

# LESSON PLAN OF 4<sup>th</sup> SEMESTER(2019-22) CIVIL ENGINEERING

Discipline :- CIVIL Semester:- 4<sup>th</sup> Name of the Teaching Faculty:- MRS.MADHUSMITA SAHOO

Subject:- Structural Design-1 TH 1 No of Days/per Week Class Allotted :- 05 Semester From:- 19<sup>th</sup> Apr, 2021 To:- 13<sup>th</sup> Aug, 2021 No of Weeks:- 17 ONLINE CLASS

Week	Class Day	Theory Topics
1 <sup>st</sup>	1 <sup>st</sup>	<b>1.0 Working stress method (WSM)</b> 1.1 Objectives of design and detailing.
	2 <sup>nd</sup>	State the different methods of design of concrete structures.
	3 <sup>rd</sup>	1.2 Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete
	4 <sup>th</sup>	and steel Permissible stresses, assumption in W.S.M.
	5 <sup>th</sup>	1.3 Basic concept of under reinforced, over reinforced and balanced section
2 <sup>nd</sup>	1 <sup>st</sup>	1.4 flexural design & analysis of singly and doubly reinforced rectangular sections.
	2 <sup>nd</sup>	Numerical problems on Balanced section
	3 <sup>rd</sup>	Numerical problems on Balanced section
	4 <sup>th</sup>	Numerical problems on under reinforced section
	5 <sup>th</sup>	Numerical problems on under reinforced section
3 <sup>rd</sup>	1 <sup>st</sup>	Numerical problems on over reinforced section
	2 <sup>nd</sup>	Numerical problems on over reinforced section
	3 <sup>rd</sup>	<b>2.0 Limit state method (LSM)</b> 2.1 Definition, types of limit states, partial safety factors for materials strength.
	4 <sup>th</sup>	Characteristic load, design load, loading on structure 2.2 I.S specification regarding spacing of reinforcement in slab,
	5 <sup>th</sup>	Cover to reinforcement in slab Beam column & footing, minimum reinforcement in slab.
4 <sup>th</sup>	1 <sup>st</sup>	Beam & column, lapping, anchorage
	2 <sup>nd</sup>	Effective span for beam & slab.
	3 <sup>rd</sup>	<b>3.0 Analysis and design of singly reinforced sections (LSM) and doubly reinforced section (LSM)</b> 3.1 Limit state of collapse (flexure), Assumptions, Stress-Strain relationship for concrete and steel, neutral axis.
	4 <sup>th</sup>	Stress block diagram and strain diagram for singly reinforced section.
	5 <sup>th</sup>	3.2 Concept of under- reinforced, over-reinforced and limiting section
5 <sup>th</sup>	1 <sup>st</sup>	Neutral axis co-efficient,
	2 <sup>nd</sup>	Limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
	3 <sup>rd</sup>	Numerical problems on determining design constants
	4 <sup>th</sup>	Numerical problems on determining design constants
	5 <sup>th</sup>	Numerical problems on determining design constants
6 <sup>th</sup>	1 <sup>st</sup>	Moment of resistance and area of steel for rectangular sections.
	2 <sup>nd</sup>	Numerical problems on Moment of Resistance.
	3 <sup>rd</sup>	3.3 General features, necessity of providing doubly reinforced section, reinforcement limitations

