16CE306 DESIGN OF REINFORCED CONCRETE STRUCTURES

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	13	45	5	15	2	-
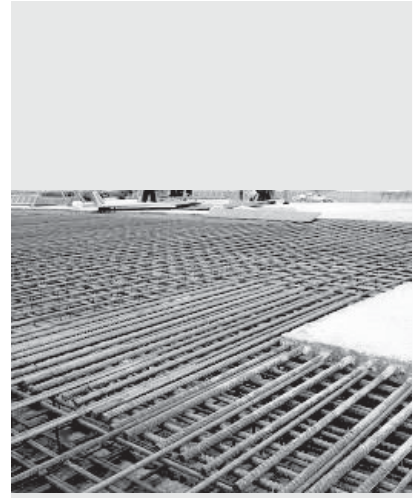
Course Description and Objectives:

This course provides students with an understanding of the structural design process, the mechanics of reinforced concrete, and the ability to design and proportion structural concrete members including slabs, beams, and columns for strength, serviceability, and economy. The objective of the course is to design the sturcural elements by using IS456:2000 specifications.

Course Outcomes:

The Students will be able to:

- design the reinforced concrete beams using limit state and working stress methods.

- calculate reinforcement for slabs.

- explain position of reinforcement for columns and footings.

- check serviceability requirements for the structures.

SKILLS:

- ✓ *Design beams for limit state of collapse.*
- ✓ *Design beams for limit state of serviceability.*
- ✓ *Study about bond and anchorage.*
- ✓ *Analyze and design slabs.*
- ✓ *Design and analysis of substructure.*

ACTIVITIES:

o *Design Regular/ Flanged beam for different types of loading conditions.*

o *Design one way and two way slabs.*

o *Design the individual footing.*

o *Design the columns.*

o *Check the serviceability requirements of the structural elements.*

UNIT - 1   **L-9, T-3**

METHODS OF DESIGN OF CONCRETE STRUCTURES: Concept of working stress method and limit state method, Advantages of limit state method, Design codes and specifications of limit state philosophy as per current IS code.

WORKING STRESS METHOD: Assumptions, Permissible stresses in concrete and steel, Balanced design, Transformed area method, Analysis and design for flexure of singly reinforced sections, Doubly reinforced sections.

UNIT - 2   **L-9, T-3**

LIMIT STATE DESIGN OF BEAMS: Singly, Doubly reinforced rectangular and flanged beams.

LIMIT STATE DESIGN FOR SERVICEABILITY: Design of members for serviceability requirements of deflection and cracking.

UNIT - 3   **L-9, T-3**

LIMIT STATE DESIGN FOR SHEAR, TORSION, BOND AND ANCHORAGE: Behavior of RC beams in shear and torsion, Shear and torsion reinforcement, Limit state design of R C members for combined bending shear and torsion, Use of design aids.

UNIT - 4   **L-9, T-3**

LIMIT STATE DESIGN OF SLABS: Analysis and design of one way, Two way and continuous slabs, Boundary conditions and corner effects.

UNIT - 5   **L-9, T-3**

LIMIT STATE DESIGN OF COLUMNS: Types of columns, Analysis and design of short columns for uni-axial and bi-axial bending, Design of long columns use of design aids.

LIMIT STATE DESIGN OF FOOTINGS: Design of wall footing-design of axially and eccentrically loaded rectangular footing, Design of combined rectangular footing for two columns.

TEXT BOOKS:

1. P. C Varghese, "Limit State Design of Reinforced Concrete", 2nd edition, Prentice Hall of India Private Limited, New Delhi, 2009

2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Limit State Design of Reinforced Concrete (AS PERIS 456:2000)", 1st edition, Laxmi Publications, 2007

REFERENCE BOOKS:

1. Ashok K. Jain, "Reinforced Concrete (limit state design)", 23rd edition, Roorkee, Nem Chand and Bros, 2003.

2. S. Unnikrishna Pillai and Devdas Menon, "Reinforced Concrete Design", 2nd edition, Tata McGraw Hill Education Publishers, 2003.

3. H. J. Shah, "Reinforced Concrete", 15th edition, Charotar Publishing House, 2000.