DESIGN OF CONCRETE STRUCTURES - I

VI Semester: CE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACEB34	Professional Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

COURSE OBJECTIVES:

The students will try to learn:

I. The basic design concepts for reinforced concrete structures starting with historical development to the latest limit state theory.
II. The Indian Slandered codal provisions and refreshing the bending and shear theory.
III. The behavior of reinforced concrete components and systems subjected to gravity as well as lateral loads, designing of different structural members like beam, slab, column and footing.
IV. The utilization of advanced computer software packages for the analysis and design of structural components.

COURSE OUTCOMES:

After successful completion of the course students are able to:

CO 1 **Recall** basic concepts of reinforced concrete design, material stress–strain curves, and safety factors to know the properties of concrete structure.
CO 2 **Recall** the concept of Stress block parameters and use the design concept of working stress method, limit state method for designing different structural components like beams and columns.
CO 3 **Solve** singly reinforced, doubly reinforced, T, and L beam sections for obtaining the reinforcement details in load bearing members.
CO 4 **Examine** the limit state method, design of section for shear and torsion for determining the allowable stresses in the member.
CO 5 **Explain** the concept of bond, anchorage and development length, for safe designing of residential, commercial and industrial structures.
CO 6 **Illustrate** the deflection limits as per IS: 456–2000 for designing conceptual structural members in different applications.
CO 7 **Develop** the design concept of two-way Slabs and continuous slabs for design the different spans and loading condition.
CO 8 **Apply** the I.S. coefficients for Cantilever slab and Canopy slab to analyse and design different types of slabs.
CO 9 **Understand** the concepts of short and long columns to evaluate the vertical members and obtain reinforcement details.
CO 10 **Outline** the concept of Axial loading uni-axial and bi-axial bending of vertically loaded members for analysis and design.
CO 11 **Develop** concept for isolated and Combined footing to determine the strength depending on the type and bearing capacity of soils.
CO 12 **Develop** procedure for stair case to obtain reinforcement details.

MODULE–I	DESIGN OF BEAMS
Concepts of RC Design –Limit state method, Material Stress–Strain curves, Safety factors, Characteristic values, Stress block parameter, IS-456:2000 - Working Stress Method. BEAMS: Limit state analysis and design of singly reinforced, doubly reinforced, T, and L beam sections.	
MODULE–II	**SHEAR TORSION AND BOND**
Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing Limit state design for serviceability for deflection, cracking and codal provision.	
MODULE–III	**DESIGN OF SLABS**
Design of One-way Slabs and Two-way slabs. Continuous slabs using I.S. coefficients, Cantilever slab or Canopy slab.	
MODULE–IV	**DESIGN OF COLUMNS**
Design of short columns for axial loads, uni-axial and bi-axial bending. I.S. Code provisions.	
MODULE–V	**DESIGN OF FOOTINGS**
Design of isolated square and rectangular footings for axially and eccentrically loaded columns, Design of combined footing.	

Text Books:

1. Dr. B. C. Punmia, “Limit state design of reinforced concrete”, Laxmi Publications, NewDelhi.
2. S. Unnikrishna Pillai and Devdas Menon, “Reinforced concrete design”, Tata Mc. Graw Hill, New Delhi.
3. N. Krishna Raju and R. N. Pranesh, “Reinforced Concrete Design”, New Age International
4. Publishers, New Delhi.
5. P. C. Varghese, “Limit state design of reinforced concrete”, Prentice Hall of India, New Delhi

Reference Books:

1. Ojha CSP, Chandramouli P. N., Berndtsson R., “Fluid Mechanics and Machinery, Oxford University Press, 2010.
2. Chow V.T., “Open Channel Hydraulics”, Blackburn Press, 2009.
3. Franck N. White, ―Fluid Mechanics‖, Tata McGraw Hill Publications, 8th Edition, 2015.