

B.E. Semester: V

Department of Civil Engineering

Subject Name: Design of Reinforced Concrete Structures (CV503-N)

Course Category: Program Course Core (PCC)

A. Objectives of the Course:

- This course contains design for RCC structures starting with historical development to the latest limit state theory, understanding the codal provisions and refreshing the bending and shear theory.
- The objective of the subject is to provide a coherent development to the students for the courses in sector of reinforced concrete designing
- To present the foundations of many basic engineering concepts related designing of structures
- To give an experience in the implementation of designing concepts those are applied in field of structural engineering
- To involve the application of scientific and technological principles of design of buildings according to limit state method of design

B. Teaching & Evaluation Scheme:

Teaching Scheme				Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE	CIA	Pra/Viva	
hrs	hrs	hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	1	0	4	4	3	70	30	20	30	150

C. Detailed Syllabus:

1. Introduction to Designing Process and Material:

Structural Layout – Analysis – Designing – Detailing, Stress – Strain Curves for Concrete and Steel, Types of Steel, Grade of Concrete, Function of Concrete and Steel in RC structures, Modes of Failure (Balanced Section, Under Reinforced Section and Over Reinforced Section), Introduction to IS 456:2000 and SP 16

2. Introduction to Design Methods:

Working Stress Method – Introduction, Assumptions

Ultimate Strength Method – Introduction, Assumptions

Limit State Method – Introduction, Assumptions

3. Design of Slab:

Function of slab, Introduction to different types of Slabs (One – Way Slab, Two – Way Slab, Flat Slab and Continuous Slab)

Design of One – Way Simply Supported Slab, One – Way Continuous, Slab (With appropriate checks)

Design of Two – Way Simply Supported Slab and Continuous Slab (With appropriate checks)

Design of Straight Staircase Slab

4. Design of Beam:

Function of Beam, Types of Beam (Singly Reinforced Beam, Doubly Reinforced Beam, Flanged Beam)

Calculation of Moment Carrying Capacity of Rectangular and Flanged Beam Section

Design (Flexure, Shear & Torsion) of Rectangular and Flanged beam, Singly Reinforced Section and Doubly Reinforced Section (With appropriate checks)

5. Design of Column:

Function of Column, Types of Column (Short Column & Long Column)

Design of Axially Loaded Short Column

Introduction and Generation of $P_u - M_u$ Interaction Diagram

Design (Flexure & Shear) of Axially Loaded Column, Uni – Axially Loaded Column, Bi – Axially Loaded Column

6. Design of Foundation:

Function of Foundation, Types of Foundation, Design (Flexure and Shear) of Isolated Column Footing and Combined Footing

NOTE: All Designs will be according to Limit State Method as per IS: 456: 2000

D. Lesson Planning:

Unit No	Title of the Unit	Minimum Hours	Weightage (%)
1	Introduction to Designing Process and Design Material	05	08

2	Introduction to Design Methods	01	03
3	Design of Slab	10	25
4	Design of Beam	12	25
5	Design of Column	12	25
6	Design of Foundation	05	14
Total:		45	100

E. List of Practical/Assignments:

- Minimum 10 examples and 5 theory questions from each unit
- Design of G+3 building

Note:

- Students will have to submit the term work in one spiral bound of A4 size blank Pages
- Detailing Sheet for each element with appropriate scale in A3 size sheets

F. Instructional method and pedagogy (Continuous Internal Assessment Scheme CIA):

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practical and tutorial which carry 05 marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in tutorial rooms carries 05 marks.
- Viva voce will be conducted at the end of the semester of 05 marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.

G. Students Learning Outcomes:

On the successful completion of this course

- The students will gain an experience in the implementation of designing on engineering concepts which are applied in field structural engineering.

- The students will get a diverse knowledge of design practices applied to real life problems

H. Recommended Study Materials:

a. Text book & Reference Books:

1. Limit State Theory & Design of Reinforced Concrete by Dr. S. R. Karve and Dr. V. L. Shah, Structures Publications
2. Illustrated Design of Reinforced Concrete Buildings by Dr. S. R. Karve and Dr. V. L. Shah, Structures Publications
3. RCC Designs by Dr. B.C. Punamia, A.K. Jain, Laxmi Publication
4. Reinforced Concrete Design by S.N.Sinha, Tata McGrawhill
5. Design of Concrete Structures by A.K.Jain, Nemchand Publication
6. Design of Reinforced Concrete Structures by S. Ramamrutham, Dhanpat Rai Publication
7. Reinforced Concrete Vol. I (Elementary Reinforced Concrete) by Dr. H. J. Shah, Charotar Publication
8. Reinforced Concrete Vol. II (Advanced Reinforced Concrete) by Dr. H. J. Shah, Charotar Publication
9. Understanding Concept of Structural Analysis and Design by Janak P. Parikh, Charotar Publication
10. Structures by Daniel L. Schodek and Martin Bechthold, PHI Publication
11. Reinforced Concrete Structures by R. Park and T. Paulay, A Wiley – Interscience Publication, John Willey & Sons

b. Indian Standards:

1. IS: 456: 2000, Plain and Reinforced Concrete Code of Practice
2. SP 16: 1978, Design Aids for Reinforced Concrete to IS: 456
3. IS 875 (Part 1): 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures – Dead Loads – Unit Weights of Building Materials and Stored Materials
4. IS 875 (Part 2): 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures – Imposed Loads

c. Web Materials:

1. <http://www.cdeep.iitk.ac.in/nptel>

2. <http://www.nptel.iitm.ac.in>