ACADEMIC SESSION: SUMMER-2024

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: 16/01/2024 to 26/04/2024 No. of Weeks : 15
Week	**Class day**	**Theory/Practical Topics:**
1st	1st	**Working stress method (WSM)** Objectives of design and detailing. State the different methods of design of concrete structures. Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete and steel.
	2nd	Permissible stresses, assumption in W.S.M. Concept of under reinforced, over reinforced and balanced sections.
	3rd	Flexural design and analysis of single reinforced sections from first principles.
	4th	Numericals based on WSM
	5th	Numericals based on WSM
2nd	1st	Advantages and disadvantages of WSM, reasons for its obsolescence.
	2nd	**Philosophy Of Limit State Method (LSM):** Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.
	3rd	Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
	4th	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.
	5th	**Analysis and Design of Single and Double Reinforced Sections (LSM) :** Limit state of collapse (flexure), Assumptions, Stress-Strain relationship for concrete and steel, neutral axis, stress block diagram and strain diagram for singly reinforced section.
3rd	1st	Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient
	2nd	Limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	3rd	Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections.
	4th	Numericals on Analysis of Beam using LSM
	5th	Numericals on Analysis of Beam using LSM
4th	1st	Numericals on Beam Design using LSM
	2nd	Numericals on Beam Design using LSM
	3rd	Numericals on Beam Design using LSM
	4th	Necessity of doubly reinforced section, design of doubly reinforced rectangular section

	5th	Analysis of Doubly Reinforced Section
5th	1st	Analysis of Doubly Reinforced Section-Numericals
	2nd	Design of Doubly Reinforced Section- Numericals
	3rd	Design of Doubly Reinforced Section- Numericals
	4th	Design of Doubly Reinforced Section- Numericals
	5th	**Shear, Bond and Development Length (LSM) :** 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.
6th	1st	Problems on Shear Reinforcement
	2nd	Problems on Shear Reinforcement
	3rd	Problems on Shear Reinforcement
	4th	Bond and types of bond, bond stress, check for bond stress, development length in tension and compression, anchorage value for hooks 90^0 bend and 45^0 bend standards lapping of bars, check for development length.
	5th	Problems on Development Length
7th	1st	Problems on Development Length
	2nd	**Analysis and Design of T-Beam (LSM):** General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	3rd	Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis, moment of resistance of T-beam section with neutral axis lying within the flange.
	4th	Numericals on Analysis of T-Beam
	5th	Numericals on Analysis of T-Beam
8th	1st	Simple numerical problems on deciding effective flange width
	2nd	Numericals on Design of T-Beam
	3rd	Numericals on Design of T-Beam
	4th	**Analysis and Design of Slab and Stair case (LSM):** Design of simply supported one-way slabs for flexure check , deflection control and shear- Design Parameters
	5th	Design of Simply Supported One Way Slab- Numericals
9th	1st	Design of Simply Supported One Way Slab- Numericals
	2nd	Design of Simply Supported One Way Slab- Numericals
	3rd	Design of One Way Cantilever Slab- Numericals
	4th	Design of One Way Cantilever Slab- Numericals
	5th	Design of two-way simply supported slabs for flexure with corner free to lift – Design Parameters

10th	1st	Design of Two Way Slab - Numericals
	2nd	Design of Two Way Slab - Numericals
	3rd	Design of Two Way Slab - Numericals
	4th	Design of Two Way Slab - Numericals
	5th	Design of Dog Legged Stair case- Procedure
11th	1st	Design of Dog Legged Stair case- Numericals
	2nd	Design of Dog Legged Stair case- Numericals
	3rd	Design of Dog Legged Stair case- Numericals
	4th	Detailing of reinforcement in stairs spanning longitudinally.
	5th	**Design of Axially loaded columns and Footings (LSM):** Assumptions in limit state of collapse- compression. Definition and classification of columns, effective length of column.
12th	1st	Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	2nd	Analysis of Axially Loaded Short Column - Numericals
	3rd	Analysis of Axially Loaded Short Column - Numericals
	4th	Design of Axially Loaded short Column - Numericals
	5th	Design of Axially Loaded short Column - Numericals
13th	1st	Design of Axially Loaded short Column - Numericals
	2nd	Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.
	3rd	Design of isolated Square Column Footing- Numericals
	4th	Design of isolated Square Column Footing- Numericals
	5th	Design of isolated Square Column Footing- Numericals
14th	1st	Design of isolated Square Column Footing- Numericals
	2nd	Doubt Clearing Class
	3rd	Doubt Clearing Class
	4th	Doubt Clearing Class
	5th	Doubt Clearing Class

15th	1st	Previous Year Question Practice
	2nd	Previous Year Question Practice
	3rd	Previous Year Question Practice
	4th	Previous Year Question Practice
	5th	Previous Year Question Practice

Prepared By : 16/1/24

Approved By

16/1/24

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GP Sonepur