NIRMA UNIVERSITY

Institute of Technology

School of Engineering

Bachelor of Technology - Civil Engineering

Semester- V

L	T	P	C
3	0	2	4

Course Code	2CL501
Course Name	Design of Concrete Structures

Course Outcomes:

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

1. explain the structural planning and gravity load transfer mechanism
2. design various types of beam for reinforced concrete building
3. analyze and design various types of reinforced concrete slab
4. design columns and footings for reinforced concrete building.

Syllabus: Teaching hours: 45

Unit 1: Introduction **Hours: 10**

Stages in structural planning and design; Structural components of building, structural layout; Gravity and lateral loads acting on the structure and load combinations, assessment of gravity load; Design philosophy of concrete structures; Mechanical properties of concrete and reinforcing steel.

Unit 2: Beam elements **Hours: 12**

Limit State of Collapse – flexure, shear, torsion; Design and detailing of rectangular singly and doubly reinforced beam and flanged beam; Bond and anchorage; Limit state of serviceability – deflection and cracking; Design and detailing of continuous beam.

Unit 3: Slabs **Hours: 08**

Classification of slabs, design and detailing of one way slab, two way slab and continuous slab; Design of staircase.

Unit 4: Columns **Hours: 08**

Types of column, column behaviour, design of axially loaded column, P_u (axial load) - M_u (bending moment) interaction diagram, design and detailing of column subjected to axial load, bending moment and torsion.

Unit 5: Footings **Hours: 07**

Types of footing, design considerations, design and detailing of isolated and combined footing.

Self-Study:

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

Laboratory Work:

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

Suggested Readings:

1. Pillai, U.S. & Menon, D. *Reinforced Concrete Design*, Tata McGraw Hill.
2. Varghese, P.C. *Limit State Design of Reinforced Concrete*, Prentice Hall
3. Karve, S.R., & Shah, V.L. *Limit State Theory and Design of Reinforced Concrete*, Structures.
4. Shah, H.J. *Reinforced Concrete Vol – I, II*, Charotar Publication.
5. Subramanian, N. *Design of Reinforced Concrete Structures*, Oxford Press.
6. Codes: IS:456, IS:875, IS:1893, SP:16, SP:24, SP:34.

L= Lecture, T= Tutorial, P= Practical, C= Credit

w.e.f. academic year 2020-21 and onwards