ACADEMIC SESSION: SUMMER-2023

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: 14/02/2023 to 23/05/2023 No. of Weeks : 15
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
	1st	Concept of under- reinforced section
	2nd	Numerical problem

4th	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.
5th	1st	Numerical problem
	2nd	Analysis and design: determination of design constants
	3rd	moment of resistance and area of steel for rectangular sections
	4th	Necessity of doubly reinforced section
	5th	design of doubly reinforced rectangular section
6th	1st	Numerical problem
	2nd	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.
	3rd	Bond and types of bond, bond stress, check for bond stress, development length in tension and compression, anchorage value for hooks 900 bend and 450 bend standards lapping of bars, check for development length.
	4th	Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear
	5th	Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only).
7th	1st	General features of flange
	2nd	Advantages of flange
	3rd	effective width of flange as per IS: 456-2000 code provisions.
	4th	Analysis of singly reinforced T-Beam
	5th	strain diagram
8th	1st	stress diagram
	2nd	depth of neutral axis
	3rd	moment of resistance of T-beam section with neutral axis lying within the flange.
	4th	Numerical problem
	5th	Simple numerical problems on deciding effective flange width.
9th	1st	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange
	2nd	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of

		flange
	3rd	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange
	4th	Problems on neutral axis
	5th	Class test
10th	1st	Design of simply supported one-way slabs for flexure check for deflection control and shear.
	2nd	continued
	3rd	continued
	4th	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	5th	continued
11th	1st	continued
	2nd	Design of two-way simply supported slabs for flexure with corner free to lift.
	3rd	continued
	4th	continued
	5th	Design of dog-legged staircase
12th	1st	continued
	2nd	continued
	3rd	Detailing of reinforcement in stairs spanning longitudinally
	4th	continued
	5th	Assumptions in limit state of collapse- compression.
13th	1st	Definition and classification of columns
	2nd	effective length of column
	3rd	Specification for minimum reinforcement; cover, maximum reinforcement
	4th	number of bars in rectangular, square and circular sections
	5th	diameter and spacing of lateral ties.
14th	1st	Analysis and design of axially loaded short square,
	2nd	Analysis and design of axially loaded rectangular column
	3rd	Analysis and design of axially loaded circular columns (with lateral ties only).

		.
	4th	Types of footing
	5th	Design of isolated square column footing of uniform thickness for flexure and shear
15th	1st	continued
	2nd	Design problem
	3rd	Class test
	4th	revision
	5th	Previous year qs and ans discussion