LESSON PLAN

Discipline: Civil	Semester: 4th	Semester from: 16.01.24 to 26.04.24 No. of weeks:17
Subject: Structural Design – I Th.1	No. of days/per week Class Allotted: 5	Name of the teaching faculty: Sushree Souravi Rout

Week	Class/Day	Theory Topics
1st	1st	CH 1:Working stress method (WSM)
	2nd	1.1 Objectives of design and detailing. State the different methods of design of concrete structures.
	3rd	-DO-
	4th	-DO-
	5th	1.2 Introduction to reinforced concrete, R.C. sections their behavior,
2nd	1st	grades of concrete and steel.
	2nd	Permissible stresses, assumption in W.S.M.
	3rd	1.3 Flexural design and analysis of single reinforced sections from first principles.
	4th	1.4 Concept of under reinforced, over reinforced and balanced sections.
	5th	-DO-
3rd	1st	1.5 Advantages and disadvantages of WSM, reasons for its obsolescence.
	2nd	-DO-
	3rd	CH:2 Philosophy Of Limit State Method (LSM)
	4th	2.1 Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy
	5th	-DO-
4th	1st	2.2 Types of limit states, partial safety factors for materials strength, characteristic strength,
	2nd	characteristic load, design load, loading on structure as per I.S. 875
	3rd	2.3 Study of I.S specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam column & footing,
	4th	minimum reinforcement in slab, beam & column,
	5th	lapping, anchorage, effective span for beam & slab.
5th	1st	CH 3: Analysis and Design of Single and Double Reinforced Sections (LSM)
	2nd	-DO-

	3rd		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.
	4th		-DO-
	5th		-DO-
6th	1st		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.
	2nd		-DO-
	3rd		-DO-
	4th		-DO-
	5th		3.3 Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
7th	1st		-DO-
	2nd		-DO-
	3rd		-DO-
	4th		3.4 Necessity of doubly reinforced section, design of doubly reinforced rectangular section
	5th		-DO-
8th	1st		CH 4: Shear, Bond and Development Length (LSM
	2nd		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.
	3rd		-DO-
	4th		-DO-
	5th		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.
9th	1st		-DO-
	2nd		-DO-
	3rd		-DO-
	4th		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).
	5th		-DO-
10th	1st		-DO-
	2nd		-DO-
	3rd		-DO-

		4th	CH 5: Analysis and Design of T-Beam (LSM)
		5th	5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
11th		1st	-DO-
		2nd	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.
		3rd	-DO-
		4th	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).
		5th	-DO-
12th		1st	-DO-
		2nd	CH 6: Analysis and Design of Slab and Stair case (LSM)
		3rd	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear.
		4th	-DO-
		5th	-DO-
13th		1st	6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
		2nd	-DO-
		3rd	6.3 Design of two-way simply supported slabs for flexure with corner free to lift.
		4th	-DO-
		5th	-DO-
14th		1st	6.4 Design of dog-legged staircase
		2nd	-DO-
		3rd	-DO-
		4th	6.5 Detailing of reinforcement in stairs spanning longitudinally.
		5th	CH 7: Design of Axially loaded columns and Footings (LSM)
15th		1st	7.1 Assumptions in limit state of collapse-compression.
		2nd	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.
		3rd	-DO-
		4th	-DO-

	5th	7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
16th	1st	-DO-
	2nd	-DO-
	3rd	-DO-
	4th	7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.
	5th	-DO-
17th	1st	-DO-
	2nd	REVISION
	3rd	REVISION
	4th	REVISION
	5th	REVISION

Signature of faculty