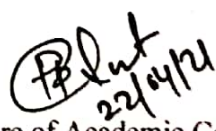


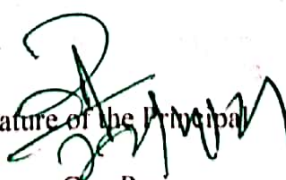
	4 <sup>th</sup>	3.4 Analysis of doubly reinforced section, strain diagram, stress diagram, depth of neutral axis
	5 <sup>th</sup>	Moment of resistance of the rectangular section.
7 <sup>th</sup>	1 <sup>st</sup>	3.5 Numerical problems on finding moment of resistance and design of beam sections.
	2 <sup>nd</sup>	Numerical problems
	3 <sup>rd</sup>	Numerical problems
	4 <sup>th</sup>	<b>4.0 Shear, Bond and Development Length (LSM)</b> 4.1 Nominal shear stress in R.C. section, design shear strength of concrete, maximum shear stress,
	5 <sup>th</sup>	Design of shear reinforcement, minimum shear reinforcement, forms of shear reinforcement.
8 <sup>th</sup>	1 <sup>st</sup>	4.2 Bond and types of bond, bond stress, check for bond stress, development length in tension and compression,
	2 <sup>nd</sup>	Anchorage value for hooks 90° bend and 45° bend standards lapping of bars check for development length.
	3 <sup>rd</sup>	4.3 Numerical problems on deciding whether shear reinforcement are required or not, check for adequacy of the section in shear. Design of shear reinforcement;
	4 <sup>th</sup>	Minimum shear reinforcement in beams; Determination of Development length required for tension reinforcement of cantilevers beam and slab, check for development length.
	5 <sup>th</sup>	<b>5.0 Analysis and Design of T-Beam (LSM)</b> 5.1 General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
9 <sup>th</sup>	1 <sup>st</sup>	5.2 Analysis of singly reinforced T-Beam, 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>	5.3 Design of T-beam for moment and shear for neutral axis within or up to flange bottom
	4 <sup>th</sup>	5.4 Simple numerical problems on deciding effective flange width.
	5 <sup>th</sup>	Problems on finding moment of resistance of T-beam section when N.A. lies within or up to the bottom of flange
10 <sup>th</sup>	1 <sup>st</sup>	Simple numerical problems
	2 <sup>nd</sup>	Simple numerical problems
	3 <sup>rd</sup>	<b>6.0 Analysis and Design of Slab and Stair case (LSM)</b> 6.1 Design of simply supported one-way slabs for flexure
	4 <sup>th</sup>	Check for deflection control and shear.
	5 <sup>th</sup>	6.2 Design of one-way cantilever slabs for flexure
11 <sup>th</sup>	1 <sup>st</sup>	Check for deflection control and check for development length and shear.
	2 <sup>nd</sup>	Design of cantilevers chajjas for flexure
	3 <sup>rd</sup>	Check for deflection control and check for development length and shear.
	4 <sup>th</sup>	Simple numerical problems on design of one-way simply supported slabs
	5 <sup>th</sup>	Simple numerical problems on design of cantilever slab
12 <sup>th</sup>	1 <sup>st</sup>	6.3 Design of two-way simply supported slabs for flexure with corner free to lift
	2 <sup>nd</sup>	Simple numerical problems on design of two-way simply supported slab
	3 <sup>rd</sup>	6.4 Design of dog-legged staircase
	4 <sup>th</sup>	Simple numerical problems on dog-legged staircase
	5 <sup>th</sup>	Design of cantilever staircase.
13 <sup>th</sup>	1 <sup>st</sup>	Simple numerical problems on cantilever staircase
	2 <sup>nd</sup>	<b>7.0 Design of Axially loaded columns and Footings (LSM)</b>

		7.1 Assumptions in limit state of collapse- compression. 7.2 Definition and classification of columns
	3 <sup>rd</sup>	Length of column. Specification for minimum reinforcement; cover, maximum reinforcement
	4 <sup>th</sup>	Number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	5 <sup>th</sup>	7.3 Analysis and design of axially loaded short column with lateral ties only
	14 <sup>th</sup>	1 <sup>st</sup> Analysis and design of axially loaded square column with lateral ties only 2 <sup>nd</sup> check for short column and check for minimum eccentricity 3 <sup>rd</sup> Analysis and design of axially loaded rectangular columns with lateral ties only 4 <sup>th</sup> Analysis and design of axially loaded circular with lateral ties only 5 <sup>th</sup> 7.4 Types of footing
15 <sup>th</sup>	1 <sup>st</sup>	Design of isolated square column footing for flexure and shear
	2 <sup>nd</sup>	Design of Strip footing for walls.
	3 <sup>rd</sup>	7.5 Simple numerical problems on axially loaded short columns
	4 <sup>th</sup>	Simple numerical problems on isolated footings.
	5 <sup>th</sup>	Simple numerical problems on wall footings.
16 <sup>th</sup>	1 <sup>st</sup>	<b>DOUBT CLEARING CLASS AND REVISION &amp; DISCUSSION</b>
	2 <sup>nd</sup>	
	3 <sup>rd</sup>	
	4 <sup>th</sup>	
	5 <sup>th</sup>	
17 <sup>th</sup>	1 <sup>st</sup>	<b>DOUBT CLEARING CLASS AND REVISION &amp; DISCUSSION</b>
	2 <sup>nd</sup>	
	3 <sup>rd</sup>	
	4 <sup>th</sup>	
	5 <sup>th</sup>	

Madhusmita Sahoo.  
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