessions

Practical	Title of Experiment / Activity
1	Demonstration on the unidirectional shaking table.

7. Textbook

Sl. No.	Author(s)	Title	Publisher & Year
1	Anil K. Chopra	Dynamics of Structures - "Theory and Application to Earthquake Engineering"	5th edition, Pearson Education, 2019
2	Vinod Hosur	Earthquake-Resistant Design of Building Structures	1st edition, WILEY (India), 2012
3	M. Mukhyopadhaya	Structural Dynamics: Vibrations and Systems	1st edition, Springer, 2022

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Clough & Penzien	Structural Dynamics	2nd edition, McGraw-Hill, 1993
2	Timoshenko S, Weaver & Young	Vibration Problems in Engineering	5th edition, Wiley, 1990
3	Mario Paz & William Leigh	Structural Dynamics: Theory And Computation	5th edition, CBS publishers, 2004

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:** Head and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

ADICHUNCHANAGIRI UNIVERSITY

NAAC GRADE A+ ACCREDITED UNIVERSITY

1. Course Information

Section	Details
Course Title	Mechanics of Deformable Bodies
Course Code	24CSE141
Program	Structural Engineering
Academic Year/Semester	2024-25 /I Sem M.Tech
Course Type	☐Core ✓ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of stress–strain relations, equilibrium and compatibility, stress transformations, plane stress and strain, cylinder analysis, and fundamentals of plasticity.
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	3
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course introduces elasticity and plasticity concepts including stress–strain relations, transformations, plane stress/strain, and axisymmetric problems. It also covers stress analysis of cylinders, stress concentrations, and plasticity models with work-hardening and flow theories

2. Course Objectives

1. To make students to learn principles of Analysis of Stress and Strain.
2. To predict the stress-strain behavior of continuum.
3. To evaluate the stress and strain parameters and their inter relations of the continuum.

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, PO5,PO12
CO2	Understand the principles of stress-strain behavior of a continuum	L2	PO1, PO2, PO3, PO5,PO12
CO3	Design and develop analytical skills.	L2	PO1, PO2, PO3, PO5,PO12
CO4	Describe the continuum in 2 and 3 dimensions.	L2	PO1, PO2, PO3, PO5,PO12
CO5	Understand the concepts of elasticity and plasticity	L2	PO1, PO2, PO3, PO5,PO12

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	Theory of Elasticity Introduction: Definition of stress and strain and strain at a point, components of stress and strain at a point of Cartesian and polar coordinates. Constitutive relations, equilibrium equations, compatibility equations in 2-D and 3-D cases.	8	CO1
II	Transformation of stress and strain at a point, Principal stresses and principal strains, invariants of stress and strain, hydrostatic and deviatric stress, spherical and deviatric strainsmax. shear strain	8	CO2
III	Plane stress and plane strain Airy's stress function approach to 2-D problems of elasticity, simple problems of bending of beams. Solution of axisymmetric problems, stress concentration due to the presence of a circular hole in plates	8	CO3
IV	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.	8	CO4
V	Theory of Plasticity Introduction, Advantages of Plasticity, Stress–strain diagram in simple tension, perfectly elastic, Rigid Perfectly plastic, Linear work–hardening, Elastic-Perfectly plastic, Elastic Linear work-hardening materials, Theories of plastic flow.	8	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	-	-	-	-	-	-	1
CO2	3	3	3	-	2	-	-	-	-	-	-	1
CO3	3	3	3	-	2	-	-	-	-	-	-	1
CO4	3	3	3	-	2	-	-	-	-	-	-	1
CO5	3	3	3	-	2	-	-	-	-	-	-	1

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

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Technical talk on Theory of Elasticity

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	S. P. Timoshenko & J. N. Goodier,	Theory of Elasticity	3rd Edition, McGraw-Hill, 1970
2	L. S. Srinath	Advanced Mechanics of Solids,	4th Edition, Tata McGraw-Hill, 3rd Edition, 2008

3	Sadhu Singh,	Theory of Elasticity,	4th edition, Khanna Publishers, ,2024
4	P. D. S. Verma	Theory of Elasticity,	1st edition, Vikas Publishing Pvt. Ltd
5	W. P. Chen & D. J. Hendry	Plasticity for Structural Engineers,	1st edition, Springer -reissued by J. Ross Publishing in 2007
6	C. Valliappan	Continuum Mechanics Fundamentals,	1st edition, Oxford IBH Publishing Co. Ltd 1981
7	Sadhu Singh	Applied Stress Analysis,	4th Edition, Khanna Publishers - 2000

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	R.C. Hibbeler	Mechanics of Materials	10th Edition. Pearson, 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: Dr. Mahalingegowda H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Associate Professor	**Designation:** Head and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

ADICHUNCHANAGIRI UNIVERSITY

NAAC GRADE A+ ACCREDITED UNIVERSITY

1. Course Information

Section	Details
Course Title	Optimization Techniques
Course Code	24CSE142
Program	Structural Engineering
Academic Year/Semester	2024-25 /II Sem M.Tech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of engineering mathematics, calculus, linear algebra, differential equations, numerical methods, and fundamentals of structural analysis.
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	4
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course introduces optimization concepts and their applications in engineering, focusing on formulating structural optimization problems. It covers classical, linear, nonlinear, and constrained optimization methods including simplex, penalty functions, Lagrange multipliers, and search techniques. Students also learn advanced methods such as geometric and dynamic programming for solving structural engineering problems.

2. Course Objectives

1. To learn principles of optimization,
2. To implement the optimization Concepts for the structural engineering problems.
3. To evaluate different methods of optimization.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Achieve Knowledge of design and development of problem solving skills.	L2	PO1, PO2, PO3, PO4,PO12
CO2	Understand the principles of optimization	L2	PO1, PO2, PO3, PO4,PO12
CO3	Design and develop analytical skills	L4	PO1, PO2, PO3, PO4,PO12
CO4	Summarize the Linear, Non-linear and Geometric Programming	L2	PO1, PO2, PO3, PO4,PO12

CO5	Understands the concept of Dynamic programming	L2	PO1, PO2, PO3, PO4, PO12

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	Introduction: Introduction to optimization, engineering applications of optimization, Formulation of structural optimization problems as programming problems. Optimization Techniques: Classical optimization techniques, single variable optimization, multivariable optimization with no constraints, unconstrained minimization techniques and algorithms constrained optimization solutions by penalty function techniques, Lagrange multipliers techniques and feasibility techniques.	8	CO1
II	Linear Programming: Linear programming, standard form of linear programming, geometry of linear programming problems, solution of a system of linear simultaneous equations, pivotal production of general systems of equations, simplex algorithms, revised simpler methods, duality in linear programming.	8	CO2
III	Non-linear programming: Non-linear programming, one dimensional minimization methods, elimination methods, Fibonacci method, golden section method, interpolation methods, quadratic and cubic methods, Unconstrained optimization methods, direct search methods, random search methods, descent methods	8	CO3
IV	Constrained optimization techniques such as direct methods, the complex methods, cutting plane method, exterior penalty function methods for structural engineering problems. Formulation and solution of structural optimization problems by different technique	8	CO4
V	Geometric programming: Geometric programming, conversion of NLP as a sequence of LP/ geometric programming. Dynamic programming: Dynamic programming conversion of NLP as a sequence of LP/ Dynamic programming	8	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	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	1
CO4	3	3	3	2	-	-	-	-	-	-	-	1
CO5	3	3	3	2	-	-	-	-	-	-	-	1

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

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Technical Talk on LPP

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Spunt	Optimum Structural Design	1st edition, Prentice Hall 1971
2	S. S. Rao,	Optimization	1st edition, Theory and Practice, Wiley Eastern Ltd. 1979
3	Uri Kirsch,	Optimum Structural Design	1st edition, McGraw-Hill Hill 1981
4.	Richard Bronson,	Operations Research	1st edition, Schaum's Outline Series 1981
5.	S. S. Bhavikatti,	Structural Optimization Using Sequential Linear Programming	1st edition, Vikas Publishing House 2003

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1.	K. P. Chong & Stanislaw H. Zak	An Introduction to Optimization	4th edition, Wiley4th Ed., 2013

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: Dr. Mahalingegowda H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Associate Professor	**Designation:** Head and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Design of Masonry Structures
Course Code	24CSE143
Program	Structural Engineering
Academic Year/Semester	2024-25 /II Sem M.Tech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of engineering mathematics, calculus, linear algebra, differential equations, and numerical methods
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	3
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course covers masonry materials, behavior under compression, flexure, and shear, and design of load-bearing masonry buildings as per BIS codes. It also introduces earthquake-resistant masonry and the structural concepts of arches, domes, and vaults.

2. Course Objectives

1. The objective of this course is to make students to learn performance of masonry structures,
2. To design the masonry structures for earthquake resistance.
3. To evaluate the strength and stability of the masonry 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,PO12
CO2	Understand the principles of design and construction of masonry structures	L2	PO1, PO2, PO3, PO4,PO12
CO3	Design and develop analytical skills.	L4	PO1, PO2, PO3, PO4,PO12
CO4	Summarize the masonry Characteristics	L3	PO1, PO2, PO3, PO4,PO12
CO5	Evaluate the strength and stability of the masonry structures	L5	PO1, PO2, PO3, PO4,PO12

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	Introduction, Masonry units, materials and types: History of masonry Characteristics of Brick, stone, clay block, concrete block, stabilized mud block masonry units – strength, modulus of elasticity and water absorption. Masonry materials –Classification and properties of mortars, selection of mortars.	8	CO1
II	Strength of Masonry in Compression: Behaviour of Masonry under compression, strength and elastic properties, influence of masonry unit and mortar characteristics, effect of masonry unit height on compressive strength, influence of masonry bonding patterns on strength, prediction of strength of masonry in Indian context, Failure theories of masonry under compression. Effects of slenderness and eccentricity, effect of rate of absorption, effect of curing, effect of ageing, workmanship on compressive strength	8	CO2
III	Flexural and shear bond, flexural strength and shear strength: Bond between masonry unit and mortar, tests for determining flexural and shear bond strengths, factors affecting bond strength, effect of bond strength on compressive strength, orthotropic strength properties of masonry in flexure, shear strength of masonry, test procedures for evaluating flexural and shear strength	8	CO3
IV	Design of load bearing masonry buildings: Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses, Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels; Wall carrying axial load, eccentric load with different eccentricity ratios, wall with openings, freestanding wall; Design of load bearing masonry for buildings up to 3 to 8 storeys using BIS codal provisions	8	CO4

V	Earthquake resistant masonry buildings: Behaviour of masonry during earthquakes, concepts and design procedure for earthquake resistant masonry, BIS codal provisions. Masonry arches, domes and vaults: Components and classification of masonry arches, domes and vaults, historical buildings, construction procedure	8	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	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	1
CO4	3	3	3	2	-	-	-	-	-	-	-	1
CO5	3	3	3	2	-	-	-	-	-	-	-	1

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

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Site visit to Masonry structures

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	**A**. W. Hendry	Structural Masonry, Macmillan Education Ltd.	2nd Edition, Red Globe Press, 1998
2	A. W. Hendry B. P. Sinha & S. R. Davies	Design of Masonry Structures	3rd Edition, E & FN Spon Taylor & Francis, 2004
3	P. Dayaratnam	Brick and Reinforced Brick Structures	Oxford & IBH Publishing Co.2017
4	W. G. Curtin, G. Shaw & J. K. Beck	Design of Reinforced and Prestressed Masonry,	Thomas Telford Ltd., 1988
5	Sven Sahlin	Structural Masonry	1st Edition, Prentice Hall, 1971
6	K. S. Jagadish, B. V. Venkatarama Reddy & K. S. Nanjunda Rao	Alternative Building Materials and Technologies,	1st Edition, New Age International 2007
7	IS 1905, Bureau of Indian Standards, New Delhi		
8	SP 20 (S&T), Bureau of Indian Standards, New		

