DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF COURSE WORK

Course Details:

Course Title	**DESIGN OF REINFORCED CONCRETE STRUCTURES**
Course Code	**20CE1117**
L T P C	**3 0 0 3**
Program	**B.Tech.**
Specialization	**CIVIL ENGINEERING**
Semester	**V**
Prerequisites	**Strength of Materials, Building Materials and Concrete Technology, Structural Analysis.**
Courses to which it is a prerequisite	**Advanced Reinforced Concrete Structures**

COURSE OUTCOMES (COs):

After completion of this course the student would be able to

CO	Course Outcomes	Learning Outcomes
1	Describe the methods of design to reinforced concrete members	1. Compare the concept of various methods of design (L2) 2. Select the sizes of members in reinforced concrete design (L2) 3. Discuss the design approaches to reinforced concrete members (L2)
2	Apply the concept of Limit State design to beams.	1. Design a singly reinforced beam (L3) 2. Design a doubly reinforced beam (L3) 3. Design of flanged beam sections (L3)
3	Design the members subjected to shear, torsion and bond	1. Apply the shear provisions to various beams (L3) 2. Illustrate the beam design with torsion provisions (L3) 3. Estimate the development length requirement in beams (L2)
4	Design one-way and two-way slabs including dog-legged staircase	1. Classify different slabs and design one-way slab and cantilever slabs (L2) 2. Design of two way slabs for different support conditions (L3) 3. Design of a dog-legged stair case (L3)
5	Design columns subjected to axial load, uniaxial and bi-axial bending and also design the isolated footings	1. Design of axially loaded column with uniaxial bending (L3) 2. Design of axially loaded column with biaxial bending (L3) 3. Design of an isolated footing (L3)

PROGRAMME OUTCOMES

1. Graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.
2. Graduates will attain the capability to identify, formulate and analyse problems related to

civil engineering and substantiate the conclusions

3. Graduates will be in a position to design solutions for civil engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4. Graduates will be able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5. Graduates will be able to select and apply appropriate techniques from the available resources and modern civil engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6. Graduates will be able to carry out their professional practice in civil engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7. Graduates will be able to understand the impact of the professional engineering solutions on environmental safety and legal issues.
8. Graduates will transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9. Graduates will be able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10. Graduates will be able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11. Graduates will be able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12. Graduates will engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of civil engineering.

PROGRAMME SPECIFIC OUTCOMES(PSOs):

1. Collect, process and analyse the data from topographic surveys, remote sensing, hydrogeological investigations, geotechnical explorations, and integrate the data for planning of civil engineering infrastructure.
2. Analyse and design of substructures and superstructure for buildings, bridges, irrigation

structures and pavements.

3. Estimate, cost evaluation, execution and management of civil engineering projects.

Course Outcome Vs Program Outcomes:

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

Course Outcome Vs Programme Specific Outcomes:

CO	PSO1	PSO2	PSO3
CO1	-	3	-
CO2	3	-	-
CO3	-	3	-
CO4	-	3	-
CO5	-	3	-

Mapping Levels:
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), put -: No Correlation

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation:

Week	TOPIC / CONTENTS	CO	Sample questions	Teaching - learning strategy	Assessment Method & Schedule
1	Introduction to Working stress Method , Design for bending – stress and strain diagrams- Permissible stresses-calculation of design constants	1	What are different Design methods for design of RC structures? Calculate the design constants to the given grade of concrete and steel.	Lecture Problem solving	Assignment
2	Analysis and design of singly reinforced beams-Moment of Resistance of section-Simply supported beams.	1	Calculate moment of resistance of the given section. Design the beam for the givenloading/Moment.	Lecture Problem solving	
3	Analysis and design of doubly reinforced beams-identification of tension and Compression Zone	1	Analyse and design the beam for the given loading or Design the beam for the given Moment. Placing of Tension and Compression steel	Lecture Problem solving	
4	Introduction to Limit State Methodof Design-Concepts -Characteristic loads-Characteristic strength-Partial load factor and Material Safety factors-Representative Stress-	2	What are the partial safety factors for strength? What are the assumptions made in the Limit state of Design? Calculate the moment of	Lecture Problem solving	

	Strain curves- Assumptions in limit state design-Stress block parameters -Limiting moment of resistance.		resistance of the given section.		
5	Limit state analysis and design of singly reinforced beams.	2	Design of a simply supported beam for the given loading using limit state method.	Lecture Problem solving	
6	Limit state analysis and design of doubly reinforced beams.	2	Design a simply supported beam for the given loading when the depth is restricted	Lecture Problem solving	
7	Flanged sections-Design of T andL beam sections. Limit state analysis and design of sections for shear and torsion –	3	Design a T-beam section for thespan and loading given. Prepare Reinforcement details in a drawing for T-beam and L-beam. Design of a beam for Shear reinforcement.	Lecture Problem solving Drawing	
8	Concept of bond, anchorage and development length, I.S Code provisions. Design examples in simply supported and continuous beams.	3	Calculate the development length for the given parameters. Draw Reinforcement details in a continuous beam.	Lecture Problem solving Drawing	
9	**MID TEST – I**				
10	Slabs- Design of one way slabs	4	Identify edge conditions in restrained slabs	Lecture Problem solving	Assignment/ Quiz
11	Two way slabs and Continuous slabs using I.S coefficients.	4	Design the two way slabs.	Lecture Problem solving	
12	Draw Reinforcement details of One- way, Two-way and Continuous slabs.	4	Identify boundary conditions in restrained slabs. Draw Reinforcement details for slabs	Lecture Problem solving Drawing	
13	Columns-Short and long columns– Uni- axial loads, Uni - axial bending and bi-axial bending – I.S code provisions.	5	Design a short column for the loads and section given. Design of a column for slenderness.	Lecture Problem solving	
14	Footings-Different types of footings–Design of isolated, square, rectangular and circular footings.	5	Design an isolated footing for the given load.	Lecture Problem solving	
15	Reinforcement details of typical cross section of column and footing.	5	Draw plan and section of a rectangular footing and show the reinforcement details. Also show column details.	Lecture Problem solving Drawing	
16	**MID TEST - II**				
17	**END EXAM**				