LESSON PLAN FOR STRUCTURAL DESIGN -1

Discipline Civil Engg.	**Semester**: 4th	**Name of teaching faculty**: RAJ KRISHNA NANDA
Subject: STRUCTURAL DESIGN -1	Nos of days per week class allotted: 5	Semester from date:9.12.19 to date:31.03.20
Week	**Class day**	**Theory topics**
DEC 2ND Week	1ST	**Working stress method (WSM)** 1.1 Objectives of design and detailing. State the different methods of design of concrete structures.
	2ND	Introduction to reinforced concrete, R.C. sections their behavior, 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
DEC 3rd Week	1ST	**Philosophy Of Limit State Method (LSM)** 2.1 Definition, Advantages of LSM over WSM,
	2ND	IS code suggestions regarding design philosophy.
	3RD	Types of limit states, partial safety factors for materials strength,
	4TH	characteristic strength, characteristic load, design load,
	5TH	loading on structure as per I.S. 875
January 1st week	1ST	Study of I.S specification regarding spacing of reinforcement in slab, ,
	2ND	cover to reinforcement in slab
January 2nd week	1ST	beam column & footing, minimum reinforcement in slab, beam & column,
	2ND	lapping, anchorage, effective span for beam & slab.
	3RD	**Analysis and Design of Single and Double Reinforced Sections (LSM)** 3.1 Limit state of collapse (flexure), Assumptions,
	4TH	Stress-Strain relationship for concrete and steel, neutral axis, stress block diagram and strain diagram for singly reinforced section.
	5TH	Concept of under- reinforced, over-reinforced and limiting section, neutral axis

		co-efficient
January 3rd week	1ST	limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	2ND	Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
	3RD	Necessity of doubly reinforced section
	4TH	design of doubly reinforced rectangular section
	5TH	**Shear, Bond and Development Length (LSM)** 4.1 Nominal shear stress in R.C. section,
January 4th week	1ST	design shear strength of concrete, maximum shear stress, design of shear reinforcement,
	2ND	minimum shear reinforcement, forms of shear reinforcement.
	3RD	Bond and types of bond, bond stress, check for bond stress,
	4TH	development length in tension and compression, anchorage value for hooks 900 bend
	5TH	450 bend standards lapping of bars, check for development length.
January 5th week	1ST	Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear.
	2ND	Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only).
	3RD	**Analysis and Design of T-Beam (LSM)** 5.1 General features, advantages,
	4th	effective width of flange as per IS: 456-2000 code provisions.
	5th	Analysis of singly reinforced T-Beam,
February 2nd week	1ST	strain diagram & stress diagram, depth of neutral axis,
	2ND	moment of resistance of T-beam section with neutral axis lying within the flange.
	3RD	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)..
	4TH	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	**Analysis and Design of Slab and Stair case (LSM)**.
February 3rd week	1ST	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear
	2ND	Design of one-way cantilever slabs
	3RD	cantilevers chajjas for flexure check for deflection control
	4TH	check for development length and shear.
February 4th week	1ST	Design of two-way simply supported slabs for flexure with corner free to lift.
	2ND	Design of two-way simply supported slabs for flexure with corner free to lift.
	3RD	Design of dog-legged staircase
	4th	Design of dog-legged staircase
	5th	Detailing of reinforcement in stairs spanning longitudinally.
February 5th week	1ST	**Design of Axially loaded columns and Footings (LSM)**
	2ND	Assumptions in limit state of collapse- compression.
	3RD	Definition and classification of columns
	4TH	effective length of column.
	5TH	Specification for minimum reinforcement
March 1st week	1ST	cover, maximum reinforcement
	2ND	number of bars in rectangular
	3RD	number of bars in square and circular sections
	4TH	diameter and spacing of lateral ties.
	5TH	Analysis and design of axially loaded short square
March 2nd week	1ST	Analysis and design of axially loaded short square, rectangular
	2ND	Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	3RD	Types of footing,
March 3rd week	1ST	Design of isolated square column footing of uniform thickness for flexure and shear.

	2ND	Design of isolated square column footing of uniform thickness for flexure and shear
	3RD	Design of isolated square column footing of uniform thickness for shear
	4TH	Design of isolated square column footing of uniform thickness for shear
	5TH	Doubt clearing
March 4th week	1ST	Doubt clearing
	2ND	Revision
	3RD	Revision
	4TH	Question discussion
	5TH	Question discussion