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Ramamurtham S.	Design of Reinforced Masonry Structures	1st Edition, , Dhanpat Rai Publications, 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, Semester End 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. B N Shobha
Designation: Associate Professor	**Designation:** Head and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	GREEN BUILDING TECHNOLOGY
Course Code	24CSE144
Program	Structural Engineering
Academic Year/Semester	2024-25 /II Sem M.Tech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of engineering mathematics, structural analysis, construction materials, and building construction practices.
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	3
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course covers energy use in buildings, addressing indoor environmental needs, climate influence, solar radiation, and building envelope performance. It also introduces energy auditing, targeting, and management options for improving efficiency

2. Course Objectives

1. Exposure to the green building technologies and their significance.
2. Understand the judicial use of energy and its management.
3. Educate about the Sun-earth relationship and its effect on climate.
4. Enhance awareness of end-use energy requirements in the society.
5. Develop suitable technologies for energy management.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped

CO1	Identify the functional role of ingredients of concrete and apply this knowledge to mixdesign philosophy.	L3	PO1, PO2, PO3, PO4,PO5,PO12,
CO2	Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete for special properties.	L2	PO1, PO2, PO3, PO4, PO5,PO12,
CO3	Evaluate the effect of the environment on service life performance, properties and failure of structural concrete and demonstrate techniques of measuring the Non Destructive Testing of concrete structure.	L5	PO1, PO2, PO3, PO4, PO5,PO12,
CO4	Understand the concepts, mix proportioning and methods of special concreting operations	L3	PO1, PO2, PO3, PO4, PO5,PO12,

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	Introduction, Masonry units, materials and types: History of masonry Characteristics of Brick, stone, clay block, concrete block, stabilized mud block masonry units – strength, modulus of elasticity and water absorption. Masonry materials –Classification and properties of mortars, selection of mortars.	8	CO1
II	Strength of Masonry in Compression: Behaviour of Masonry under compression, strength and elastic properties, influence of masonry unit and mortar characteristics, effect of masonry unit height on compressive strength, influence of masonry bonding patterns on strength, prediction of strength of masonry in Indian context, Failure theories of masonry under compression. Effects of slenderness and eccentricity, effect of rate of absorption, effect of curing, effect of ageing, workmanship on compressive strength	8	CO2
III	Flexural and shear bond, flexural strength and shear strength: Bond between masonry unit and mortar, tests for determining flexural and shear bond strengths, factors affecting bond strength, effect of bond strength on compressive strength, orthotropic strength properties of masonry in flexure, shear strength of masonry, test procedures for evaluating flexural and shear strength	8	CO3
IV	Design of load bearing masonry buildings: Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses, Effective height of walls and columns, opening in walls,	8	CO4

	effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels; Wall carrying axial load, eccentric load with different eccentricity ratios, wall with openings, freestanding wall; Design of load bearing masonry for buildings up to 3 to 8 storeys using BIS codal provisions		
V	Earthquake resistant masonry buildings: Behaviour of masonry during earthquakes, concepts and design procedure for earthquake resistant masonry, BIS codal provisions. Masonry arches, domes and vaults: Components and classification of masonry arches, domes and vaults, historical buildings, construction procedure	8	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	1	-	-	-	-	-	-	1
CO2	3	3	3	2	1	-	-	-	-	-	-	1
CO3	3	3	3	2	2	-	-	-	-	-	-	1
CO4	3	3	3	2	1	-	-	-	-	-	-	1
CO5	3	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	Technical Talk on Green Building Audit

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Edward Bryant	Natural Hazards	2nd Edition, Cambridge University Press, 2nd Edition, 2005
2	W. Nick Carter	Disaster Management: A Disaster Manager's Handbook	1st Edition, Asian Development Bank, 1992
3	Pardeep Sahni, Alka Dhameja & Uma Medury (eds.)	Disaster Mitigation: Experiences and Reflections	1st Edition, Prentice Hall of India, 2001
4	Edward Bryant,	Natural Hazards	2nd Edition, Cambridge University Press, 2000

8. Reference Books

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: Dr. Mahalingegowda H R	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Associate Professor	**Designation:** Head and Associate Professor	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Research Methodology & IPR
Course Code	24RMI15
Program	Civil Engineering
Academic Year/Semester	2024-25 /I Sem M.Tech
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Statistics, analytical & writing skills, basic understanding of innovation, legal/ethical awareness, and documentation ability.
Contact Hours per Week	Lecture: 3 Tutorial: 0 Practical: 0 Total: 3
Credits	3
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course introduces the fundamentals of research methodology and intellectual property rights (IPR). It equips students with skills in research design, data collection, analysis, and report writing, while providing insights into patents, copyrights, trademarks, and related legal frameworks. The course emphasizes ethical research practices and the protection of innovations through IPR.

2. Course Objectives

1. To give an overview of the research methodology and explain the technique of defining a research problem
2. To explain carrying out a literature search, its review, developing theoretical and conceptual frame works and writing a review.
3. To explain the details of sampling designs, and also different methods of data collections.
4. To explain the art of interpretation and the art of writing research reports.
5. To explain various forms of the intellectual property, its relevance and business impact in the changing global business environment.
6. To discuss leading International Instruments concerning Intellectual Property Rights.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Discuss research methodology and the technique of defining a research problem	L2	PO1, PO2,PO12.

CO2	Explain the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and writing a review.	L2	PO1, PO2, PO3, PO12.
CO3	Explain various research designs and their characteristics.	L2	PO1, PO2, PO3, PO12.
CO4	Explain the art of interpretation and the art of writing research reports	L2	PO1, PO2, PO3, PO12.
CO5	Discuss various forms of the intellectual property, its relevance and business impact in the changing global business environment and leading International Instruments concerning IPR.	L2	PO1, PO2, PO3, PO12.

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	**Research Methodology:** Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.	8	CO1
II	**Procedural Statements and Routines:** **Defining the Research Problem:** Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration. **Reviewing the literature:** Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.	8	CO2
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, Basic Principles of Experimental Designs, Important Experimental Designs. **Design of Sample Surveys:** Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.	8	CO3
IV	**Data Collection**:	8	CO4

	Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method. **Interpretation and Report Writing:** Meaning of Interpretation, Technique of Interpretation, Precautions in Interpretation, Significance of Report Writing, Different Steps in Writing Report of a Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports		
V	**Intellectual Property:** The Concept, Intellectual Property System in India, Development of TRIPS Complied Regime in India, Patents Act, 1970, Trade Mark Act, 1999,The Designs Act, 2000, The Geographical Indications of Goods (Registration and Protection) Act1999, Copyright Act,1957,The Protection of Plant Varieties and Farmers' Rights Act, 2001,The Semi-Conductor Integrated Circuits Layout Design Act, 2000, Trade Secrets, Utility Models, IPR and Biodiversity, The Convention on Biological Diversity (CBD) 1992, Competing Rationales for Protection of IPRs, Leading International Instruments Concerning IPR, World Intellectual Property Organisation (WIPO),WIPO and WTO, Paris Convention for the Protection of Industrial Property, National Treatment, Right of Priority, Common Rules, Patents, Marks, Industrial Designs, Trade Names, Indications of Source, Unfair Competition, Patent Cooperation Treaty (PCT), Advantages of PCT Filing, Berne Convention for the Protection of Literary and Artistic Works, Basic Principles, Duration of Protection, Trade Related Aspects of Intellectual Property Rights(TRIPS) Agreement, Covered under TRIPS Agreement, Features of the Agreement, Protection of Intellectual Property under TRIPS, Copyright and Related Rights, Trademarks, Geographical indications, Industrial Designs, Patents, Patentable Subject Matter, Rights Conferred, Exceptions, Term of protection, Conditions on Patent Applicants, Process Patents, Other Use without Authorization of the Right Holder, Layout-Designs of Integrated Circuits, Protection of Undisclosed Information, Enforcement of Intellectual Property.	8	CO5

5. CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	2
CO2	3	3	3	-	-	-	-	-	-	-	-	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	Group Discussion: Why is research output in India lower compared to developed countries

7. Textbooks

Sl.No	Author(s)	Title	Publisher & Year
1	C. R. Kothari, Gaurav Garg.	Research Methodology: Methods and Techniques,	4th Edition, New Age International, 2018.
2	Ranjit Kumar	Research Methodology: A Step-by-Step Guide for Beginners *(*for the topic Reviewing the Literature under Module 2*)*.	3rd Edition, SAGE Publications Ltd., 2011.
3	The Institute of Company Secretaries of India	Professional Programme: Intellectual Property Rights, Law and Practice *(*Study Material for the topic Intellectual Property under Module 5).	Statutory Body under an Act of Parliament, September 2013.

8. Reference Books

Sl.No	Author(s)	Title	Publisher & Year
1	Trochim	Research Methods: the concise knowledge base.	Atomic Dog, Publishing 2005
2	Fink	A Conducting Research Literature Reviews: From Internet to Paper.	5th edition, SAGE Publications, 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, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

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

1. Course Information

Section	Details
Course Title	Structural Engineering Lab-I
Course Code	24CSEL16
Program	Structural Engineering
Academic Year/Semester	2025-2026 / I sem M.Tech
Course Type	☐ Core ☐ Elective ✔Lab
Contact Hours per Week	Lecture: 0 Tutorial: 0 Practical: 3 Total: 3
Credits	2
W.e.f	2024-25
Approved in AC on	September -2024
Course Description	This laboratory course provides hands-on experience in evaluating the behaviour and performance of structural elements and materials through experimental methods. Students will conduct tests on structural components such as beams, columns, trusses, and frames to study their strength, stiffness, deflection, and failure mechanisms. The course emphasizes understanding load–deformation behaviour, stress distribution, and structural responses under different loading conditions. Experiments are designed to validate theoretical concepts learned in structural analysis and design courses. The laboratory also familiarizes students with the use of testing equipment, data acquisition systems, and standard codes, enhancing their ability to analyze, interpret, and present experimental results.

2. Course Objectives

1) The objective of this course is to make students to learn principles of design of experiments.
2) To investigate the performance of the structural elements.
3) To evaluate the different testing methods and equipment's.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Achieve Knowledge of design and development of experimenting skills.	2	PO1, PO2, PO3, P04, PO5
CO2	Understand the principles of design of experiments	2	PO1, PO2, P03, PO4, PO5
CO3	Design and develop analytical skills.	3	PO1, PO2, PO3, P04, PO5

CO4	Summarize the testing methods and equipment's	3	PO1, PO2, PO3, P04, PO5

4. Course Content

Sl. No	Experiment	Hours	COs
1	Experiments on Self-Compacting Concrete, including Mix Design.	10	CO1
2	Testing of beams for deflection, flexure and shear.	10	CO2
3	Experiments on vibration of multi-storey frame models for Natural frequency and modes.	10	CO3
4	Use of Non-destructive testing (NDT) equipment's – Rebound hammer, Ultra sonic pulse velocity meter and Profometer.	10	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	2	-	-	-	-	-	-	-
CO2	3	3	2	3	2	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	2	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	Technical Talk on Self-Compacting Concrete

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	10
Record	40
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. Amith B J	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr. B N Shobha
Designation: Assistant Professor	**Designation:** Head and Associate Professor	**Designation:** Director, IQAC	**Designation:** Principal & Dean
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Advanced Design of Steel Structures
Course Code	24CSE21
Program	Structural Engineering
Academic Year/Semester	2024-2025/ II Sem MTech
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Basic knowledge of Steel Structure Design and Structural Analysis
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	4
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course provides advanced knowledge of designing hot-rolled and cold-formed steel structures, focusing on laterally unrestrained beams, beam-columns, steel beams with web openings, cold-formed sections, and fire resistance. It covers design provisions per IS codes, structural behaviour under various conditions, and applications such as pre-engineered buildings and solar panel structures. The curriculum emphasizes theoretical understanding, analytical skills, and practical design applications for complex steel structures.

