NIRMA UNIVERSITY

Institute:	**Institute of Technology**
Name of Programme:	**B. Tech. in Civil Engineering**
Course Code:	3CL101CC24
Course Title:	**Design of Concrete Structures**
Course Type:	**Core**
Year of Introduction:	**2024-25**

L	T	Practical Component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

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

1. illustrate the structural systems and load transfer mechanism (BL2)
2. make use of limit state criteria for the design of rectangular and flanged beams (BL3)
3. choose and formulate one-way and two-way slabs (BL3)
4. analyse and design 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.	08
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 slab.	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.	12

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 contents.

Suggested Readings/ References:

- Pillai, U.S. & Menon, D. *Reinforced Concrete Design*, Tata McGraw Hill.
- Shah, H.J. *Reinforced Concrete Vol – I, II*, Charotar Publication.
- Karve, S.R., & Shah, V.L. *Limit State Theory and Design of Reinforced Concrete*, Structures Publishers.
- 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.
- BIS Codes (IS – 456, IS – 875, SP – 16, SP – 34)

Laboratory Work: Laboratory work will be based on the above syllabus with minimum 05 exercises to be incorporated.

Suggested List of Experiments (not restricted to the following):
(Only for Information)

Sr. No.	Name of Experiment/Exercise	Hours
1.	Gravity load transfer mechanism	04
2.	Analysis and design of beams	08
3.	Design and detailing of slabs	08
4.	Design and detailing of columns	06
5.	Design and detailing of footings	04