

DHABALESWAR INSTITUTE OF POLYTECHNIC

LESSON PLAN

Discipline: CIVIL	Semester: 4 TH	Name of the Teaching Faculty CHITNAY KUMAR DAS
Subject: STRUCTURAL DESIGN-I	No. of days per week Class Allotted:	Semester from Dt. 14/02/23 to Dt. 23/05/23 No. of Weeks: 15
Week	Class Day	Theory / Practical Topics
1 st week	1 st class 2 nd class 3 rd class 4 th class	1. <u>Working stress method (WSM)</u> 1.1. objectives of design and detailing state the different methods of design of concrete structures. 1.2. Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete and steel. Permissible stresses, assumption in W.S.M.
2 nd week	1 st class 2 nd class 3 rd class 4 th class	1.3. Flexural design and analysis of single reinforced sections from first Principles. 1.4. Concept of under reinforced, over reinforced and balanced sections. 1.5. Advantages and disadvantages of WSM, reasons for its obsolescence.
3 rd week	1 st class 2 nd class 3 rd class 4 th class	2. <u>Philosophy of Limit state Method (LSM)</u> 2.1. Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy. 2.2. Types of Limit states, Partial safety factors for material strength, characteristic strength, characteristic load, design load, loading on structure as per IS 875.
4 th week	1 st class	

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5th week	2nd class	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.
	3rd class	
	4th class	
6th week		<u>3. Analysis and Design of single and Double Reinforced sections (LSM)</u>
	1st class	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.
	2nd class	
	3rd class	
	4th class	
		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.
	1st class	
	2nd class	
	3rd class	
	4th class	3.3. Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections.
		3.4. Necessity of doubly reinforced section, design of doubly reinforced rectangular section.

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7 th week	1 st day	4. <u>Shear, Bond and Development Length (LSM)</u>
	2 nd day	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.
	3 rd day	
	4 th day	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.
8 th week	1 st day	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)
	2 nd day	
	3 rd day	
	4 th day	5. <u>Analysis and Design of T-Beam (LSM)</u>
9 th week	1 st day	5.1. General features, advantages, effective width of flange as per IS: 456-2000 Code Provisions.
	2 nd day	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 rd day	5.3. Simple numerical problems on deciding effective flange width.
	4 th day	
10 th week	1 st day	
	2 nd day	
	3 rd day	
	4 th day	

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Week	Class Day	Theory / Practical Topics
11 th week	1 st class	6. <u>Analysis and Design of slab and stair case</u>
	2 nd class	6.1. Design of simple supported one-way slabs for flexure check for deflection control and shear.
	3 rd class	6.2. Design of one-way cantilever slabs and cantilever chajias for flexure check for deflection control and check for development length and shear.
	4 th class	
12 th week	1 st class	6.3. Design of two-way simply supported slabs for flexure with corner free to lift.
	2 nd class	6.4. Design of dog-legged staircase.
	3 rd class	6.5. Detailing of reinforcement in stairs spanning longitudinally.
	4 th class	7. <u>Design of Axially Loaded Columns and footings</u>
13 th week	1 st class	7.1. Assumptions in limit state of collapse - compression.
	2 nd class	7.2. Definition and classification of column, 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 rd class	
	4 th class	
14 th week	1 st class	7.3. Analysis and design of axially loaded short square, rectangular and circular columns.
	2 nd class	
	3 rd class	
	4 th class	
15 th week	1 st class	7.4. Types of footing, Design of isolated square, column footing of uniform thickness for flexure and shear.
	2 nd class	
	3 rd class	
	4 th class	