2. Course Objectives

1. Understand the background to the design provisions for hot-rolled and cold-formed steel structures, including the main differences between them.
2. Proficiency in applying the provisions for design of columns, beams, beam columns.
3. Design structural sections for adequate fire resistance

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Able to understand behaviour of Light gauge steel members	L3	PO1, PO2, PO4
CO2	Able to understand design concepts of cold-formed/unrestrained beams	L4	PO1, PO2, PO3, PO5

CO3	Able to understand Fire resistance concept required for present days.	L4	PO1, PO2, PO3, PO5
CO4	Able to analyze beam-column behaviour.	L4	PO1, PO2, PO3, PO4, PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Laterally Unrestrained Beams:** Lateral Buckling of Beams, Factors affecting lateral stability, IS 800 code provisions, Design Approach. Lateral buckling strength of Cantilever beams, continuous beams, beams with continuous and discrete lateral restraints, Mono-symmetric and non-uniform beams –Design Examples. Solar panel steel structure introduction, Importance of steel structures in solar panel, Types Design considerations materials used in solar panel steel structures manufacturing process installation process advantages, future trends and innovations.	10	CO2
II	**Beam- Columns in Frames:** Behaviour of Short and Long Beam - Columns, Effects of Slenderness Ratio and Axial Force on Modes of Failure, Biaxial bending, Strength of Beam Columns, Sway and Non-Sway Frames, Strength and Stability of rigid jointed frames, Effective Length of Columns- Methods in IS 800 – Examples	10	CO4
III	**Steel Beams with Web Openings:** Shape of the web openings, practical guidelines, and Force distribution and failure patterns. Analysis of beams with perforated thin and thick webs, Design of laterally restrained castellated beams for given sectional properties. Vierendeel girders (design for given analysis results)	10	CO2
IV	**Cold-formed steel sections:** Techniques and properties, Advantages, Typical profiles, Stiffened and unstiffened elements, Local buckling effects, effective section properties, IS 801& 811 code provisions numerical examples, beam design, column design.	10	CO1
V	**Fire resistance:** Fire resistance level, Period of Structural Adequacy, Properties of steel with temperature, Limiting Steel temperature, Protected and unprotected members, Methods of fire protection, Fire resistance Ratings. Numerical Examples of Undisclosed Information, Enforcement of Intellectual Property **Pre-Engineered Buildings** Introduction Advantages - Pre-Engineered Buildings Vs Conventional Steel Buildings - Design of Pre-Engineered Buildings (PEB) Applications.	10	CO3

5. CO–PO Mapping Matrix

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

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

6. Details of Practical Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Technical Talk on Steel Structures for Solar Panels

7. Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	N. Subramanian	Design of Steel Structures	1st Edition Oxford University Press (India), 2008
2	Duggal S K	Design of Steel Structures	4th Edition Tata McGraw-Hill Education, 2008
3	Bureau of Indian Standards (BIS). IS 800:2007	General Construction in Steel – Code of Practice	New Delhi, 2007
4	IS 801-2010	Code of Practice for Use of Cold-Formed Light Gauge Steel Structural Members in General Building Construction	New Delhi, 2010.
5	IS 811-1987	Cold-Formed Light Gauge Structural Steel Sections – Specification	New Delhi, 1987

8. Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	BS 5950 Part-8	BS 5950-8: Structural use of steelwork in building	London, 2003.
2	SP 6 (5)-1980	Handbook for Structural Engineers	New Delhi, 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: Mr. Sachin M S	**Name**: Dr. Shruthi R	**Name:** Dr. M Shankar	**Name**: Dr. Shobha B N
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	Finite Element Method of Analysis
Course Code	24CSE22
Program	Structural Engineering
Academic Year/Semester	2024-25 / 1st Sem
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite	Basics of Engineering mechanics, strength of materials and matrix algebra**.**
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	04
W.e.f	2024-25
Approved in AC on	Sep 2024
Course Description	This course introduces the fundamental concepts of elasticity and the finite element method (FEM), emphasizing its advantages, limitations, and applications in structural engineering. Students will learn finite element procedures, shape functions, and interpolation techniques for one, two, and three-dimensional problems, along with the development of strain-displacement and stiffness matrices. The course covers isoparametric elements, numerical integration, mesh refinement, node numbering, and convergence criteria for accurate structural modeling. Applications to trusses, beams, plates, shells, and nonlinear structural systems are explored using both analytical and computational approaches. Students will also gain exposure to FEM software, enabling them to analyze real-world structural problems effectively.

2. Course Objectives

1. To provide the fundamental concepts of the theory of the finite element method.
2. To develop proficiency in the application of the finite element method (modeling, analysis, and interpretation of results) to realistic engineering problems through the use of softwares.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the basic theory behind the finite element method.	L2	PO1, PO2, PO3
CO2	Formulate force-displacements relations for 2-D elements	L3	PO1, PO2, PO5
CO3	Use the finite element method to analyze structural members.	L4	PO1, PO2, PO4, PO5,PO11

CO4	Use a Finite Element based program for structural analysis.	L5	PO1, PO2, PO4, PO5, PO11

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Basic concepts of elasticity, finite element method: advantages and disadvantages, applications, Finite element procedure, Finite elements used for one, two and three dimensional problems, principle of minimum potential energy, Element aspect ratio, Mesh refinement vs. higher order elements, Numbering of nodes to minimize bandwidth	10	CO1
II	Nodal displacement parameters, Convergence criterion, Compatibility requirements, Geometric invariance, Shape function, Polynomial form of displacement function, shape functions for one, two & three dimensional elements using polynomials and lagrange's interpolation functions (cartesian and natural coordinate system only), Hermite shape function for beam element	10	CO2
III	Development of strain-displacement matrix and stiffness matrix for finite elements. Isoparametric elements, Internal nodes and higher order elements, Serendipity and Lagrangian family of Finite Elements, Sub-parametric and Super- parametric elements, Condensation of internal nodes, Jacobian transformation Matrix, consistent load vector, numerical integration.	10	CO2
IV	Element stiffness matrix for plane truss element and beam element, Analysis of plane trusses and beams using FEM approach.	10	CO3
V	Application to Plates & Shells, Techniques to solve non linearities in structural systems; material, geometric and combined non linearity, incremental and iterative techniques. Choice of displacement function (C0, C1 and C2 type), Structure of computer program for FEM analysis, exposure to FEM softwares.	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	2	-	-	2	-	-	-	-	-	-	-
CO3	3	3	-	2	3	-	-	-	-	-	1	-
CO4	3	2	-	2	3	-	-	-	-	-	1	-

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

6. Details of Practical Sessions

Practical	Title of Experiment / Activity
1	Technical Talk on FEA softwares

7. Textbook

S. No.	Author(s)	Title	Publisher & Year
1	Zeinkeiwich, O.C. and Tayler R.L	The Finite Element Method for Solid and Structural Mechanics	Butterworth Heinemann, 2013
2	Krishnamoorthy C.S	Finite Element Analysis: Theory and programming	Tata McGraw Hill Publishing Co. Ltd., 2017
3	Reddy, J	An Introduction to Finite Element Methods	McGraw Hill Co., 2013
4	Bathe K J	Finite Element Procedures in Engineering Analysis	Prentice Hall

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Cook R.D, Malkas, D.S. and Plesha M.E	Concepts and applications of Finite Element Analysis	John Wiley and Sons., 2007
2	Desai C., and Abel J. F	Introduction to the Finite Element Method: A Numerical method for Engineering Analysis	East West Press Pvt. Ltd., 1972

8. 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:**

ADICHUNCHANAGIRI UNIVERSITY

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1. Course Information

Section	Details
Course Title	Earthquake Resistant Structures
Course Code	24CSE23
Program	Structural Engineering
Academic Year/Semester	2024-25 /II Sem M.Tech
Course Type	✓ Core ☐ Elective ☐ Lab
Prerequisite (If any)	Understanding guidelines of IS 1893 (Part 1): 2016, IS 13920: 2016
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	4
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course introduces the fundamentals of engineering seismology and earthquake hazards in India. It emphasizes seismic analysis, response spectra, and codal procedures for computing seismic forces. Students learn structural configuration, ductile detailing, and design of earthquake-resistant RC and masonry buildings.

2. Course Objectives

1. To make students to learn principles of engineering seismology
2. To design the reinforced concrete buildings for earthquake resistance.
3. To evaluate the seismic response 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.	L2	PO1, PO2, PO3, PO5,PO12
CO2	Understand the principles of engineering seismology	L2	PO1, PO2, PO3, PO5,PO12
CO3	Design and develop analytical skills	L4	PO1, PO2, PO3, PO5,PO12
CO4	Summarize the Seismic evaluation and retrofitting of structures.	L2	PO1, PO2, PO3, PO5,PO12
CO5	Understand the concepts of earthquake resistance of reinforced concrete buildings	L2	PO1, PO2, PO3, PO5,PO12

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	MODULE – 1 Introduction to engineering seismology, Geological and tectonic features of India, Origin and propagation of seismic waves, characteristics of earthquake and its quantification – Magnitude and Intensity scales, seismic instruments. Earthquake Hazards in India, Earthquake Risk Evaluation and Mitigation. Structural behavior under gravity and seismic loads, Lateral load resisting structural systems, Requirements of efficient earthquake resistant structural system, damping devises, base isolation systems.	8	CO1
II	MODULE – 2 The Response history and strong motion characteristics. Response Spectrum – elastic and inelastic response spectra, tripartite (D-V-A) response spectrum, use of response spectrum in earthquake resistant design. Computation of seismic forces in multi-storied buildings – using procedures (Equivalent lateral force and dynamic analysis) as per IS-1893.	8	CO2
III	MODULE – 3 Structural Configuration for earthquake resistant design, Concept of plan irregularities and vertical irregularities, Soft storey, Torsion in buildings. Design provisions for these in IS- 1893. Effect of infill masonry walls on frames, modeling concepts of infill masonry walls. Behavior of masonry buildings during earthquakes, failure patterns, strength of masonry in shear and flexure, Slenderness concept of masonry walls, concepts for earthquake resistant masonry buildings – codal provisions.	8	CO3
IV	MODULE – 4 Design of Reinforced concrete buildings for earthquake resistance-Load combinations, Ductility and energy absorption in buildings. Confinement of concrete for ductility, designof columns and beams for ductility ductile detailing provisions as per IS1893. Structural behavior, design and ductile detailing of shear walls.	8	CO4
V	MODULE – 5 Seismic response control concepts – Seismic demand, seismic capacity, Overview of linear and nonlinear procedures of seismic analysis. Performance Based Seismic Engineering methodology, Seismic evaluation and retrofitting of structures.	8	CO5

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	-	1	-	-	-	-	-	-	2
CO3	3	3	3	-	2	-	-	-	-	-	-	2
CO4	2	2	2	-	2	-	-	-	-	-	-	3
CO5	3	2	3	-	2	-	-	-	-	-	-	2

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

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	Seismic test on MDOF system using Unidirectional Shaking Table

7. Textbooks

1	Anil K. Chopra	Dynamics of Structures – Theory and Application to Earthquake Engineering	(2nd ed.) Pearson Education- 2001
2	Vinod Hosur	Earthquake Resistant Design of Building Structures	Wiley India- 2009
3	Duggal S.K.	Earthquake Resistant Design of Structures	Oxford University Press- 2013
4.	Pankaj Agarwal & Manish Shrikhande	Earthquake Resistant Design of Structures	PHI Learning Pvt. Ltd.-2006
5.	Bureau of Indian Standards	IS 1893 (Part I): 2002, IS 13920: 1993, IS 4326: 1993, IS 13828: 1993- BIS (New Delhi), 1993–2002	
6.	Minoru Wakabayashi	Design of Earthquake Resistant Buildings	McGrawHill Publishing,1986

8. Reference Books

1	T Paulay	Seismic Design of Reinforced Concrete and Masonry Buildings	John Wiley & Sons, Inc., New York.1992

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: 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	Advanced Design of Pre-Stressed Concrete Structures
Course Code	24CSE241
Program	Structural Engineering
Academic Year/Semester	2025-2026 / 2nd Semester
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite	Material Science, Material Testing Lab
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W. e. f	2024-25
Approved in AC on	September -2024
Course Description	This course provides in-depth knowledge and analytical skills in the design and behavior of pre-stressed concrete structures. It covers advanced concepts of pre-stressing methods, losses of pre-stress, stress analysis, and design principles in accordance with relevant codes and standards. Students will study the flexural and shear behavior of pre-stressed members, anchorage systems, end block design, and deflection control. Special emphasis is given to the design of continuous beams, composite construction, bridges, and statically indeterminate structures. The course also addresses serviceability, durability, and performance criteria of modern pre-stressed structures with case studies and applications in infrastructure projects.

