

ACADEMIC SESSION: SUMMER-2025

Discipline :Civil engg	Semester: 4th	Name of the Teaching Faculty : PADMA LOCHAN BEHERA
Subject: structural design-I	No. of Days / Week class allotted: 5	Semester Duration: 04/02/2025 to 17/05/2025
Week	Class day	Theory/Practical Topics:
1st	1st	Objectives of design and detailing. State the different methods of design of concrete structures.
	2nd	Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete and steel. Permissible stresses, assumption in W.S.M.
	3rd	Flexural design and analysis of single reinforced sections from first principles.
	4th	Concept of under reinforced, over reinforced and balanced sections.
	5th	Advantages and disadvantages of WSM, reasons for its obsolescence.
2nd	1st	Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.
	2nd	Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
	3rd	Study of I.S specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam column & footing, minimum reinforcement in slab, beam & column, lapping, anchorage, effective span for beam & slab.
	4th	Limit state of collapse (flexure)
	5th	Assumptions
3rd	1st	Stress-Strain relationship for concrete and steel reinforced rectangular section
	2nd	neutral axis
	3rd	Numerical problem related to neutral axis
	4th	stress block diagram and strain diagram for singly reinforced section.
	5th	continued
4th	1st	Concept of under- reinforced section
	2nd	Numerical problem
	3rd	Concept of over-reinforced and limiting section
	4th	neutral axis co-efficient, limiting value of moment of resistance
	5th	limiting percentage of steel required for limiting singly R.C. section.

5 th	1 st	Numerical problem
	2 nd	Analysis and design: determination of design constants
	3 rd	moment of resistance and area of steel for rectangular sections
	4 th	Necessity of doubly reinforced section
	5 th	design of doubly reinforced rectangular section
6 th	1 st	Numerical problem
	2 nd	Nominal shear stress in R.C. section, design shear strength of concrete, maximum shear stress, design of shear reinforcement, minimum shear reinforcement, forms of shear reinforcement.
	3 rd	Bond and types of bond, bond stress, check for bond stress, development length in tension and compression, anchorage value for hooks 90° bend and 45° bend standards lapping of bars, check for development length.
	4 th	Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear
	5 th	Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only).
7 th	1 st	General features of flange
	2 nd	Advantages of flange
	3 rd	effective width of flange as per IS: 456-2000 code provisions.
	4 th	Analysis of singly reinforced T-Beam
	5 th	strain diagram
8 th	1 st	stress diagram
	2 nd	depth of neutral axis
	3 rd	moment of resistance of T-beam section with neutral axis lying within the flange.
	4 th	Numerical problem
	5 th	Simple numerical problems on deciding effective flange width.
9 th	1 st	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange
	2 nd	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange
	3 rd	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange
	4 th	Problems on neutral axis
	5 th	Class test
10 th	1 st	Design of simply supported one-way slabs for flexure check for deflection control and shear.
	2 nd	continued
	3 rd	continued
	4 th	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	5 th	continued

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