JHARSUGUDA ENGINEERING SCHOOL, JHARSUGUDA
Department of Civil Engineering
4th Sem (2nd Year) Summer 2023

Theory No:	1	Name of The Faculty: Sri Dhanurjaya Behera, Sri	
Subject:	STRUCTURAL DESIGN – I	Swapnashish Patel	
Sl No	Chapter No	No. Of Classes Scheduled	Topics to be covered
1	1	1	1. Working stress method (WSM) 1.1 Objectives of design and detailing. State the different methods of design of concrete structures.
2		1	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	1.3 Flexural design and analysis of single reinforced sections from first principles.
4		1	1.4 Concept of under reinforced, over reinforced and balanced sections. .
5		1	Revision
6		1	Revision
7		1	Practice on Problems
8		1	Practice on Problems
9		1	Practice on Problems
10		1	1.5 Advantages and disadvantages of WSM, reasons for its obsolescence
11	2	1	2. Philosophy Of Limit State Method (LSM)2.1 Definition, Advantages of LSM over WSM,
12		1	IS code suggestions regarding design philosophy.
13		1	2.2 Types of limit states, partial safety factors for materials strength,
14		1	characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
15		1	Revision
16		1	Revision
17		1	Practice on Problems
18		1	Practice on Problems

19		1	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. .
20		1	Revision
21		1	Revision
22		1	Practice on Problems
23		1	Practice on Problems
24		1	3. Analysis and Design of Single and Double Reinforced Sections (LSM)3.1 Limit state of collapse (flexure), Assumptions,
25		1	Stress-Strain relationship for concrete and steel,
26		1	neutral axis, stress block diagram and strain diagram for singly reinforced section
27		1	Revision
28		1	Revision
29		1	Practice on Problems
30		1	Practice on Problems
31	3	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.
32		1	3.3 Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
33		1	3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section
34		1	Revision
35		1	Revision
36		1	Practice on Problems
37		1	Practice on Problems
38		1	4.Shear, Bond and Development Length (LSM)

39		1	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.
40	4	1	4.2 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.
41		1	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)
42		1	Revision
43		1	Revision
44		1	Practice on Problems
45		1	Practice on Problems
46		1	5.Analysis and Design of T-Beam (LSM)
47		1	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
48	5	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.
49		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)..
50		1	Revision
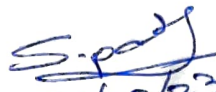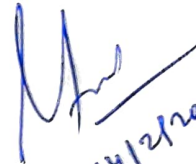
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52		1	Revision
53		1	Practice on Problems
54		1	Practice on Problems
		1	6. Analysis and Design of Slab and Stair case (LSM)
55		1	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.
56		1	6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
57	6	1	6.3 Design of two-way simply supported slabs for flexure with corner free to lift.
58		1	Revision
59		1	Revision
60		1	Practice on Problems
61		1	Practice on Problems
62		1	6.4 Design of dog-legged staircase
63		1	Practice on Problems
64		1	6.5 Detailing of reinforcement in stairs spanning longitudinally.
65		1	Practice on Problems
66		1	7 Design of Axially loaded columns and Footings (LSM)
67		1	7.1 Assumptions in limit state of collapse- compression.
68		1	7.2 Definition and classification of columns, effective length of column.
69	7	1	Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
70		1	7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
71		1	Revision
72		1	Practice on Problems

73		1	7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.
74		1	Revision
75		1	Practice on Problems
	Total	**75**	

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