

DEPARTMENT OF CIVIL ENGINEERING
GANAPATI INSTITUTE OF ENGINEERING AND TECHNOLOGY, JAGATPUR, CUTTACK

LESSON PLAN OF 4TH SEMESTER(2022-23) CIVIL ENGINEERING

Discipline: CIVIL ENGG.	Semester:- 4 TH	Name of the Teaching Faculty BIBHU RANJAN SAMAL
Subject:- STRUCTURAL DESIGN- I	No of Days/per Week Class Allotted :-05	Semester From:- 13/02/2023 To:- 23/05/2023 No of Weeks:- 15
Week	Class Day	Theory / Practical Topics
1 st	1 st	Working stress method (WSM) : Objectives of design and detailing. State the different methods of design of concrete structures.
	2 nd	Introduction to reinforced concrete, R.C. sections their behavior, grades of concrete and steel. Permissible stresses, assumption in W.S.M.
	3 rd	Flexural design and analysis of single reinforced sections from first principles.
	4 th	Concept of under reinforced, over reinforced and balanced sections.
	5 th	Advantages and disadvantages of WSM, reasons for its obsolescence.
2 nd	1 st	Philosophy of Limit state method (LSM) : Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.
	2 nd	Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
	3 rd	Study of I.S specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam column & footing, minimum reinforcement in slab, beam & column, lapping, anchorage, effective span for beam & slab.
	4 th	Analysis and design of singly and double reinforced sections (LSM)
	5 th	Limit state of collapse (flexure),
3 rd	1 st	Assumptions,
	2 nd	Stress-Strain relationship for concrete and steel, neutral axis, stress block diagram and strain diagram for singly reinforced section.
	3 rd	Numerical
	4 th	Concept of under- reinforced, over-reinforced and limiting section,
	5 th	neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section.
4 th	1 st	Numerical
	2 nd	Analysis and design: determination of design constants,
	3 rd	Numerical
	4 th	moment of resistance and area of steel for rectangular sections
	5 th	Numerical
5 th	1 st	Necessity of doubly reinforced section,
	2 nd	design of doubly reinforced rectangular section
	3 rd	Numerical
	4 th	Shear, Bond and Development Length (LSM) : 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.
	5 th	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.

6 th	1 st	Numerical problems on deciding whether shear reinforcement are 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
	3 rd	Analysis and Design of T-Beam (LSM)
	4 th	General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
	5 th	General features, advantages, effective width of flange as per IS: 456-2000 code provisions.
7 th	1 st	Analysis of singly reinforced T-Beam,
	2 nd	strain diagram & stress diagram, depth of neutral axis
	3 rd	moment of resistance of T-beam section with neutral axis lying within the flange.
	4 th	Numerical
	5 th	Numerical
8 th	1 st	Numerical
	2 nd	Numerical
	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).
	4 th	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 th	Numerical
9 th	1 st	Numerical
	2 nd	Numerical
	3 rd	Analysis and Design of Slab and Stair case (LSM)
	4 th	Design of simply supported one-way slabs for flexure check for deflection control and shear.
	5 th	Design of simply supported one-way slabs for flexure check for deflection control and shear.
10 th	1 st	Design of simply supported one-way slabs for flexure check for deflection control and shear.
	2 nd	Numerical
	3 rd	Numerical
	4 th	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	5 th	Numerical
11 th	1 st	Design of two-way simply supported slabs for flexure with corner free to lift.
	2 nd	Design of two-way simply supported slabs for flexure with corner free to lift.
	3 rd	Design of dog-legged staircase
	4 th	Design of dog-legged staircase
	5 th	Detailing of reinforcement in stairs spanning longitudinally.
12 th	1 st	Detailing of reinforcement in stairs spanning longitudinally.
	2 nd	Numerical
	3 rd	Design of Axially loaded columns and Footings (LSM)
	4 th	Assumptions in limit state of collapse- compression.
	5 th	Assumptions in limit state of collapse- compression.

13 th	1 st	Definition and classification of columns, effective length of column.
	2 nd	Specification for minimum reinforcement; cover, maximum reinforcement,
	3 rd	number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	4 th	number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	5 th	numerical
14 th	1 st	numerical
	2 nd	Analysis and design of axially loaded short square
	3 rd	rectangular and circular columns (with lateral ties only).
	4 th	rectangular and circular columns (with lateral ties only).
	5 th	numerical
15 th	1 st	numerical
	2 nd	Types of footing,
	3 rd	Design of isolated square column footing of uniform thickness for flexure and shear.
	4 th	Design of isolated square column footing of uniform thickness for flexure and shear.
	5 th	numerical