SPINTRONIC TECHNOLOGY AND ADVANCE RESEARCH,BHUBANESWAR

SUBJECT: STRUCTURAL DESIGN-I

LESSON PLAN SESSION- 2024-25, SEMESTER - 4TH

DEPT:CIVILENGINEERING

NAME OF THE FACULTY: SUKTI PRAGNYA RATH

SL. NO.	WEEK	TOPICS PLANNED TO BE COVERED	Total No of Period	Cumulative no of Periods
01	01	**1. Working stress method (WSM)** 1.1 Objectives of design and detailing. State the different methods of design of concrete structures.	**1**	**1**
		1.2 Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete and steel. Permissible stresses, assumption in W.S.M.	1	2
		1.3 Flexural design and analysis of single reinforced sections from first principles.	1	3
		1.4 Concept of under reinforced, over reinforced and balanced sections.	1	4
		1.5 Advantages and disadvantages of WSM, reasons for its obsolescence	1	5
02	02	**2. Philosophy Of Limit State Method (LSM)** 2.1Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.	**1**	**6**
		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	1	7
		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.	1	8
		3 Analysis and Design of Single and Double Reinforced Sections (LSM)	**1**	**9**
		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	1	10
03	03	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.	1	11
		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.	1	12
		3.2 Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient	1	13
		3.2 limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.	1	14
		Class test 1	**1**	**15**
04	04	3.3 Analysis and design: determination of design constants for rectangular sections	1	16

		3.3 Analysis and design: determination of design constants for rectangular sections	1	17
		3.3 Moment of resistance and area of steel for rectangular sections	1	18
		3.3 Moment of resistance and area of steel for rectangular sections	1	19
		Solving problems	1	20
05	05	3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section	1	21
		3.4 design of doubly reinforced rectangular section	1	22
		Solving problems	1	23
		4 Shear, Bond and Development Length (LSM) 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	1	24
		4.2 Bond and types of bond, bond stress, check for bond stress, development length in tension and compression, anchorage value for hooks 90 degree bend and 45 degree bend standards lapping of bars, check for development length.	1	25
06	06	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	1	26
		Class Test 2	**1**	**27**
		5 Analysis and Design of T-Beam (LSM)	**1**	**28**
		5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.	1	29
		5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.	1	30
07	07	5.2 Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis	1	31
		5.2 Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis	1	32
		5.2 moment of resistance of T-beam section with neutral axis lying within the flange	1	33
		5.2 moment of resistance of T-beam section with neutral axis lying within the flange	1	34
		5.3 Simple numerical problems on deciding effective flange width	1	35
08	08	5.3 Simple numerical problems on deciding effective flange width	1	36
		5.3 Simple numerical problems on deciding effective flange width	1	37
		5.3 Simple numerical problems on deciding effective flange width	1	38
		Internal	**1**	**39**
		Solving problems	1	40
09	09	**6 Analysis and Design of Slab and Stair case (LSM)**	**1**	**41**
		6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.	1	42
		6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.	1	43

		6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for	1	44

		development length and shear.	1	45
		6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.	1	46
10	10	**Solving numerical problems**	**1**	**47**
		6.3 Design of two-way simply supported slabs for flexure with corner free to lift	1	48
		6.3 Design of two-way simply supported slabs for flexure with corner free to lift	1	49
		Solving numerical problems	**1**	**50**
		6.4 Design of dog-legged staircase	1	51
11	11	6.4 Design of dog-legged staircase	1	52
		6.5 Detailing of reinforcement in stairs spanning longitudinally	1	53
		6.5 Detailing of reinforcement in stairs spanning longitudinally	1	54
		Solving numerical problems	**1**	**55**
		7 Design of Axially loaded columns and Footings (LSM)	**1**	**56**
12	12	7.1 Assumptions in limit state of collapse- compression.	1	57
		7.1 Assumptions in limit state of collapse- compression.	1	58
		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	1	59
		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	1	60
		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	1	61
13	13	7.3 Analysis and design of axially loaded short square column(with lateral ties only)	1	62
		7.3 Analysis and design of axially loaded short square column(with lateral ties only)	1	63
		7.3 Analysis and design of axially loaded short rectangular and circular column(with lateral ties only)	1	64
		7.3 Analysis and design of axially loaded short rectangular and circular column(with lateral ties only)	1	65
		Solving numerical problems	**1**	**66**
14	14	7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.	1	67
		7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.	1	68

		7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.	1	69
		7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.	1	70
15	15	7.4 Design of isolated square column footing of uniform thickness for flexure and shear.	1	71
		Solving numerical problems	**1**	**72**
		Solving numerical problems	**1**	**73**

		Discussion on previous year questions	1	74
		Discussion on previous year questions	1	75

Reference Books:

1. **N.Subramanian : Design of Reinforced Concrete Structures:oxford Pbln**
2. **H .J. Saha.: Reinforced Concrete: Charotar Publ House**
3. **IS:456-2000**

FACULTY **HOD**