

Approval: 9th Senate Meeting

Course Number: CE 351

Course Name: Design of Reinforced Concrete Structures

Credits: 2-1-0-3

Prerequisites: CE 301 - Strength of Materials and Structures

Intended for: UG

Distribution: Discipline Core

Semester: Odd/Even

Preamble: The design of reinforced concrete constitutes a significant facet of civil engineering practice. Based on the previously taught concepts relating to mechanics of rigid bodies, structural analysis and design, the present course is to enable the student in realizing the physical design of structural elements as per to the guidelines of IS 456: 2000.

Course Outline: The course encompasses the study of standard design procedures for common reinforced concrete elements as per to the provisions of IS 456:2000. The course concludes with an introduction to the advanced topics of pre-stressed concrete design and ductile detailing of elements, the later deemed necessary for adequate performance under seismic action.

Modules:

1. Design of beams: Singly and doubly reinforced. **(6 contact hours)**
2. Design of columns: Short and slender columns. **(6 contact hours)**
3. Design of slabs: One way, two way and flat slabs. **(6 contact hours)**
4. Design for bond and anchorage of reinforcement. **(6 contact hours)**
5. Reinforcement detailing at beam-column and column-foundation junctions. **(6 contact hours)**
6. Design of Staircase, Isolated and combined footings. **(6 contact hours)**
7. Introduction to pre-stressed concrete design. Basics of seismic analysis and detailing. **(6 contact hours)**

Text books:

- a) Pillai, S.U. and Menon, D, 'Reinforced concrete design', Tata McGraw-Hill, New Delhi, 2009.
- b) Subramanian, N. 'Design of reinforced concrete structures', Oxford University Press, USA, 2014.
- c) Sinha, S.N., 'Reinforced concrete design', Tata McGraw-Hill, New Delhi, 2002.

- d) Raju, N.K. and Pranesh, R.N., 'Reinforced concrete design: principles and practice', New Age International, New Delhi, 2007.
- e) Raju, N.K., 'Prestressed concrete', Tata McGraw-Hill, New Delhi, 2006.

Reference books:

- a) Nawy, E.G., 'Reinforced concrete: a fundamental approach', Prentice Hall, NJ, 2009.
- b) Wright, J.K. and MacGregor, J.G., 'Reinforced concrete: mechanics and design', Pearson, NJ, 2015.
- c) Hewson, N.R., 'Prestressed concrete bridges: design and construction', Thomas Telford, London, 2003.
- d) Varghese, P.C., 'Advanced reinforced concrete design', Prentice Hall of India, New Delhi, 2009.