

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B Tech Civil Engineering
Course Code:	
Course Title:	Design of Concrete Structures
Course Type:	Core
Year of introduction:	2024-2025

L	T	Practical Component				C
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Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. examine the structural systems and load transfer mechanism (BL4)
2. make use of the limit state criteria for the design of rectangular and flanged beams (BL3)
3. design one-way and two-way slabs (BL6)
4. analyse columns and footings (BL4)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	Structural Systems and Load Assessment Structural systems and components; loads acting on the structure and their combinations, assessment of gravity load; mechanical properties of concrete and reinforcing steel; design philosophies of concrete structures.	10
Unit-II	Beams Limit state of collapse – flexure and shear; design and detailing of singly and doubly reinforced rectangular sections and flanged sections; bond and anchorage; limit state of serviceability.	15
Unit-III	Slabs Classification, design and detailing of the one-way, two-way, and continuous slabs.	10
Unit-IV	Columns and Footings Types and behaviour of column, design and detailing of column subjected to axial load and bending moment; types of footing, design considerations, design and detailing of isolated footing.	10

Self-Study: The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study content.

- Suggested Readings/References:
- Pillai, U.S., & Menon, D. *Reinforced Concrete Design*, Tata McGraw Hill.
 - Subramanian, N. *Design of Reinforced Concrete Structures*, Oxford Press.
 - Varghese, P.C. *Limit State Design of Reinforced Concrete*, Prentice Hall
 - Dayaratnam, P. & Sarah, P. *Design of Reinforced Concrete Structures*, Medtech Publishers.
 - Karve, S.R., & Shah, V.L. *Limit State Theory and Design of Reinforced Concrete*, Structures Publishers.
 - Shah, H.J. *Reinforced Concrete Vol – I, II*, Charotar Publication.
 - BIS Codes (IS – 456, IS – 875, SP – 16, SP – 34)

Laboratory Work: Laboratory work will be based on the above syllabus with a minimum of 05 exercises to be incorporated. The students in a suitable group size will design and perform one experiment as a part of laboratory work.

Sr. No.	Name of Exercise / Experiments	Hours
1.	Structural planning and gravity load transfer mechanism	04
2.	Analysis and design of the reinforced concrete beam	08
3.	Design and detailing of reinforced concrete slab	06
4.	Design and detailing of reinforced concrete columns	06
5.	Design and detailing of reinforced concrete footing	04