2. Course Objectives

1. Design pre-stressed elements
2. Understand the behavior of pre-stressed elements.
3. Understand the behavior of pre-stressed sections

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understands the concept of Serviceability and Durability	3	PO1,PO2,P03,PO4,
CO2	Analyse , Design and detail PSC elements	2	PO1,PO2,P03, PO5

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Loss of prestress in pre-tensioned and post tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of steel, slip in anchorage, bending of member and frictional loss –Analysis of sections for flexure.	08	CO1
II	**Design of Section for Flexure** Allowable stresses, Elastic design of simple beams having rectangular and I-section for flexure, kernlines, cable profile and cable layout. Design of Sections for Shear Shear and Principal stresses, Improving shear resistance by different pre stressing techniques horizontal, sloping and vertical prestressing, Analysis of rectangular and I– beam, Design of shear reinforcement, Indian code provisions.	08	CO1
III	**Deflections of Prestressed Concrete Beams** Short term deflections of uncracked members, Prediction of long-term deflections, load– deflection curve for a PSC beam, IS code requirements for maximum deflections.	08	CO2
IV	**Transfer of Prestress in Pretensioned Members** Transmission of prestressing force by bond, Transmission length, Flexural bond stresses,IS code provisions, Anchorage zone stresses in post tensioned members, stress distribution in End block, Anchorage zone reinforcements	08	CO2
V	**Statically Indeterminate Structures** Advantages and disadvantages of continuous PSC beams, Primary and secondarymoments, P and C lines, Linear transformation, concordant and non-concordant cable profiles, Analysis of continuous beams.	08	CO2

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	-	3	-	-	-	-	-	-	-

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

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

Practical	Title of Experiment / Activity
1	Demonstration (with diagrams) of horizontal, sloping, and vertical prestressing techniques.

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Srinath. L.S	Advanced Mechanics of Solids	3rd EditionTata McGraw-Hill Publishing Delhi Co ltd., NewDelhi 2019

2	Krishna Raju	"Prestressed concrete"	6th EditionTMH publications, New Delh Tata Mc Graw Hill Book – Co ., New Delhi i-2020

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	T.Y. Lin and Burn	Design of pre stress concrete structures	3rd Edition (Wiley): January 16, 1991 John Wiley, New York
2	S. Ramamrutham	Pre stressed concrete"	5th Edition Dhanpat Rai Publishing Company Pvt. Ltd. 2013 Dhanpat Rai & Sons, 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, Semester End Exams.
Indirect	Course Exit Survey, Student Feedback

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

1. Course Information

Section	Details
Course Title	Stability of Structures
Course Code	24CSE242
Program	Structural Engineering
Academic Year/Semester	2025-26/2nd Sem
Course Type	☐ Core ✔Elective ☐ Lab
Prerequisite	Structural Analysis, Advanced Mechanics of Solids.
Contact Hours per Week	Lecture: 04 Tutorial: 00 Practical: 00 Total: 04
Credits	3
W.e.f	2024-25
Approved in AC on	September 2024
Course Description	The course deals with the fundamental principles of stability of structural elements. It focuses on stability analysis of beam-columns, frames, continuous beams, and plates subjected to axial and lateral loads. It also introduces finite element methods in stability analysis, lateral buckling of beams, torsion in thin-walled members, and energy methods. Applications include advanced analysis of beams, frames, and plates used in real structural systems.

2. Course Objectives

This course will enable students to,
1. Fundamental principles related to stability of structures.
2. Concepts of stability in different structural elements.
3. Application of strain energy in plate bending and stability.
4. Introduction to finite element approach in stability analysis.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain stability behavior of beam-columns under different load conditions.	L2	PO1, PO2
CO2	Apply energy methods for stability analysis of frames and continuous beams.	L3	PO1, PO2
CO3	Analyze stability of structural members using finite element approach.	L4	PO1, PO2, PO3
CO4	Explain lateral buckling and torsional behavior of beams.	L2	PO1, PO2

CO5	Evaluate buckling behavior of plates under different loading conditions.	L3	PO1, PO2, PO3

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Beam – Column:** Differential equation. Beam column subjected to (i) lateral concentrated load, (ii) several concentrated loads, (iii) continuous lateral load. Application of trigonometric series, Euler's formulation using fourth order differential equation for pined – pined, fixed – fixed, fixed –free and fixed – pinned column.	8	CO1
II	**Buckling Of Frames & Continuous Beams:** Elastic Energy method: Approximate calculation of critical loads for a cantilever. Exact critical load for hinged – hinged column using energy approach. Buckling of bar on elastic foundation. Buckling of cantilever column under distributed loads. Determination of critical loads by successive approximation. Bars with varying cross section. Effect of shear force on critical load. Column subjected to pulsating forces.	8	CO2
III	**Stability Analysis By Finite Element Approach:** Derivation of shape function for a two nodded Bernoulli–Euler beam element (lateral and translation of) – element stiffness and element geometric stiffness matrices – assembled stiffness and geometric stiffness matrices for a discretized column with different boundary condition – calculation of critical loads for a discretized (two elements) column (both ends built in). Buckling of pin jointed frames (maximum of two active DOF) – symmetrical single bay portal frame.	8	CO3
IV	**Lateral Buckling Of Beams:** Differential equation –pure bending – cantilever beam with tip load – simply supported beam of I section subjected to central concentrated load. Pure Torsion of thin – walled bars of open cross section. Non – uniform Torsion of thin – walled bars of open cross section.	8	CO4
V	**Expression For Strain Energy In Plate Bending With In Plate Forces (Linear& Non – Linear):** Buckling of simply supported rectangular plate– uniaxial load and biaxial load. Buckling of uniformly compressed rectangular plate simply supported along two opposite sides perpendicular to the direction of compression and having various edge condition along the other two sides.	8	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	2	-	-	-	-	-	-	-	-	-

CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-

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

6. Details of Practicals Sessions

Practical	Title of Experiment / Activity
1	Presentation on lateral buckling and torsional behaviour of beams.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Timoshenko S.P & Gere J.M	Theory of Elastic Stability	2nd Edition, McGraw Hill, 2019.
2	Chajes A	Principles of Structural Stability Theory	1st Edition, Prentice Hall, 2019.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	L Bazant Z. P & Cedolin L	Stability of Structures: Elastic, Inelastic, Fracture, and Damage Theories.	1st Edition, World Scientific, 2021.
2	Brush, D. O. & Almroth, B. O	Buckling of Bars, Plates, and Shells.	1st Edition, McGraw Hill, 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: 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	Advances in Artificial intelligence
Course Code	24CSE243
Program	Structural Engineering
Academic Year/Semester	2025-26/2nd Sem
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite	Basics of programming and Mathematics
Contact Hours per Week	Lecture: 4 Tutorial:0 Practical: 0 Total:4
Credits	3
W.e.f	2024-25
Approved in AC on	September 2024
Course Description	The course introduces the concepts, techniques, and applications of Artificial Intelligence (AI). It emphasizes search strategies, knowledge representation, learning algorithms, natural language processing, and robotics. The objective is to enable students to understand AI principles and apply them to real-world problem-solving, especially in engineering applications.

2. Course Objectives

This course will enable students to,
1. Difference between optimal reasoning and human-like reasoning.
2. Concepts of state space representation, exhaustive and heuristic search, along with computational complexities.
3. Knowledge representation techniques and logical reasoning.
4. Applications of AI in game playing, theorem proving, expert systems, machine learning, NLP, and robotics.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Explain the foundations and basic principles of Artificial Intelligence including agents, environments, and search strategies.	L2	PO1, PO2
CO2	Apply knowledge representation schemes and logical reasoning for problem-solving.	L3	PO1, PO2, PO3, PO4
CO3	Analyze and implement learning techniques such as decision trees, neural networks, and probabilistic reasoning.	L4	PO1, PO2, PO3
CO4	Evaluate AI applications in natural language processing, speech, vision, and robotics.	L4	PO1, PO2, PO3, PO4, PO5

CO5	Demonstrate the use of AI programming tools for real-world Engineering problems.	L3	PO1, PO2, PO3, PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction:** Introduction of AI Foundations of AI, History of AI, Agents and environments, The nature of the Environment, Problem solving Agents, Problem Formulation, Search Strategies.	8	CO1
II	**Knowledge & Reasoning:** Knowledge-based Agents, Representation, Reasoning and Logic, Prepositional logic, First-order logic, Using First-order logic, Inference in First order logic, forward and Backward Chaining	8	CO2
III	**Learning:** Learning from observations, Forms of Learning, Inductive Learning, Learning decision trees, why learning works, Learning in Neural and Belief networks.	8	CO3
IV	**Practical Natural Language Processing:** Practical applications, Efficient parsing, Scaling up the lexicon, Scaling up the Grammar, Ambiguity, Perception, Image formation, Image processing operations for Early vision, Speech recognition and Speech Synthesis.	8	CO4
V	**Robotics:** Introduction, Tasks, parts, effectors, Sensors, Architectures, Configuration spaces, Navigation and motion planning, Introduction to AI based programming Tools.	8	CO5

5. CO–PO Mapping Matrix

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

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

6. Details of Practicals Sessions

Practical	Title of Experiment / Activity
1	Conduct a short quiz on AI history, applications, and new trends.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Stuart Russell, Peter Norvig	Artificial Intelligence – A Modern Approach.	4th Edition, Pearson, 2021.
2	Elaine Rich, Kevin Knight	Artificial Intelligence.	3rd Edition, McGraw Hill, , 2019.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Dan W. Patterson	Introduction to Artificial Intelligence and Expert Systems.	1st Edition, Pearson, 2018.
2	Tom M. Mitchell	Machine Learning.	4th Edition, McGraw Hill, 2017.
3	Nils J. Nilsson	Principles of Artificial Intelligence.	1st Edition, Springer, 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 End Semester 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	24CSE244
Program	Structural Engineering
Academic Year/Semester	2025-26/2nd Sem
Course Type	☐ Core ✔Elective ☐ Lab
Prerequisite	Knowledge of Concrete Technology
Contact Hours per Week	Lecture: 4 Tutorial:0 Practical: 0 Total:4
Credits	3
W.e.f	2024-25
Approved in AC on	September 2024
Course Description	The course provides advanced knowledge of concrete materials, mix design, testing, and performance evaluation of conventional and special concretes. It emphasizes fibre-reinforced, lightweight, high-density, polymer, self-compacting, and sustainable concretes, enabling students to apply innovative concrete technologies in structural engineering practice.

