

## LESSON PLAN FOR STRUCTURAL DESIGN -1

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

		co-efficient
January 3rd week	1 <sup>ST</sup>	limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	2 <sup>ND</sup>	Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
	3 <sup>RD</sup>	Necessity of doubly reinforced section
	4 <sup>TH</sup>	design of doubly reinforced rectangular section
	5 <sup>TH</sup>	<b>Shear, Bond and Development Length (LSM)</b> 4.1 Nominal shear stress in R.C. section,
January 4th week	1 <sup>ST</sup>	design shear strength of concrete, maximum shear stress, design of shear reinforcement,
	2 <sup>ND</sup>	minimum shear reinforcement, forms of shear reinforcement.
	3 <sup>RD</sup>	Bond and types of bond, bond stress, check for bond stress,
	4 <sup>TH</sup>	development length in tension and compression, anchorage value for hooks 90° bend
	5 <sup>TH</sup>	45° bend standards lapping of bars, check for development length.
January 5th week	1 <sup>ST</sup>	Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear.
	2 <sup>ND</sup>	Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only).
	3 <sup>RD</sup>	<b>Analysis and Design of T-Beam (LSM)</b> 5.1 General features, advantages,
	4 <sup>th</sup>	effective width of flange as per IS: 456-2000 code provisions.
	5 <sup>th</sup>	Analysis of singly reinforced T-Beam,
February 2nd week	1 <sup>ST</sup>	strain diagram & stress diagram, depth of neutral axis,
	2 <sup>ND</sup>	moment of resistance of T-beam section with neutral axis lying within the flange.
	3 <sup>RD</sup>	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)..
	4 <sup>TH</sup>	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)..
	5 <sup>TH</sup>	<b>Analysis and Design of Slab and Stair case (LSM).</b>
February 3rd week	1 <sup>ST</sup>	6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear
	2 <sup>ND</sup>	Design of one-way cantilever slabs
	3 <sup>RD</sup>	cantilevers chajjas for flexure check for deflection control
	4 <sup>TH</sup>	check for development length and shear.
February 4th week	1 <sup>ST</sup>	Design of two-way simply supported slabs for flexure with corner free to lift.
	2 <sup>ND</sup>	Design of two-way simply supported slabs for flexure with corner free to lift.
	3 <sup>RD</sup>	Design of dog-legged staircase
	4 <sup>th</sup>	Design of dog-legged staircase
	5 <sup>th</sup>	Detailing of reinforcement in stairs spanning longitudinally.
February 5th week	1 <sup>ST</sup>	<b>Design of Axially loaded columns and Footings (LSM)</b>
	2 <sup>ND</sup>	Assumptions in limit state of collapse- compression.
	3 <sup>RD</sup>	Definition and classification of columns
	4 <sup>TH</sup>	effective length of column.
	5 <sup>TH</sup>	Specification for minimum reinforcement
March 1st week	1 <sup>ST</sup>	cover, maximum reinforcement
	2 <sup>ND</sup>	number of bars in rectangular
	3 <sup>RD</sup>	number of bars in square and circular sections
	4 <sup>TH</sup>	diameter and spacing of lateral ties.
	5 <sup>TH</sup>	Analysis and design of axially loaded short square
March 2 <sup>nd</sup> week	1 <sup>ST</sup>	Analysis and design of axially loaded short square, rectangular
	2 <sup>ND</sup>	Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	3 <sup>RD</sup>	Types of footing,
March 3 <sup>rd</sup> week	1 <sup>ST</sup>	Design of isolated square column footing of uniform thickness for flexure and shear.

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