

REINFORCED CONCRETE STRUCTURES DESIGN AND DRAWING

V Semester: CE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACECI6	Core	L	T	P	C	CIA	SEE	Total
		3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

Prerequisite: Strength of Materials

I. COURSE OVERVIEW:

Reinforced Concrete Structures Design and Drawings an introductory design course in civil engineering. This course covers the structural design of reinforced concrete beams like singly reinforced, doubly reinforced, T & L beam sections, columns like short and long columns with biaxial bending, slabs like one way, two way, continuous and cantilever and footings like isolated, combined, strip, etc. Different methods of design will be briefly described before introducing the limit state of design. The design will be done as per IS 456:2000. In this course, basic elements governed by bending, shear, axial forces or combination of them are identified and are considered for structural analysis of the whole structure.

II. COURSE OBJECTIVES:

The student 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 Standard 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.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

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| CO 1 | Explain the concept of Stress block parameters and use the design concept of working stress method, limit state method for designing different structural components. | Understand |
| CO 2 | Recall basic concepts of singly reinforced, doubly reinforced, T, L beam, material stress-strain curves, and safety factors to know the properties of concrete structure. | Remember |
| CO 3 | Explain the concept of bond, anchorage and development length and section for shear and torsion for safe designing of residential, commercial and industrial structures. | Understand |
| CO 4 | Solve design of reinforced concrete slab sections as per IS: 456-2000 for obtaining the reinforcement details in load bearing members. | Apply |
| CO 5 | Develop the concept of Axial loading uni-axial and bi-axial bending of vertically loaded members to obtain reinforcement details. | Apply |
| CO 6 | Design reinforcement structural sections for isolated, Combined footing and staircase for obtaining the reinforcement details | Apply |

IV. COURSE SYLLABUS:

MODULE –I: INTRODUCTION TO LIMIT STATE DESIGN (9)

Concepts of reinforced concrete design, design Load, limit state method, material Stress, strain curves, safety factors, characteristic values; Stress block parameters, modes of failure - 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 (9)

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; General aspects of serviceability, deflection limits in IS: 456-2000, calculation of deflection (theoretical method), cracking in structural concrete members, calculation of deflections and crack width.

MODULE -III: DESIGN OF SLABS (9)

Design of one-way and two-way slab.

Design of continuous slab using IS coefficients, cantilever slab / canopy slab.

MODULE -IV: DESIGN OF COLUMNS (9)

Short and long columns, axial loads, uniaxial and biaxial bending IS Code provisions.

MODULE -V: DESIGN OF FOOTINGS AND STAIRCASE (9)

Design of footing: Isolated (square and rectangular) and combined footings. Design of staircase.

V. TEXTBOOKS:

1. Neelam Sharma, “Reinforced Cement Concrete Design, S.K. Kataria & Sons, New Delhi, 2002.
2. Dr. B.C Punmia, “Reinforced Concrete Structures, Volume I”, Laxmi Publications (P) LTD, New Delhi, 2002.

VI. REFERENCE BOOKS:

1. M.L. Gambhir, “Fundamentals of Reinforced Concrete Design, Print ice Hall of India Pvt. Ltd, New Delhi, 2006.
2. P. Purushotham, “Reinforced Concrete Structural Elements – Behavior, Analysis and Design”, Tata McGraw Hill, 1994.
3. P.C. Varghese, “Limit State Design of Reinforced Concrete”, Prentice Hall of India, New Delhi, 2008.
4. N. Krishna Raju and R.N. Pranesh, “Reinforced Concrete Design”, New Age International Publishers, New Delhi, 2007.

VII. WEB REFERENCES:

1. <http://www.nptel.ac.in/courses/105105105/>
2. <http://www.nptel.ac.in/courses/105105104/>

VIII. E-TEXT BOOKS:

1. http://weccivilians.weebly.com/uploads/2/4/6/2/24623713/design_of_reinforced_concrete_9th_edition_-_jack_c._mccormac.pdf