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 advanced materials and special concretes with their properties, applications, and limitations.	L2	PO1, PO2
CO2	Apply advanced mix design principles and testing methods to evaluate the performance of special concretes.	L3	PO1, PO2, PO3, PO4
CO3	Analyze the potential of sustainable concretes using industrial waste and innovative practices in structural engineering.	L4	PO1, PO3, PO4, PO5

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 of fibres, balling effect, properties of fibre reinforced concrete, applications of fibre reinforced concrete. Types of Fibre reinforced concrete. **Ferro Cement:** Definition, different materials used, casting techniques, properties of Ferro cement, Applications.	8	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.	8	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 in fresh and hardened states, applications & limitations.	8	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.	8	CO2
V	**Concrete From Industrial Wastes:** Blast furnace slag cement concrete, Fly-ash concrete, Silica fume concrete, Recycled aggregate Concrete.	8	CO3

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

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

6. Details of Practicals Sessions

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

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	M.S. Shetty	Concrete Technology.	8th Edition, S. Chand Publishing, 2020.
2	A.M. Neville	Properties of Concrete.	5th Edition, Pearson, 2012.

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	P. K Mehta & P.J. Monteiro	Concrete: Microstructure, Properties, and Materials.	4th Edition, McGraw-Hill, 2014.
2	A.R. Santhakumar	Concrete Technology.	2nd Edition Oxford 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 End Semester 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 Structural Analysis
Course Code	24CSE251
Program	Structural Engineering
Academic Year/Semester	2025-26/2nd Sem
Course Type	☐ Core ✔Elective ☐ Lab
Prerequisite	Knowledge of Structural Analysis and Mechanics of Materials
Contact Hours per Week	Lecture: 4 Tutorial:0 Practical: 0 Total:4
Credits	3
W.e.f	2024-25
Approved in AC on	September 2024
Course Description	In-depth analysis of curved beams, elastic foundation effects, shear centre, unsymmetrical bending, and buckling of non-prismatic columns and beam-columns with application-based numerical problems.

2. Course Objectives

This course will enable students to,
1. Advanced principles like Winkler Bach and strain energy for stress and deformation analysis in curved members.
2. Analytical expressions for foundation pressure slope, bending moment and shear force in beams on elastic foundations.
3. Shear centre, unsymmetrical bending, and buckling in structural elements with mathematical formulations.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Apply Winkler Bach and Strain Energy principles to obtain stresses and deformation in curved members.	L3	PO1, PO2
CO2	Derive the expressions to Foundation pressure, Deflection, Slope, BM and SF of infinite and semi- infinite Beams resting on Elastic Foundation.	L4	PO1, PO2, PO3
CO3	Obtain the equations for the shear centre for symmetrical and unsymmetrical from fundamental.	L3	PO1, PO2
CO4	Extrapolate the bending theory to calculate the stresses and deformations in unsymmetrical bending.	L4	PO1, PO2, PO3

CO5	Develop the characteristic equation for the buckling load of compound column and stresses and deformations in beam-column.	L4	PO1, PO2, PO3, PO4

4.3Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Curved Beams Curved beams, Introduction, assumptions, derivation of WINKLER BACH equation, Radius to the neutral surface of simple geometric figures, Limitation, Stress distribution in open curved members such as Hooks and chain links, Stress distribution in closed rings and chain links. Deformations of open and closed rings.	8	CO1
II	Beams on Elastic Foundations Governing differential equation for elastic line, Interpretation of constants, Infinite beam with point load, moment & UDL with problems. Semi-infinite beams with point load and moment UDL with problems over fixed and hinged support conditions.	8	CO2
III	Shear Centre Concept of shear center in torsion induced bending of beams, expression to the Shear Centre for Symmetrical and Unsymmetrical Sections, Derivation of shear centre for angles, channel, semicircular and built -up sections with numerical problems	8	CO3
IV	Unsymmetrical Bending (Asymmetrical Bending) Theory behind unsymmetrical bending, Assumptions, obtaining the stresses in beams, simply supported and cantilever unsymmetrical beams subjected to inclined loading, Deflections of unsymmetrical simply supported and cantilever beams with numerical problems	8	CO4
V	Buckling of Non Prismatic Columns and Beam-Column Principle behind Euler's theory of buckling, Governing differential equation applied to buckling of columns and evaluation of constants for various boundary conditions, Obtaining the characteristic equation for the buckling load of non-prismatic compound columns, Analysis of Beam-column, conceptual theory of magnification stresses and deformations subjected to axial and different types of lateral loads with numerical problems.	8	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	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	-

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

6. Details of Practicals Sessions

Practical	Title of Experiment / Activity
1	Case Study Discussion-Discuss with analysis methods (matrix, plastic, FEM) are suitable.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	R.C. Hibbeler	Structural Analysis.	10th Edition, Pearson, 2019.
2	C.S. Reddy	Advanced Structural Analysis.	3rd Edition, McGraw Hill, 2017.

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	K.U. Muthu	Theory of Structures.	1st Edition, Khanna Publishers, 2018.
2	W.F. Chen & E.M. Lui	Structural Stability: Theory and Implementation.	1st Edition, Elsevier, 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, End Semester 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	Composite Materials
Course Code	24CSE252
Program	Structural Engineering
Academic Year/Semester	2024-2025/ II Sem M.Tech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite	Understanding of metals, polymers, ceramics, and concrete.
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	3
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course introduces students to the fundamental concepts, behavior, and applications of composite materials in civil engineering. It covers the classification, properties, and manufacturing techniques of composites, emphasizing their use in structural applications. The course includes macro- and micro-mechanical behavior of laminas, classical lamination theory, and failure criteria, with a focus on analytical skills and practical problem-solving through numerical examples.

2. Course Objectives

1. Understand the properties, classification, and applications of composite materials in civil engineering.
2. Analyze the macro- and micro-mechanical behavior of composite laminas.
3. Apply classical lamination theory and failure criteria to design composite structures.
4. Evaluate the performance and limitations of composite materials in structural applications.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the properties, classification, and applications of composite materials in civil engineering.	L2	PO1, PO2
CO2	Analyze the macro-mechanical behavior of composite laminas	L4	PO1, PO3, PO4
CO3	Evaluate the micro-mechanical behavior and stiffness properties of composite laminas.	L4	PO1, PO3, PO4

CO4	Apply classical lamination theory and failure criteria to design composite structures	L3	PO1, PO2, PO3
CO5	Summarize the performance and limitations of composite materials in structural applications.	L4	PO2, PO4, PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction: Introduction: Introduction to Composite materials, classifications (thermoset and thermoplastic) and civil/structural engineering applications. Constituent materials of composites – Reinforcements and matrix. Rule of mixture. Selection of materials. Manufacturing techniques – Hand layup method and compression moulding method. Basics of fiber reinforced composite (Synthetic and natural FR Polymer composites). Advantages and Limitations of composites.	08	CO1
II	Macro-mechanical Behaviour of a Lamina: Introduction, Stress-Strain Relations for Anisotropic Materials. stiffness', compliances, and engineering constants for orthotropic materials. Restrictions on engineering constants. Numerical problems.	08	CO2
III	Macro-mechanical Behaviour of a Lamina contd... Stress-strain relations for plane stress in an orthotropic material. Stress-strain relations for a lamina of arbitrary orientation. Invariant properties of an orthotropic lamina. Strengths of an orthotropic lamina, thermal and mechanical stress analysis. Numerical problems	08	CO3
IV	Micro-mechanical behaviour of a lamina: introduction, mechanics of materials approach to stiffness. Determination of E1. Determination of E2. Determination of v12. Determination of G12. Numerical problems.	08	CO4
V	Classical composite lamination theory, cross and angle – play laminates, symmetric, antisymmetric and general symmetric laminates. Mechanical coupling. Analysis of simple laminated structural elements ply-stress and strain, lamina failure theories concepts- Maximum Stress Failure Criterion, Maximum Strain Failure Criterion and Tsai-Hill Failure Criterion. 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	2	-	-	-	-	-	-	-	-
CO3	3	-	3	2	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	-	3	-	3	2	--	-	-	-	-	-	-

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

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

Practical	Title of Experiment / Activity
1	Prepare a short report or presentation showing the advantages and limitations of using composite materials in structural applications.

7.Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	Kaw A. K	Mechanics of Composite Materials	2nd edition,CRC Press-2012
2	Gibson R. F	Principles of Composite Material Mechanics	1st edition,CRC Press-2011

8.Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Mallick P. K	Fiber-Reinforced Composites: Materials, Manufacturing, and Design	3rd edition CRC Press-2015
2	Chawla K. K	Composite Materials: Science and Engineering	Springer-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 End Semester Exams.
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: 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 & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Design of Industrial Structures
Course Code	24CSE253
Program	Structural Engineering
Academic Year/Semester	2024-2025/ II Sem M.Tech
Course Type	☐ Core ✓Elective ☐ Lab
Prerequisite	Knowledge of Structural Analysis and Design of Reinforced Concrete & Steel Structures.
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	3
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course focuses on the analysis and design of industrial structures such as steel frames, trusses, gantry girders, bunkers, silos, and chimneys. Emphasis is placed on functional requirements, load considerations, detailing, and codal provisions to ensure safety, stability, and economy in industrial applications.

2. Course Objectives

1. To learn principles of Design of industrial building.
2.To design different components of industrial structures and to detail the structures.
3.To evaluate the performance of the Pre-engineered buildings.

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	Understand the industrial building and the components.	L2	PO1,PO2, PO3,PO4
CO3	Design and develop analytical skills.	L4	PO1,PO2, PO3,PO4
CO4	Summarize the principles of Structural Design and detailing	L4	PO1,PO2, PO3,PO4
CO5	Understands the concept of Pre- engineered buildings.	L2	PO1,PO2, PO3,PO4

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Analysis of industrial building for Gravity and Wind load. Analysis and design of framing components namely, girders, trusses, gable frames	08	CO1
II	Analysis and design of gantry column (stepped column / column with bracket), purlins, girts, bracings including all connections.	08	CO2
III	Analysis of transmission line towers for wind load and design of towers including all connections	08	CO3
IV	Forms of light gauge sections, Effective width,computation of unstiffened, stiffened, multiple stiffened compression elements of cold formed light gauge sections. Concept of local buckling of thin elements. Limiting width to thickness ratio. Post buckling strength	08	CO4
V	Concept of Pre- engineered buildings, Design of compression and tension members of cold formed light gauge sections, Design of flexural members (Laterally restrained / laterally unrestrained).	08	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	3	3	2	-	-	-	-	-	-	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-

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

6.Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Design one truss member and one column in detail.

7.Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	N. Subramanian	Design of Steel Structures	1st edition,Oxford University Press, New Delhi, 2016
2	B. C. Punmia and A. K. Jain	Design of Steel Structures	2nd edition,Laxmi Publications, New

			Delhi, 2018.

8.Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	Bureau of Indian Standards	IS 800:2007 – General Construction in Steel	BIS, New Delhi, 2007
2	Bureau of Indian Standards	IS 801:1975 – Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members in General Building Construction	BIS, New Delhi, 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: Akshay Kumar H S	**Name**: Dr. Shruthi R	**Name: :** Dr. M. Shankar	**Name**: Dr. Shobha B N
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	24CSE254
Program	Civil Engineering/ Structural Engineering
Academic Year/Semester	2024-25 /II Sem M.Tech
Course Type	☐Core ✓ Elective ☐ Lab
Prerequisite (If any)	Sound understanding of the properties and behaviour of construction materials such as concrete, steel and masonry. A background in concrete technology, durability aspects and construction practices is essential to comprehend deterioration mechanisms and remedial measures.
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	3
W.e.f	2024-25
Approved in AC on	Sept 2024
Course Description	This course introduces deterioration causes, diagnostic methods, and quality assurance in concrete structures. It covers durability factors, corrosion protection, maintenance strategies, and advanced repair materials. Techniques like epoxy injection, shotcrete and underpinning are discussed through case studies, enabling students to develop practical skills in structural repair and rehabilitation.

