BHADRAK ENGINEERING SCHOOL & TECHNOLOGY (BEST), ASURALI, BHADRAK

STRUCTURAL DESIGN-1 (Th- 01)

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods as per syllabus	Periods Actually needed	Expected marks
01	**Working stress method**	05	06	10
02	**Philosophy Limit state method**	03	03	10
03	**Analysis and design of singly reinforced & doubly reinforced sections (LSM).**	15	12	15
04	**Shear, Bond and Development Length (LSM)**	04	05	15
05	**Analysis and Design of T-Beam (LSM)**	15	10	15
06	**Analysis Design of Slab and Stair case (LSM)**	15	15	20
07	**Design of Axially loaded columns and Footings (LSM)**	18	17	15
	Total	**75**	**68**	**100**

Sign of Lect.   **Sign of HOD.**   **Sign of AIC**   **Sign of Vice Principal**

LESSON PLAN

Discipline: Civil Engineering	Semester: Fourth (4th)	Name of The Faculty: Er Bapuji Nayak
Subject: Structural Design-1	No of days/ week class allotted: Six(6)	Semester from date: 14. 02.2023 to Date: 23. 05.2023 No of weeks: 15

WEEK	CLASS DAY	THEORY TOPICS
1st	1st	**Chapter No.-01(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 from first principles
	4th	Concept of under reinforced, over reinforced and balanced sections
	5th	Solving numerical
	6th	Advantages and disadvantages of WSM, reasons for its obsolescence.
2nd	1st	*Possible Question Answer Discussion*
	2nd	**Chapter No.-02(Philosophy Of Limit State Method (LSM))** Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy.
	3rd	Types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load, loading on structure as per I.S. 875
	4th	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.
	5th	*Possible Question Answer Discussion*
	6th	**Chapter No.-03 (Analysis and Design of Single and Double Reinforced Sections (LSM))** Limit state of collapse (flexure), Assumptions, Stress-Strain relationship for concrete and steel, neutral axis, stress block diagram and strain diagram for singly reinforced section.
	1st	Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient,

3rd	2nd	limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C. section
	3rd	Analysis and design: determination of design constants, moment of resistance and area of steel for rectangular sections
	4th	Analysis and design: determination of moment of resistance and area of steel for rectangular sections
	5th	Analysis and design: determination of design area of steel for rectangular sections
	6th	Necessity of doubly reinforced section .
4th	1st	*Monthly Test- 1*
	2nd	design of doubly reinforced rectangular section
	3rd	Solving numerical
	4th	Solving numerical
	5th	Solving numerical
	6th	*Possible Question Answer Discussion*
5th	1st	**Chapter No.-04 (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.
	2nd	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
	3rd	Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear
	4th	Design of shear reinforcement; Minimum shear reinforcement in beams (Explain through examples only)
	5th	Solving numerical
	6th	*Possible Question Answer Discussion*
6th	1st	**Chapter No.-05 (Analysis and Design of T-Beam (LSM))** General features, advantages, effective width of flange as per IS: 456-2000 code provisions
	2nd	Analysis of singly reinforced T-Beam, strain diagram & stress diagram
	3rd	Depth of neutral axis, moment of resistance of T-beam
	4th	section with neutral axis lying within the flange
	5th	Simple numerical problems on deciding effective flange width
	6th	Problems only on finding moment of resistance of T-beam section when N.A. lies within the bottom of flange shall be asked in written examination).

7th	1st	*Monthly Test- 2*
	2nd	Cont.
	3rd	When N.A. lies up to the bottom of flange shall be asked in written examination).
	4th	Solving numerical.
	5th	Solving numerical.
	6th	*Possible Question Answer Discussion*
8th	1st	**Chapter No.-06 Analysis and Design of Slab and Stair case (LSM)** Design of simply supported one-way slabs for flexure check for deflection control and shear.
	2nd	Cont..
	3rd	Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control
	4th	And check for development length and shear.
	5th	Cont.
	6th	Design of two-way simply supported slabs for flexure with corner free to lift
9th	1st	Cont..
	2nd	Solving numerical
	3rd	Design of dog-legged staircase
	4th	Cont.
	5th	Cont.
	6th	Detailing of reinforcement in stairs spanning longitudinally.
10th	1st	*Monthly Test- 3*
	2nd	Cont..
	3rd	Solving numerical
	4th	Cont.
	5th	*Possible Question Answer Discussion*
	6th	**Chapter No.-07 Design of Axially loaded columns and Footings (LSM)** Assumptions in limit state of collapse- compression
11th	1st	Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement
	2nd	number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
	3rd	Analysis and design of axially loaded short square columns (with lateral ties only)
	4th	rectangular columns (with lateral ties only)
	5th	Solving numerical.
	6th	circular columns (with lateral ties only)

12th	1st	Cont.
	2nd	Types of footing,
	3rd	Design of isolated square column footing of uniform thickness for flexure and shear
	4th	Design of isolated square column footing of uniform thickness for shear
	5th	Cont.
	6th	Cont.
13th	1st	Problem on above
	2nd	Problem on above
	3rd	Problem on above
	4th	***Possible Question Answer Discussion***
	5th	Review Class for Chapter No.- 01
	6th	Review Class for Chapter No.- 02
14th	1st	Review Class for Chapter No.- 03
	2nd	Review Class for Chapter No.- 03
	3rd	Review Class for Chapter No.- 04
	4th	Review Class for Chapter No.- 04
	5th	Review Class for Chapter No.- 05
	6th	Review Class for Chapter No.- 06
15th	1st	Review Class for Chapter No.- 06
	2nd	Review Class for Chapter No.- 07
	3rd	Previous Year (S- 22) Question Answer Discussion
	4th	Previous Year (S- 22) Question Answer Discussion
	5th	Previous Year (S- 21) Question Answer Discussion
	6th	Previous Year (S- 20) Question Answer Discussion

Chapters covered up to IA: **1, 2 , 3,& 4.**