DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN

Discipline: Civil Engg	***Semester: 4th***	***Name of the Teaching faculty: Amlan Nayak***
Subject: Structural design-I Th-1	***No of Days/Week class alloted:5 days***	***No of weeks:15***
Week	***Class Day***	***Topics***
1st	1st	**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.
	3rd	Flexural design and analysis of single reinforced sections fromfirst principles.
	4th	Concept of under reinforced, over reinforced and balancedsections.
	5th	Advantages and disadvantages of WSM, reasons for its obsolescence
2nd	1st	**Philosophy Of Limit State Method (LSM)** Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.
	2nd	Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
	3rd	Study of I.S specification regarding spacing of reinforcement inslab, cover to reinforcement in slab, beam column & footing, minimum reinforcement in slab, beam & column, lapping, anchorage, effective span for beam & slab.
	4th	**Analysis and Design of Single and Double Reinforced Sections(LSM)** Limit state of collapse (flexure), Assumptions, Stress-Strain relationship for concrete and steel
	5th	neutral axis, stress block diagram and strain diagram for singly reinforced section.
3rd	1st	Concept of under- reinforced, over-reinforced and limitingsection, neutral axis co-efficient
	2nd	limiting value of moment of resistance and limiting percentage ofsteel required for limiting singly R.C. section.
	3rd	Analysis and design: determination of design constants
	4th	moment of resistance and area of steel for rectangular sections
	5th	Necessity of doubly reinforced section, design of doublyreinforced rectangular section
4th	*1st*	*problems*
	2nd	*problems*

	3rd	problems
	4th	problems
	5th	problems
5th	1st	problems
	2nd	problems
	3rd	**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.
	4th	Bond and types of bond, bond stress, check for bond stress, development length in tension and compression, anchorage value for hooks 900 bend and 450 bend standards lapping of bars, check for development length.
	5th	Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear
6th	1st	Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only).
	2nd	**Analysis and Design of T-Beam (LSM)** General features, advantages, effective width of flange as per IS: 456-2000 code provisions
	3rd	Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis, moment of resistance of T-beam section with neutral axis lying within the flange
	4th	numerical problems
	5th	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)..
7th	1st	numerical problems
	2nd	numerical problems
	3rd	numerical problems
	4th	numerical problems
8th	1st	numerical problems
	2nd	numerical problems
	3rd	numerical problems
	4th	numerical problems
9th	1st	numerical problems
	2nd	numerical problems
	3rd	numerical problems
	4th	**Analysis and Design of Slab and Stair case (LSM)** Design of simply supported one-way slabs for flexure check for deflection control and shear
10th	1st	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear.
	2nd	Design of two-way simply supported slabs for flexure with corner free to lift.
	3rd	Design of dog-legged staircase
	4th	Detailing of reinforcement in stairs spanning longitudinally
11th	1st	numerical problems

	2nd	*numerical problems*
	3rd	*numerical problems*
	4th	*numerical problems*
12th	*1st*	*numerical problems*
	2nd	*numerical problems*
	3rd	*numerical problems*
	4th	*numerical problems*
13th	*1st*	*numerical problems*
	2nd	*numerical problems*
	3rd	***Design of Axially loaded columns and Footings (LSM)*** *Assumptions in limit state of collapse- compression.*
	4th	*Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, squareand circular sections, diameter and spacing of lateral ties.*
	5th	*Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only).*
14th	*1st*	*Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear.*
	2nd	*numerical problems*
	3rd	*numerical problems*
	4th	*numerical problems*
	5th	*numerical problems*
15th	*1st*	*numerical problems*
	2nd	*numerical problems*
	3rd	*numerical problems*
	4th	*numerical problems*
	5th	*numerical problems*
16th	*1st*	*CLASS TEST 3, PREVIOUS YEAR QUESTIONS, QUIZ*