2. Course Objectives

The objective of this course is to make students

1. To investigate the cause of deterioration of concrete structure.
2. To strategize different repairs and rehabilitation of structure.
3. To evaluate the performance of the materials for repair.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify causes of deterioration and evaluate concrete properties using diagnostic and NDT methods	L3	PO1, PO2, PO3, PO5.

CO2	Assess durability and serviceability factors and apply corrosion protection measures.	L2	PO1, PO2, PO3.
CO3	Apply maintenance, inspection, and testing strategies for damaged structures	L3	PO1, PO2, PO4, PO5.
CO4	Select repair materials, execute repair techniques, and analyze case studies for structural rehabilitation.	L3	PO1, PO2, PO3, PO6.

4. Course Content (Module-Wise)

Module	Topics	Hours	COs
I	**General:** Introduction, Cause of deterioration of concrete structures, Diagnostic methods & analysis, preliminary investigations, experimental investigations using NDT, load testing, corrosion mapping, core drilling and other instrumental methods. Quality assurance for concrete construction, as built concrete properties strength, permeability, thermal properties and cracking.	8	CO2
II	**Influence on Serviceability and Durability:** Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, and cathodic protection.	8	CO2
III	**Maintenance and Repair Strategies:** Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance, Preventive measures on various aspects. Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration, testing techniques.	8	CO4
IV	**Materials for Repair:** Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete. Techniques for Repair: Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.	8	CO4

V	**Examples of Repair to Structures:** Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure, engineered demolition techniques for dilapidated structures - case studies.	8	CO4

5. CO–PO Mapping Matrix

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

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

6. Details of Practicals Sessions (if applicable)

Practical	Title of Experiment / Activity
1	"Hands-on Field Practice: Using NDT Equipment"

7. Textbooks

Sl.No	Author(s)	Title	Publisher & Year
1	Sidney, M. Johnson	Deterioration, Maintenance and Repair of Structures.	First edition, McGraw-Hill Inc., US, 1981
2	Denison Campbell, Allen & Harold Roper	Concrete Structures – Materials, Maintenance and Repair.	Illustrated edition (often referenced as first), Longman Scientific & Technical (Longman Pub Group / John Wiley & Sons), 1991.
3.	D. Mitchell, M. Alexander, R. Dhir	Concrete Repair, Rehabilitation and Retrofitting	CRC Press / Taylor & Francis, 2008

8. Reference Books

Sl.No	Author(s)	Title	Publisher & Year

1.	R.T.Allen and S.C. Edwards	Repair of Concrete Structures.	First (CRC Press edition), CRC Press (Taylor & Francis Group), 2019.
2.	R. Dodge Woodson	Concrete Structures: Repair, Rehabilitation and Retrofitting	Elsevier / Butterworth-Heinemann, 2009.

9. Asessment 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: Dr. Manjula K	**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	STRUCTURAL ENGINEERING LAB-II
Course Code	24CSEL26
Program	Structural Engineering
Academic Year/Semester	2025-2026 / 2nd Semester
Course Type	☐ Core ☐ Elective ✓Lab
Prerequisite	structural analysis software
Contact Hours per Week	Lecture: 0 Tutorial: 0 Practical: 4 Total: 4
Credits	3
W.e.f	2024-25
Approved in AC on	September -2024
Course Description	This laboratory course focuses on advanced experimental investigations of structural systems and materials, building upon the fundamentals learned in Structural Engineering Laboratory – I. Students will perform experiments on complex structural components such as continuous beams, portal frames, arches, shells, and pre-stressed members to study their load-carrying behavior, stiffness, and modes of failure. The course emphasizes advanced instrumentation, strain measurement, and the use of modern testing facilities. Students will also engage in model studies, non-destructive testing (NDT), and validation of analytical models with experimental results. The lab develops research aptitude and prepares students for professional practice in structural analysis, design, and testing.

2. Course Objectives

1) The objective of this course is to make students to learn principles of design of experiments.
2) To investigate the performance of the structural elements.
3) To evaluate the different testing methods and equipment's.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	To analyze the structure using FE based Software.	L2	PO1 ,PO4,PO5,PO10,
CO2	To learn principles of design	L2	PO1,PO2,P03 ,PO5

CO3	To investigate the performance of structural elements.	L3	PO1,PO2, P03,PO4
CO4	To design the structural components using excel sheets	L3	PO1,PO2,PO4,PO5

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	-	-	-	-	-	-	-
CO3	2	3	2	-	2	-	-	-	-	-	-	-
CO4	2	2	-	2	2	-	-	-	-	-	-	-

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

5. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Static and Dynamic analysis and design of Multi-storey Building structures using software (ETABS / STAADPRO).
2	Design of RCC structures using software (ETABS / STAADPRO).
3	Preparation of EXCEL sheets for RC elements.

6. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	S K Khanna, C E G Justo A Veeraragavan	Highway Engineering	10th Revised EditionNew Age International pub-2019 10th Revised Edition originally in 2011

7. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Yoder & wit zorac	Principles of pavement design	Wiley pub.-2020
2	R Srinivasa Kumar	Pavement Design	University Press -2017

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: Mr.Amith B J	**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	Design of Concrete Bridges
Course Code	24CSE31
Program	Structural Engineering
Academic Year/Semester	2024-2025/ III Sem MTech
Course Type	✓Core ☐ Elective ☐ Lab
Prerequisite	Basic knowledge of Bridges, Design and Structural Analysis
Contact Hours per Week	Lecture: 4 Tutorial: 0 Practical: 0 Total: 4
Credits	4
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course provides fundamental and advanced concepts in the analysis and design of concrete bridges, including slab, T-beam, box-girder, and prestressed concrete bridges. Emphasis is placed on structural behavior, load distribution, detailing, and design as per IRC and relevant standards to ensure safety, durability, and serviceability.

2.Course Objectives

1. Various loads that act on the bridges as per IRC.
2. Analysis for the maximum BM and SF at critical section using load distributing theories.
3.Design of various components using limit state method with reinforcement details.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Describe historical growth, select ideal site and bridge, calculate values of design parameters.	L3	PO1,PO2, PO3,PO4
CO2	Carry out analysis of box culvert as per IRC to obtain the values of design parameters and to design and detail the components following IS code procedure.	L4	PO1,PO2, PO3,PO4
CO3	Demonstrate the use of Pigeauds Method and Courbon's Method in the analysis of T beam bridge as per IRC.	L4	PO1,PO2, PO3,PO4
CO4	Display the use of Courbon's Method in the analysis of PSC bridge as per IRC, design to obtain the safe value of prestressing force.	L4	PO1,PO2, PO3,PO4
CO5	Analysis a balanced cantilever bridge as per IRC and to obtain the safe values of design parameters and to design and detail the components as per IS code procedure.	L4	PO1,PO2, PO3,PO4

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Introduction & Design of Slab Culvert** Bridge Engineering and its development in past, Ideal site selection for Bridges, Bridge classifications, Forces acting on Bridge. Analysis for maximum BM and SF at critical sections for Dead and Live load as per IRC class A, B, AA tracked and wheeled vehicles. Structural design of slab culvert using working stress method with reinforcement details.	10	CO1
II	**Box Culvert** Introduction to box culvert, advantage of structural continuity, Analysis for maximum BM and SF at critical sections using moment distribution method for various load combinations such as Dead, Surcharge, Soil, Water and Live load as per IRC class A, B, AA tracked and wheeled vehicles. Structural design of box culvert using working stress method with reinforcement details.	10	CO2
III	**T Beam Bridge** Components of T Beam Bridge, Load transfer mechanism, Proportioning the of Components, Analysis of Slab using Pigeauds Method for maximum BM and SF at critical sections for Dead and Live load as per IRC class A, B, AA tracked and wheeled vehicles and design of Slab using working stress method with reinforcement details. Analysis of Cross Girder for maximum BM and SF at critical sections for Dead and Live load as per IRC class A, B, AA tracked and wheeled vehicles and design of slab using working stress method with reinforcement details. Analysis of Main Girder using Courbon's Method for maximum BM and SF at critical sections for Dead and Live load as per IRC class A, B, AA tracked and wheeled vehicles and design of Main Girder using working stress method with reinforcement detail.	10	CO3
IV	**PSC Bridge** Introduction to Pre & Post Tensioning, Proportioning of Components, Analysis & Structural Design of Slab, Analysis of Main Girder Using Courbon's Method for IRC Class AA, Tracked vehicle, Calculations of Prestressing Force, Calculations of Stresses, Cable profile, Design of End Block, Detailing of Main Girder.	10	CO4
V	Substructures - Design of Piers and abutments. Introduction to Bridge bearings, Hinges and Expansion joints (No design).	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	3	3	2	-	-	-	-	-	-	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-
CO4	3	3	3	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	Site Visit local Railway Bridge in BG nagar & Explanation of Historical & design of Bridges.

7.Textbooks

Sl. No.	Author(s)	Title	Publisher & Year
1	T. R. Jagadeesh and M. A. Jayaram	Design of Bridge Structures	PHI Learning (Prentice-Hall of India), 2020
2	D. Johnson Victor	Essentials of Bridge Engineering	Oxford & IBH Publishing Co.New Delhi, 2017 (6th Edition).

8.Reference Books

Sl. No.	Author(s)	Title	Publisher & Year
1	The Indian Road Congress.	**IRC:6-1966**, Standard Specifications and Code of Practice for Road Bridges, Section II – Loads and Stresses	The Indian Roads Congress, New Delhi, 1966
2	The Indian Road Congress	**IRC:21-1966**, Standard Specifications and Code of Practice for Road Bridges, Section III – Cement Concrete	The Indian Roads Congress, New Delhi, 1966

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: 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 & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Theory of Plates and Shells
Course Code	24CSE321
Program	Structural Engg
Academic Year/Semester	2024-2025/ III Sem MTech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite (If any)	Understanding of basic structural analysis methods, including beam theory, truss analysis, and matrix methods, to grasp the behaviour of plates and shells under various loading conditions.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course introduces students to the fundamental principles and advanced methods for the analysis and design of plates and shells, which are critical components in civil engineering structures. It covers theoretical concepts, analytical techniques, and practical applications, including the design and detailing of plates, folded plates, and various shell structures. The course emphasizes problem-solving skills, energy principles, and performance evaluation of spatial structures under different loading and boundary conditions.

2.Course Objectives

This course will enable students to:
1. Learn various methods for the analysis and design of plates and shells.
2. Critically detail the structural behaviour of plates, folded plates, and shells.
3. Evaluate the performance of spatial structures under diverse conditions.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Achieve Knowledge of design and development of problem-solving skills of Plate theory	L2	PO1,PO2, PO3
CO2	Understand the principles of Analysis and Design energy mathods for rectangular and circular plates.	L2	PO1, PO2
CO3	Design and develop analytical skills of shells .	L4	PO1,PO3, PO4
CO4	Summarize the performance of shells and gecklers approximation.	L5	PO2,PO4, PO5

CO5	Understand the concepts of energy principle, spherical domes, water tanks, barrel vaults.	L3	PO1,PO2, PO3

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction to plate theory, Small deflection of laterally loaded thin rectangular plates for pure bending. Navier's and Levy's solution for various lateral loading and boundary conditions (No derivation), Numerical examples.	8	CO1
II	Energy methods for rectangular and circular plates with clamped edges subjected to symmetric loadings.	8	CO3
III	Introduction to curved surfaces and classification of shells, Membrane theory of spherical shells, cylindrical shells, hyperbolic paraboloids, elliptic paraboloid and conoids.	8	CO4
IV	Axially symmetric bending of shells of revolution, closed cylindrical shells, water Tanks, spherical shells and Geckler's approximation. Bending theory of doubly curved shallow shells.	8	CO2
V	Design and detailing of folded plates with numerical examples Design and Detailing Of simple shell problems – spherical domes, water tanks, barrel vaults and hyperbolic paraboloid roofs.	8	CO4.

