

**LESSON PLAN : TH.1. STRUCTURAL DESIGN – I, SESSION -2023-2024 (SUMMER 2023) BATCH-2021-2024(4th Semester)**

Discipline: Civil Engineering	Semester: 4th	Name of the Teaching Faculty: B. Silba Kumar Dora(PTGF)
Subject: TH.1-STRUCTURAL DESIGN -I	No. of days/ per week class allotted: 5	Semester From Date : 14/04/2023 to Date: 31/5/2023 No. of Weeks: 15
Week	Class Day	Theory/ Practical Topics
		<b>1 Working stress method (WSM)</b>
1ST	1	1.1 Objectives of design and detailing. State the different methods of design of concrete structures
	2	1.2 Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete and steel. Permissible stresses, assumption in W.S.M.
	3	1.3 Flexural design and analysis of single reinforced sections from first principles.
	4	1.4 Concept of under reinforced, over reinforced and balanced sections
	5	1.5 Advantages and disadvantages of WSM, reasons for its obsolescence
		<b>2 Philosophy Of Limit State Method (LSM)</b>
2ND	1	2.1 Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy
	2	2.2 Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
	3	2.3 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.
		<b>3 Analysis and Design of Single and Double Reinforced Sections (LSM)</b>
	4	3.1 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.
	5	3.1 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	1	3.1 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.
	2	3.1 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.
	3	3.2 Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	4	3.2 Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	5	3.2 Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
4TH	1	3.2 Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	2	3.3 Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
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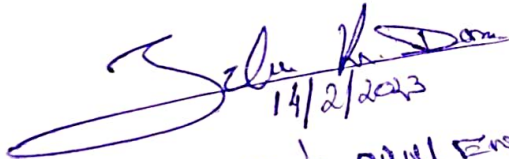



	4	3.3 Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
	5	3.3 Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
5TH	1	3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section
	2	3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section
	3	3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section
		<b>4 Shear, Bond and Development Length (LSM)</b>
	4	4.1 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.
	5	4.1 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	1	4.2 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.
	2	4.3 Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear. Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only).
		<b>5 Analysis and Design of T-Beam (LSM)</b>
	3	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	4	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	5	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
7TH	1	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	2	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	3	5.2 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.
	4	5.2 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.
	5	5.2 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.
8TH	1	5.2 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.
	2	5.2 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.
	3	5.3 Simple numerical problems on deciding effective flange width. (Problems only on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange shall be asked in written examination).
	4	5.3 Simple numerical problems on deciding effective flange width. (Problems only on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange shall be asked in written examination).
	5	5.3 Simple numerical problems on deciding effective flange width. (Problems only on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange shall be asked in written examination).



9TH	1	5.3 Simple numerical problems on deciding effective flange width. (Problems only on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange shall be asked in written examination).
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		<b>6 Analysis and Design of Slab and Stair case (LSM)</b>
	3	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.
	4	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.
	5	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.
10TH	1	6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	2	6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	3	6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	4	6.3 Design of two-way simply supported slabs for flexure with corner free to lift.
	5	6.3 Design of two-way simply supported slabs for flexure with corner free to lift.
11TH	1	6.3 Design of two-way simply supported slabs for flexure with corner free to lift.
	2	6.4 Design of dog-legged staircase
	3	6.4 Design of dog-legged staircase
	4	6.4 Design of dog-legged staircase
	5	6.5 Detailing of reinforcement in stairs spanning longitudinally.
12TH	1	6.5 Detailing of reinforcement in stairs spanning longitudinally.
	2	6.5 Detailing of reinforcement in stairs spanning longitudinally.
		<b>7. Design of Axially loaded columns and Footings (LSM)</b>
	3	7.1 Assumptions in limit state of collapse- compression.
	4	7.1 Assumptions in limit state of collapse- compression.
	5	7.1 Assumptions in limit state of collapse- compression.
13TH	1	7.1 Assumptions in limit state of collapse- compression.
	2	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	3	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	4	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	5	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
14TH	1	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	2	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	3	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.

	4	7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	5	7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
15TH	1	7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	2	7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	3	7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.
	4	7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.
	5	7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.

  
 14/2/2023  
 PTGF in civil Engg.

  
 14/02/2023.  
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