SYNERGY SCHOOL OF ENGINEERING, DHENKANAL
LESSON PLAN
Session: 2024-25

Discipline: Civil Engineering	Semester: 4th	Name of the Faculty: Kedarnath Behera E-mail ID: kedarnathbehera2015@gmail.com	
Subject: Structural Design-I	No. Of Days/Week Class Allotted-5	Start Date: 4/2/25 End Date: 17/5/25	
Week	**Class Day**	**Theory**	
1st	1st	Objectives of design and detailing. State the different methods of design of concrete structures.	
	2nd	Introduction to reinforced concrete, R.C. sections their behaviour, grades of concrete and steel. Permissible stresses, assumption in W.S.M.	
	3rd	Flexural design and analysis of single reinforced sections from first principles.	
	4th	Concept of under reinforced, over reinforced and balanced sections.	
	5th	Advantages and disadvantages of WSM, reasons for its obsolescence.	
2nd	1st	Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.	
	2nd	Types of limit states, partial safety factors for materials strength,	
	3rd	characteristic load, design load, loading on structure as per I.S. 875	
	4th	Study of I.S specification regarding spacing of reinforcement in slab	
	5th	cover to reinforcement in slab, beam column & footing	
3rd	1st	minimum reinforcement in slab, beam & column, lapping, anchorage, effective span for beam & slab.	
	2nd	Limit state of collapse (flexure), Assumptions	
	3rd	Stress-Strain relationship for concrete and steel, neutral axis,	
	4th	stress block diagram and strain diagram for singly reinforced section.	
	5th	Concept of under- reinforced, over-reinforced and limiting section,	
4th	1st	neutral axis co-efficient,	
	2nd	limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section	
	3rd	Analysis and design: determination of design constants	
	4th	moment of resistance and area of steel for rectangular sections	
	5th	Necessity of doubly reinforced section	
5th	1st	design of doubly reinforced rectangular section	
	2nd	Problem	
	3rd	Problem	
	4th	Problem	
	5th	Problem	

6th	1st	Nominal shear stress in R.C. section,	
	2nd	design shear strength of concrete, maximum shear stress,	
	3rd	design of shear reinforcement, minimum shear reinforcement,	
	4th	forms of shear reinforcement.	
	5th	Bond and types of bonds, bond stress	
7th	1st	check for bond stress, development length in tension and compression,	
	2nd	anchorage value for hooks 900 bend and 450 bend standards lapping of bars, check for development length	
	3rd	Numerical problems on deciding whether shear reinforcement is required or not,	
	4th	check for adequacy of the section in shear. Design of shear reinforcement	
	5th	Minimum shear reinforcement in beams (Explain through examples only).	
8th	1st	Problem	
	2nd	Problem	
	3rd	Problem	
	4th	Problem	
	5th	Analysis and Design of T-Beam (LSM) General features, advantages,	
9th	1st	effective width of flange as per IS: 456-2000 code provisions.	
	2nd	Analysis of singly reinforced T-Beam	
	3rd	strain diagram & stress diagram, depth of neutral axis,	
	4th	moment of resistance of T-beam section with neutral axis lying within the flange.	
	5th	Problem	
10th	1st	Problem	
	2nd	Problem	
	3rd	Problem	
	4th	Problem	
	5th	Simple numerical problems on deciding effective flange width.	
11th	1st	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).	
	2nd	Problem	
	3rd	Problem	
	4th	Design of simply supported one-way slabs for flexure check for deflection control and shear.	
	5th	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear	

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12th	1st	Design of two-way simply supported slabs for flexure with corner free to lift.	
	2nd	problem	
	3rd	problem	
	4th	Design of dog-legged staircase	
	5th	Problem	
13th	1st	Detailing of reinforcement in stairs spanning longitudinally.	
	2nd	problem	
	3rd	Assumptions in limit state of collapse- compression	
	4th	Definition and classification of columns	
	5th	effective length of column. Specification for minimum reinforcement;	
14th	1st	cover, maximum reinforcement, number of bars in rectangular,	
	2nd	square and circular sections, diameter and spacing of lateral ties.	
	3rd	Analysis and design of axially loaded short square,	
	4th	rectangular and circular columns (with lateral ties only).	
	5th	problem	
15th	1st	problem	
	2nd	Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.	
	3rd	Problem	
	4th	problem	
	5th	Revision	