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

Practical	Title of Experiment / Activity
1	Site visit on local nearby water tanks and analysis of design and details of water tank.

6.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	-	-	-	-	-	-	-	-	-	-
CO3	3	-	3	2	-	-	-	-	-	-	-	-
CO4	-	3	-	3	2	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-

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

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Szilard R	Theories and Applications of Plate Analysis	John Wiley & Sons,2004
2	Reddy J N	Theory and Analysis of Elastic Plates and Shells	CRC Press & 2006

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Gould, P. L	Analysis of Shells and Plates.	Spring,1999
2	Calladine	Theory of Shell Structures.	Cambridge University,2001

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: Varun C S	**Name**: Dr. Shruthi R	**Name:**Dr Shankar M	**Name**: Dr. Shobha B N
Designation: Assistant Professor	**Designation**: Associate Professor	**Designation:** IQAC, Director	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Design concepts of substructures
Course Code	24CSE324
Program	Structural Engg
Academic Year/Semester	2024-2025/ III Sem MTech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite (If any)	Understanding of soil properties, shear strength, consolidation, and bearing capacity to analyse soil behaviour in foundation design.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course provides an in-depth understanding of the design and analysis of substructures in civil engineering, focusing on foundations and other subsurface structural elements. It covers the principles of soil-structure interaction, design methodologies for shallow and deep foundations, and the application of relevant codes and standards. The course emphasizes analytical techniques, practical design considerations, and the evaluation of substructure performance under various loading conditions

2.Course Objectives

This course will enable students to:
1. Understand the principles of substructure design and soil-structure interaction.
2. Develop skills to analyse and design shallow and deep foundations.
3. Evaluate the performance and stability of substructures under diverse loading conditions.
4. Apply relevant design codes and standards to practical substructure problems.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Understand the principles of substructure design and soil-structure interaction.	L2	PO1, PO2
CO2	Analyze soil properties and their impact on foundation design	L4	PO1,PO3, PO4
CO3	Design shallow and deep foundations using appropriate methodologies	L4	PO1,PO3, PO4
CO4	Evaluate the stability and performance of substructures under various loading conditions	L5	PO2,PO4, PO5

CO5	Apply design codes and standards to substructure design problems	L3	PO1,PO2, PO3

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Introduction, Site investigation, In-situ testing of soils, Subsoil exploration, Classification of foundations systems. General requirement of foundations, Selection of foundations, Computations of Loads, Design concepts.	08	CO1
II	Application of SHM in Civil Engineering Concept of soil shear strength parameters, Settlement analysis of footings, Shallow foundations in clay, Shallow foundation in sand & C-Φ soils, Footings on layered soils and sloping ground, Design for Eccentric or Moment Loads	08	CO2
III	Types of rafts, bearing capacity & settlements of raft foundation, Rigid methods, Flexible methods, soil structure interaction, different methods of modelling the soil. Combined footings (rectangular & trapezoidal), strap footings & wall footings, Raft – super structure interaction effects & general concepts of structural design, Basement slabs	08	CO3
IV	Deep Foundations: Load Transfer in Deep Foundations, Types of Deep Foundations, Ultimate bearing capacity of different types of piles in different soil conditions, laterally loaded piles, tension piles & batter piles, Pile groups: Bearing capacity, settlement, uplift capacity, load distribution between piles, Proportioning and design concepts of piles.	08	CO5
V	Types of caissons, Analysis of well foundations, Design principles, Well construction and sinking. Foundations for tower structures: Introduction, Forces on tower foundations, Selection of foundation type, Stability and design considerations, Ring foundations – general concepts.	08	CO4

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

Practical	Title of Experiment / Activity
1	Site visit on local well construction and Tower structures & their design and foundation.

6.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	-	-	-	-	-	-	-	-
CO4	-	3	-	3	2	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-

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

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Bowles, J. E.	Foundation Analysis and Design	.McGraw-Hill Education, 1996
2	Das, B. M	Principles of Foundation Engineering	Cengage Learning,2015

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Peck, R. B., Hanson, W. E., & Thornburn, T. H.	Foundation Engineering	John Wiley & Sons, 1974
2	Terzaghi, K., Peck, R. B., & Mesri, G.	Soil Mechanics in Engineering Practice	Wiley, 1996

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: Varun C S	**Name**: Dr. Shruthi R	**Name:** Dr Shankar M	**Name**: Dr. Shobha B N
Designation: Assistant Professor	**Designation**: Associate Professor	**Designation:** IQAC ,Director	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1.Course Information

Section	Details
Course Title	Design of High-Rise structures
Course Code	24CSE323
Program	Structural Engg
Academic Year/Semester	2024-2025/ III Sem MTech
Course Type	☐ Core ✓ Elective ☐ Lab
Prerequisite (If any)	Basic understanding of dynamic response of structures to wind and earthquake loads, including modal analysis, to address seismic and wind-resistant design.
Contact Hours per Week	Lecture: 3 Tutorial: 1 Practical: 0 Total: 4
Credits	3
W.e.f	2024-2025
Approved in AC on	Sept 2024
Course Description	This course provides a comprehensive understanding of the design and analysis of high-rise structures, focusing on their stability, strength, and performance under various loading conditions. It covers design philosophies, material selection, and advanced analytical techniques for tall buildings, including wind and earthquake resistance. The course emphasizes the behavior of structural systems, stability analysis, and practical design considerations, equipping students with the skills to design safe and efficient high-rise structures.

2.Course Objectives

The objective of this course is to make students
1. To learn principles of stability of tall buildings.
2. To design the tall buildings for earthquake and wind resistance.
3.To evaluate the performance of tall structures for strength and stability

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Achieve Knowledge of design and development of problem-solving skills gravity loading.	L2	PO1, PO2, PO3
CO2	Understand the principles of strength and stability of wind loading.	L2	PO1, PO2
CO3	Design and develop analytical skills various structural system.	L4	PO1, PO3, PO4
CO4	Summarize the behavior of various total structural systems their analysis and design.	L5	PO2, PO4, PO5

CO5	Understand the concepts of stability of tall buildings.	L3	PO1, PO2, PO3

4.Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	Criteria: Design philosophy, loading, sequential loading, and materials – high performance concrete, fiber reinforced concrete, lightweight concrete, design mixes. Loading and Movement: Gravity loading: Dead and live load, methods of live load reduction, Impact, Gravity loading, Construction loads	08	CO1
II	Wind loading: static and dynamic approach, Analytical and wind tunnel experimentation method. Earthquake loading: Equivalent lateral force, modal analysis, combinations of loading, working stress design, Limit state design, Plastic design.	08	CO2
III	Behavior of Various Structural Systems: Factors affecting growth, Height and structural form; High rise behavior, Rigid frames, braced frames, in-filled frames, shear walls, coupled shear walls, wall-frames, tubular, cores, Futigger – braced and hybrid mega system.	08	CO4
IV	Analysis and Design: Modelling for approximate analysis, accurate analysis and reduction techniques, analysis of building as total structural system considering overall integrity and major subsystem interaction, analysis for member forces; drift and twist, computerized general three-dimensional analyses	08	CO3
V	Stability of Tall Buildings: Overall buckling analysis of frames, wall frames, approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first order and P-Delta analysis, Transnational, Torsional instability, out of plum effects, stiffness of member in stability, effect of foundation rotation. Structural elements: sectional shapes, properties and resisting capacities, design, deflection, cracking, pre-stressing, shear flow. Design for differential movement, creep and shrinkage effects, temperature effects and fire	08	CO5

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

Practical	Title of Experiment / Activity
1	Demonstration video on " stability of tall structures".

6.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	-	-	-	-	-	-	-	-	-	-
CO3	3	-	3	2	-	-	-	-	-	-	-	-
CO4	-	3	-	3	2	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-

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

7.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Taranath, B. S.	Structural Analysis and Design of Tall Buildings: Steel and Composite Construction.	CRC Press ,2016
2	Smith, B. S., Coull, A.	Tall Building Structures: Analysis and Design	Wiley Press,1991

8.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Taranath, B. S.	Reinforced Concrete Design of Tall Buildings	CRC Press ,2010
2	IS 456:2000	Plain and Reinforced Concrete- Code of Practise	Bureau of Indian Standards

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: Varun C S	**Name**: Dr. Shruthi R	**Name:**Dr Shankar M	**Name**: Dr. Shobha B N
Designation: Assistant Professor	**Designation:** HOD& Associate Professor	**Designation:**IQAC, Director	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Project Work Phase - I
Course Code	22CSE33
Program	Structural Engineering
Academic Year/Semester	2025 – 2026 / III Semester M.tech
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite (If any)	Research Method Basics, Technical Report Writing, Subject Knowledge Foundation
Contact Hours per Week	Lecture: 00 Tutorial: 00 Practical: 03 Total: 03
Credits	3
W.e.f	2024 – 2025
Approved in AC on	Sep 2024
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, o r environmental systems. This phase builds foundational skills for executing civil engineering projects effectively.

2. Course Objectives

1. Project is an important part of the MTech curriculum covered in the final year.
2. It is divided into Project Stage I and Project Stage II at Semesters III and IV 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 relevant research problems in Civil Engineering through literature review and field studies.	L1	PO2, PO4, PO5, PO10, PO12
CO2	Formulate research objectives and methodology for addressing the identified problem.	L2	PO2, PO4, PO5, PO10, PO12
CO3	Apply appropriate experimental, analytical or computational techniques to investigate the chosen problem.	L3	PO2, PO4, PO5, PO10, PO12

CO4	Analyse experimental or analytical results to draw meaningful interpretations related to the research objectives.	L4	PO2, PO4, PO5, PO10, PO12
CO5	Evaluate the feasibility and limitations of the proposed methodology and suggest scope for future work.	L4	PO2, PO4, PO5, PO10, PO12

4. Course Content (Guidelines)

Sl. No.	Content	Hours	COs
I	1. Each student will do the project. 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.		

5. CO–PO Mapping Matrix

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

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

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

Practical	Title of Experiment / Activity
1.	Project Proposal and Methodology Presentation.

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 Work Phase I Report	30
Presentation Skill	50
Viva and Answer	20

10. Course Outcome Attainment

Type	Method
Direct	Internal Assessment.
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:** IQAC, Director	**Designation:** Dean & Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information.

Section	Details
Course Title	Design of Formwork
Course Code	24CSE324
Program	Structural Engineering
Academic Year/Semester	2025 – 2026 / III Semester M.tech
Course Type	☐ Core ✔ Elective ☐ Lab
Prerequisite (If any)	Concrete Technology Basics, Structural Design Knowledge, Construction Methods Understanding
Contact Hours per Week	Lecture: 03 Tutorial: 01 Practical: 00 Total: 04
Credits	3
W.e.f	2024 – 2025
Approved in AC on	Sep 2024
Course Description	The Formwork for Concrete Structures course, provides a comprehensive study of formwork design and application in concrete construction. It covers form materials, pressures on formwork, and the properties of lumber, plywood, steel, and aluminium. The course explores shore design, allowable stresses, and safety practices for multi-level construction. It also addresses planning, site equipment, and crane scheduling for efficient formwork implementation. Additionally, it includes deflection, stability, and specialized forms like domes, tunnels, and slip forms, along with scaffold safety practices.

