

**BHUBANANANDA ODISHA SCHOOL OF ENGINEERING,  
CUTTACK  
DEPARTMENT OF CIVIL ENGINEERING**



**LESSON PLAN**

**SUBJECT: STRUCTURAL DESIGN - I (TH-1)**

**FACULTY: MALABIKA PATRA**

**ACADEMIC SESSION: 2022-23 (SUMMER)**

**SEMESTER: 4<sup>TH</sup>**

**SECTION : B**

Sd/-  
H O D (Civil Engg.)

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<b>DISCIPLINE: CIVIL ENGINEERING</b>	<b>SEMESTER:4<sup>TH</sup> B</b>		<b>NAME OF TEACHING FACULTY: MALABIKA PATRA</b>
<b>Subject: SD I</b>	<b>No. of Days / week class allotted: 05 periods per week (Mon-1, Tue-1, Wed-1 &amp; Fri- 2 Period)</b>		<b>Semester From Date: 14-02-2023 To Date 23-05-2023 No. of Weeks: 15</b>
<b>Week</b>	<b>Date</b>	<b>No. of periods available</b>	<b>Topics to be covered</b>
1ST	14/02/2023	1	1. WORKING STRESS METHOD (WSM) 1.1 Objectives of design and detailing. State the different methods of design of concrete structures.
	15/02/2023	1	1.2 Introduction to reinforced concrete, R.C. sections their behaviour, grades of concrete and steel. Permissible stresses, assumption in W.S.M.
	17/02/2023	2	1.3 Flexural design and analysis of single reinforced sections from first principles.
2ND	20/02/2023	1	1.4 Concept of under reinforced, over reinforced and balanced sections.
	21/02/2023	1	1.5 Advantages and disadvantages of WSM, reasons for its obsolescence.
	22/02/2023	1	2. PHILOSOPHY OF LIMIT STATE METHOD (LSM) 2.1 Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy
	24/02/2023	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
3RD	27/02/2023	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.
	28/02/2023	1	3 ANALYSIS AND DESIGN OF SINGLE AND DOUBLE REINFORCED SECTIONS (LSM) 3.1 Limit state of collapse (flexure), Assumptions, Stress-Strain relationship for

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			concrete and steel
	01/03/2023	1	3.1 Neutral axis, stress block diagram and strain diagram for singly reinforced section
	03/03/2023	2	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	06/03/2023	1	3.3 Analysis: determination of design constants for rectangular sections
	10/03/2023	2	3.3 Analysis: determination of Moment of resistance for rectangular sections
5TH	13/03/2023	1	3.3 Design: Determination of area of steel for rectangular sections
	14/03/2023	1	3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section.
	15/03/2023	1	Monthly Class Test 1
	17/03/2023	2	3.4 design of doubly reinforced rectangular section
6TH	20/03/2023	1	4 SHEAR, BOND AND DEVELOPMENT LENGTH (LSM) 4.1 Nominal shear stress in R.C. section, design shear strength of concrete, maximum shear stress
	21/03/2023	1	4.1 design of shear reinforcement, minimum shear reinforcement, forms of shear reinforcement.
	22/03/2023	1	4.2 Bond and types of bonds, bond stress, check for bond stress anchorage value for hooks 90-degree bend and 45-degree bend standards lapping of bars
	24/03/2023	2	4.2 development length in tension and compression, check for development length.
7TH	27/03/2023	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.
	28/03/2023	1	4.3 Numerical problems on Design of shear reinforcement
	29/03/2023	1	5. Analysis and Design of T-Beam (LSM) 5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions
	31/03/2023	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

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8TH	03/04/2023	1	5.3 Simple numerical problems on T beam
	04/04/2023	1	5.3 Simple numerical problems on T beam
	05/04/2023	1	Numerical problems on design of simply supported beam and check the adequacy against shear and deflection.
9TH	10/04/2023	1	Numerical problems on design of simply supported beam and check the adequacy against shear and deflection
	11/04/2023	1	6 ANALYSIS AND DESIGN OF SLAB AND STAIR CASE (LSM) 6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear
	12/04/2023	1	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear
10TH	17/04/2023	1	Class Test 2
	18/04/2023	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.
	19/04/2023	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.
	21/04/2023	2	6.3 Design of two-way simply supported slabs for flexure with corner free to lift
11TH	24/04/2023	1	6.3 Design of two-way simply supported slabs for flexure with corner free to lift
	25/04/2023	1	6.4 Different types of staircase
	26/04/2023	1	6.5 Design of dog legged staircase
	28/04/2023	2	INTERNAL ASSESSMENT
12TH	01/05/2023	1	6.5 Design of dog legged staircase
	02/05/2023	1	6.5 Design of dog legged staircase
	03/05/2023	1	6.5 Detailing of reinforcement in stairs spanning longitudinally
13TH	08/05/2023	1	7 DESIGNS OF AXIALLY LOADED COLUMNS AND FOOTINGS (LSM) 7.1 Assumptions in limit state of collapse- compression
	09/06/2023	1	7.2 Definition and classification of columns, effective length of column
	10/05/2023	1	7.2 Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	12/05/2023	2	7.3 Analysis and design of axially loaded short square column (with lateral ties only)
14TH	15/05/2023	1	7.3 Analysis and design of axially loaded short circular column (with lateral ties only)

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	16/05/2023	1	7.3 Analysis and design of axially loaded short rectangular column (with lateral ties only)
	17/05/2023	1	7.4 Types of footing,
15TH	22/05/2023	1	7.4 Design of isolated square column footing of uniform thickness for flexure and shear
	23/05/2023	1	7.4 Design of isolated square column footing of uniform thickness for flexure and shear