

LESSON PLAN

DEPARTMENT OF CIVIL ENGINEERING, ITT, CHOUDWAR

SUBJECT: STRUCTURAL DESIGN -I

Periods: 5 per week

SEMESTER: 4TH

NAME OF FACULTY: RITUPURNA SWAIN

ACADEMIC YEAR.2021-2022

Semester From date:

To Date:

No. of weeks: 15

Week	Class Day	Theory / Practical Topics
1st	1 st	1. WORKING STRESS METHOD(WSM): 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., Flexural design and analysis of single reinforced sections from first principles
	3rd	Concept of under reinforced, over reinforced and balanced sections, Advantages and disadvantages of WSM, reasons for its obsolescence.
2nd	1 st	2. PHILOSOPHY OF LIMIT STATE METHOD (LSM): Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy, Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load,
	2nd	Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy, Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load,
	3rd	3. ANALYSIS AND DESIGN OF SINGLY AND DOUBLE REINFORCED SECTIONS(LSM): Limit state of collapse (flexure), Assumptions, Stress-Strain relationship for concrete and steel,
3rd	1 st	Neutral axis, stress block diagram and strain diagram for singly reinforced section.
	2nd	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.
	3rd	Limiting percentage of steel required for limiting singly R.C. section. Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
4th	1 st	Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
	2nd	Necessity of doubly reinforced section, design of doubly reinforced rectangular section
	3rd	Design of doubly reinforced rectangular section
5th	1 st	Design of doubly reinforced rectangular section
	2nd	Design of doubly reinforced rectangular section
	3rd	4. SHEAR, BOND AND DEVELOPMENT LENGTH(LSM): Nominal shear stress in R.C. section, design shear strength of concrete,

		<p>maximum shear stress, design of shear reinforcement, minimum shear reinforcement, forms of shear reinforcement.</p> <p>Bond and types of bonds, 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.</p>
6 th	1 st	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).
	2 nd	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). 5. ANALYSIS AND DESIGN OF T- BEAM (LSM): General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	3 rd	General features, advantages, effective width of flange as per IS: 456-2000 code provisions, Moment of resistance of T-beam section with neutral axis lying within the flange.
7 th	1 st	Moment of resistance of T-beam section with neutral axis lying within the flange. Simple numerical problems on deciding effective flange width
	2 nd	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)..
	3 rd	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)..
8 th	1 st	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)..
	2 nd	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)..
	3 rd	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)..
9 th	1 st	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)..
	2 nd	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).. 6. ANALYSIS AND DESIGN OF SLAB AND STAIRCASE (LSM): Design of simply supported one-way slabs for flexure check for deflection control and shear.
	3 rd	Design of simply supported one-way slabs for flexure check for deflection control and shear.
10 th	1 st	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear
	2 nd	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear

	3rd	Design of two-way simply supported slabs for flexure with corner free to lift.
11 th	1 st	Design of two-way simply supported slabs for flexure with corner free to lift.
	2nd	Design of dog-legged staircase
	3rd	Design of dog-legged staircase, Design of dog-legged staircase
12 th	1 st	Design of dog-legged staircase
	2nd	Design of dog-legged staircase 7. DESIGN OF AXIALLY LOADED COLUMNS AND FOOTINGS(LSM): Assumptions in limit state of collapse- compression.
	3rd	Assumptions in limit state of collapse- compression. Definition and classification of columns, effective length of column.
	1st	Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
13 th	2nd	Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	3rd	Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
14 th	1 st	Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	2nd	Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).
	3rd	Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.
15 th	1 st	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 flexure and shear.