2. Course Objectives

1. Given basic knowledge material science and engineering aspects of form work Selection and the design of form work to achieve safety, economical and effective supporting system plan various activities on site for obtaining optimum movement of machinery, material and labour for timely completion of projects.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Reproduce the properties of various materials used in the form work and estimate the pressures over which the form work has to support.	L3	PO1, PO2, PO3, PO4, PO5
CO2	Describe various structural aspects of shores, choose appropriate shore required as per the situation and design the shores as per the prevailing practice.	L4	PO1, PO2, PO3, PO4, PO5

CO3	Plan the various activities to arrive at optimum movement of machinery in erecting the effective form work which will be economical.	L4	PO1, PO2, PO3, PO4, PO5
CO4	Provide lateral stability to control deflection to be in safe limits using different forms of holdings.	L3	PO1, PO2, PO3, PO4, PO5
CO5	Extrapolate the engineering aspects of form work for special applications in domes and shell for of constructions.	L4	PO1, PO2, PO3, PO4, PO5

4. Course Content (Unit-Wise)

Unit	Topics	Hours	COs
I	**Form Materials and Pressures on Formwork:** Lumber – Types – Finish – Sheathing boards – Working stresses – Repetitive member stress – Plywood – Types and grades – Textured surfaces and strength – Reconstituted wood – Steel – Aluminium Form lining materials – Hardware and fasteners – Nails in Plywood – Bolts lag screw and connectors – Bolt loads. Pressures on Formwork - Concrete density – Height of discharge – Temperature – Rates of Placing – Consistency of concrete – Live loads and wind pressure – Vibration Hydrostatic Adjustment for non-standard condition.	08	CO1
II	**Shores and Form Design:** Simple wood stresses – Slenderness ratio – Allowable loads – Tubular steel shores – Patented shores – Site Preparation - Size and spacing – Steel Tower Frames – Safety practices – Horizontal shoring for multi-levels – More concentrated shore loads - T- heads – Two tier wood shores – Ellis shores – Dayton sure grip and Baker Roosshores – Sway Symons shores – Beaver Advance shores - Dead shores – Raking and Flying shores Basic simplification – Beam formulas – Allowable stresses	08	CO2
III	**Planning, Site Equipment and Plant for Form Work:** Overall Planning – Detailed Planning – Standard units – Corner units – Schedule for column formwork –Formwork Elements – Planning at Tender stage – Development of basic system – Planning for maximum reuse – Economical form construction – Planning examples Crane size, effective scheduling estimate – Recheck plan details – Detailing the forms. Crane arrangement – Site layout plan – Transporting plant – Formwork beams – Formwork ties – Wales – Scaffold frames - Form accessories – Vertical transport table form work	08	CO3
IV	**Deflection bending lateral stability:** Shear, Bearing – Examples in wall forms – Slab forms Beam form – Ties, Anchors and Hangers – Column forms – Examples in each.	08	CO4
V	**Dome Forms, Tunnel Forms, Slip forms and Safety Practices for Scaffolds:** Shells of translation and revolution - Hemispherical – Parabolic - Barrel vaults – Hypar Shells – Conoidal Shells - Folded plates – Shell form design – Building the form – Placing concrete – Strength requirements – Tunnel forming components – Curb and Invert forms.	08	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	3	3	2	2	-	-	-	-	-	-	-
CO3	2	2	3	2	3	-	-	-	-	-	-	-
CO4	2	3	3	2	2	-	-	-	-	-	-	-
CO5	3	2	3	3	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 " Dome forms, tunnel forms & Slip forms.

7. Textbooks

S. No.	Author(s)	Title	Publisher & Year
1	Robert L. Peurifoy and Garold D. Oberlender	Formwork for Concrete Structures	4th Edition, McGraw Hill, 2011
2	M. K. Hurd	Formwork for Concrete	6th Edition, American Concrete Institute, 1995

8. Reference Books

S. No.	Author(s)	Title	Publisher & Year
1	Kumar and Neeraj Jha	Formwork for Concrete Structures	1st Edition, Tata McGraw Hill Education Private Limited, 2012
2	Michael P. Hurst	Formwork	1st Edition, Construction Press, 1997

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	Internship
Course Code	24CSE34
Program	Structural Engg
Academic Year/Semester	2025-2026 / 3rd Semester
Course Type	☐ Core ☐Elective ✓Lab
Contact Hours per Week	Lecture: 0 Tutorial: 0 Practical: 3 Total: 3
Credits	10
W.e.f	2024-25
Approved in AC on	September -2024
Course Description	The Internship provides postgraduate students with an opportunity to integrate academic learning with professional experience in industry, research organizations, consultancy firms, or government agencies. This course bridges classroom knowledge with real-world applications, enabling students to gain practical exposure, enhance technical competencies, and develop problem-solving, teamwork, and communication skills. The internship also encourages students to understand industry practices, ethical responsibilities, and emerging trends in their field of specialization. A final report and presentation are required to document the learning outcomes, challenges addressed, and contributions made during the internship

2.Course Objectives

1. To put theory into practice.
2. To expand thinking and broaden the knowledge and skills acquired through course work in the field.
3. To relate to, interact with, and learn from current professionals in the field.
4. To gain a greater understanding of the duties and responsibilities of a professional.
5. To understand and adhere to professional standards in the field.
6. To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality.
7. To identify personal strengths and weaknesses.
8. To develop the initiative and motivation to be a self-starter and work independently.

3.Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Gain practical experience within industry in which the internship is done. Develop and refine oral and	2	PO1, PO2, PO3, P04 ,P012

	communication skills.		
CO2	Acquire knowledge of the industry in which the internship is done.	2	PO1,PO2,P03,PO4
CO3	Apply knowledge and skills learned to classroom work. Expand intellectual capacity, credibility, judgment, intuition.	3	PO1,PO2, P06,PO7.PO8
CO4	Develop a greater understanding about career options while more clearly defining personal career goals.	3	PO1,PO2,P03,PO4,PO5
CO5	Experience the activities and functions of professionals. Identify areas for future knowledge and skill development.	3	PO1,PO2, P010, PO12

4.CO–PO Mapping Matrix

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

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

5.Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Students under the guidance of internal guide/s and external guide shall take part in all the activities regularly to acquire as much knowledge as possible without causing any inconvenience at the place of internship. Seminar: Each student is required to Present the seminar on the internship orally and/or through power point slides. .
2	Answer the queries and involve in debate/discussion.
3	Submit the report duly certified by the external guide.
4	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

6.Textbooks

S. No.	Author(s)	Title	Publisher & Year
1			
2			

7.Reference Books

S. No.	Author(s)	Title	Publisher & Year
1			
2			

8.Assessment Scheme

Component	Weightage (%)
Internal Assessment	50
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: Mr. Amith B J	**Name:** Dr. Shruthi R	**Name:** Dr. M Shankar	**Name:** Dr.Shobha B N
Designation: Assistant Professor	**Designation:** Associate Professor & HOD	**Designation:** Director, IQAC	**Designation:** Dean and Principal
Signature:	**Signature:**	**Signature:**	**Signature:**

1. Course Information

Section	Details
Course Title	Technical Seminar
Course Code	24CSE41
Program	Structural Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite	Academic Prerequisites, Topic Related Prerequisites & Presentation Skills/Preparation.
Contact Hours per Week	Lecture: 00 Tutorial: 00 Practical: 03 Total: 03
Credits	3
W.e.f	2024 – 2025
Approved in AC on	September 2024
Course Description	The seminar course provides students with an opportunity to explore recent developments in their field of specialization, develop self-learning skills, and present their findings effectively. The course emphasizes communication, critical thinking, teamwork, and technical writing, preparing students to present ideas confidently and engage in professional discussions.

2. Course Objectives

1. Develop self-learning and independent study habits through literature survey.
2. Enhance technical writing skills by preparing structured reports using standard tools.
3. Improve oral communication and presentation skills using appropriate media.
4. Build confidence to face an audience, answer queries, and participate in debates/discussions.
5. Encourage teamwork, peer learning, and exchange of ideas in a professional setting.

3. Course Outcomes (COs)

COs	Course Outcome Statement	BTL	POs Mapped
CO1	Identify, select, and analyze recent topics relevant to their area of specialization.	L4	PO1, PO2, PO4, PO12
CO2	Conduct a literature survey and organize technical content systematically.	L3	PO1, PO2, PO4, PO5, PO12
CO3	Prepare a well-structured technical report using proper tools	L3	PO5, PO10, PO12
CO4	Present technical content confidently using oral and visual presentation methods.	L4	PO9, PO10, PO12
CO5	Defend ideas, answer queries, and actively participate in group discussions.	L4	PO9, PO10, PO11, PO12

4. Course Content (Guidelines)

Unit	Topics	Hours	COs
I	1. Choose, preferably through peer reviewed journals, a recent topic of his/her interest relevant to the Course of Specialization. 2.Carryout literature survey, organize the Course topics in a systematic order. 3. Prepare the report with own sentences. 4. Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities. 5. Present the seminar topic orally and/or through power point slides. 6. Answer the queries and involve in debate/discussion. 7. Submit two copies of the typed report with a list of references.	-	-

5. CO–PO Mapping Matrix

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

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

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Mini Presentation Practice.

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 (%)
Internal Assessment	100

10. Course Outcome Attainment

Type	Method
Direct	Seminar Report, Presentation Skill, Question and Answers
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mrs. 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	Project Work Phase - II
Course Code	24CSE42
Program	Structural Engineering
Academic Year/Semester	2025 – 2026 / 4th Semester
Course Type	☐ Core ☐ Elective ✔ Lab
Prerequisite	Academic Requirements, Technical & Research Skills.
Contact Hours per Week	Lecture: 02 Tutorial: 00 Practical: 01 Total: 03
Credits	17
W.e.f	2024 – 2025
Approved in AC on	September 2024
Course Description	Project Work Phase – II focuses on identifying and formulating a real-world structural engineering problem, conducting literature review, and preparing a detailed project proposal. Students analyse feasibility, apply engineering principles for preliminary design, and work in teams to present and defend their project. The course emphasizes research skills, teamwork, and professional communication.

2. Course Objectives

1. Identify and formulate a real-world civil engineering problem through literature review and preliminary investigation.
2. Develop skills in preparing project proposals with clearly defined objectives, scope, and methodology.
3. Inculcate the ability to analyze feasibility considering technical, environmental, and societal aspects.
4. Strengthen knowledge application in preliminary design using civil engineering principles.
5. Enhance teamwork, project management, and technical communication skills.

3. 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.	L4	PO1, PO2, PO4
CO2	Develop a project proposal outlining objectives, scope and methodology for a civil engineering project.	L4	PO1, PO3, PO4
CO3	Analyse the feasibility of proposed civil engineering solutions considering technical, societal and environmental factors.	L4	PO2, PO3, PO6

CO4	Apply civil engineering principles to design preliminary solutions for the identified project problem.	L3	PO1, PO3, PO5
CO5	Collaborate effectively in a team to plan and present the project proposal.	L3	PO9, PO10, PO11

4. Course Content (Guidelines)

Unit	Topics	Hours	COs
I	1. Each Student will do a project. 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.	-	-

5. CO–PO Mapping Matrix

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

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

6. Details of Practical's Sessions

Practical	Title of Experiment / Activity
1	Presentation on Research Methodology and IPR.

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 (%)
Internal Assessment	50
End Semester Exam	50

10. Course Outcome Attainment

Type	Method
Direct	Project Report, Presentation Skill, Question and Answers
Indirect	Course Exit Survey, Student Feedback

Prepared by	Vetted by		Confirmed by
Faculty	**HOD**	**IQAC, ACU**	**Principal**
Name: Mr. Varun C 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:**