JHARSUGUDA ENGINEERING SCHOOL, JHARSUGUDA
DEPARTMENT OF CIVIL ENGINEERING

SESSION- WINTER 2022

LESSON PLAN

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING
SUBJECT-STRUCTURAL MECHANICS

Name of the FACULTY- Sri Dhanurjaya Behera & Sri Soubhagya mohanty **BRANCH - CIVIL Engg.**
SEMESTER-3rd

Chapter	Week No.	Class Day	Lecture No.	Topic to be Covered
1				**REVIEW OF BASIC CONCEPTS**
	1st	1st	1	**1.1** Definitions of Force, Moment, support conditions, Conditions of equilibrium.
		2nd	2	**1.2** Centroid of geometrical figures, centroid of composite figures.
		3rd	3	Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems.
		4th	4	M.I. of plane lamina & different engineering section.
2				**SIMPLE AND COMPLEX STRESS, STRAIN**
	1st	5th	5	**2.1** Introduction to stresses and strains,Mechanical properties of materials
	2nd	1st	6	Types of stresses,Types of strains , Complimentary shear.
		2nd	7	Hooke's law ,Elastic Constants, Derivation of relationship between the elastic constants.
		3rd	8	**2.2** Concept of Stress- Strain curve of a ductile material.
		4th	9	Significance of percentage elongation and reduction in area of cross section.
		5th	10	Deformation of prismatic bars due to uniaxial load.
	3rd	1st	11	Deformation of prismatic bars due to its self weight.

2	3rd	2nd	12	Elongation and Contraction, Poisson's Ratio, volumetric strain.
		3rd	13	**2.3** Introduction to Principal stresses and strains, Occurrence of normal and tangential stresses.
		4th	14	Concept of Principal stress and Principal Planes, major and minor principal stresses .
		5th	15	Streses in an oblique section of a body subjected to a direct stress in one plane and in two mutually perpendicular direction.
	4th	1st	16	Streses in an oblique section of a body subjected to a simple shear stress only
				and a direct shear stress accompained by a simple shear stress.
		2nd	17	Streses in an oblique section of a body subjected to direct stress in two mutually perpendicular direction accompanied by a simple shear stress.
		3rd	18	Mohr's Circle and its basic concepts.
		4th	19	Application of Mohr's circle to solve problems of complex stresses.
3				**STRESSES IN BEAMS AND SHAFTS**
	4th	5th	20	**3.1** Bending stress in beams – Theory of simple bending & its Assumptions.
	5th	1st	21	Equation for Flexure, Position of N.A. and Centroidal Axis.
		2nd	22	Flexural rigidity &Significance of Section modulus.
		3rd	23	**3.2** Shear stress distribution in beams and standard sections symmetrical about vertical axis.
		4th	24	Stresses in shafts due to torsion-Concept of torsion, basic assumptions of pure torsion.
		5th	25	torsion of solid and hollow circular sections, polar moment of inertia.
	6th	1st	26	**3.3** Concept torsional rigidity, equation of torsion.
		2nd	27	**3.4** Concept of combined bending and direct stresses.

3	6th	3rd	8	Conditions for no tension.
		4th	9	Middle third/fourth rule, Core or Kern for different sections, chimneys, dams and retaining walls.
4				**COLUMNS AND STRUTS**
	6th	5th	30	**4.1** Definitions of Short and Long columns,End conditions & Effective length.
	7th	1st	31	Slenderness ratio, Euler's theory of long colum.
		2nd	32	Critical load for Columns with different end conditions.
		3rd	33	CLASS TEST
5				**SHEAR FORCE AND BENDING MOMENT**
	7th	4th	34	**5.1** Types of Load,Types of Support,Types of Beams based on support conditions.
		5th	35	Calculation of support reactions using equations of static equilibrium.
	8th	1st	36	**5.2** Concept of Shear Force and Bending Moment, Signs Convention for S.F. and B.M.
		2nd	37	Relation between intensity of load, S.F and B.M.
		3rd	38	S.F and B.M diagrams for Cantilever beams.
		4th	39	S.F and B.M diagrams for Simply supported beams.
		5th	40	Discussion of different problems regarding to above concepts.
	9th	1st	41	S.F and B.M diagrams for Over hanging beams.
		2nd	42	Concept and calculation of maximum BM, Point of contra flexure.
		3rd	43	Discussion of various problems regarding to above concept.
		4th	44	CLASS TEST QUSTIONS DISCUSSION & DISTRIBUTION OF EVALUATED ANSWER SHEET TO THE STUDENTS FOR THEIR REFERENCES.
		5th	45	DISCUSSION OF ASSIGNMENT-1 QUESTIONS.

6				**SLOPE AND DEFLECTION**
	10th	1st	46	**6.1** Basic concept of slope and deflection for various beam with boundary conditions.
		2nd	47	Determination of slope and deflection of Cantilever beam-by double integration method.
		3rd	48	**6.2** Determination of slope and deflection of Cantilever beam-by Macaulay's method.
		4th	49	Determination of slope and deflection of simply supported beam-by double integration method.
		5th	50	Determination of slope and deflection of simply supported beam-by Macaulay's method.
	11th	1st	51	calculation of maximum slope and deflection at free end of a cantilever under various loading condition.
		2nd	52	calculation of maximum slope and deflection of a simply supported beam under various loading condition.
		3rd	53	Discussion of various problems regarding to the above concept.
		4th	54	Relationship between slope, deflection and curvature .
		5th	55	DISCUSSION OF ASSIGNMENT-2 QUESTIONS.
7				**INDETERMINATE BEAMS**
	12th	1st	56	**7.1** Concept of determinant and indeterminate structure.
		2nd	57	calculation of indeterminacy of different beam.
		3rd	58	Principle of consistent deformation/compatibility.
		4th	59	Analysis of propped cantilever beam.
		5th	60	SF and BM diagrams (point load and udl covering full span)of propped cantilever.
	13th	1st	61	Analysis of fixed beam.
		2nd	62	SF and BM diagrams of fixed beam .

7	13th	3rd	63	Analysis of two span continuous beams by principle of superposition.
		4th	64	SF and BM diagrams of continuous beam.
		5th	65	Discussion of various problems regarding to the above concept.
8				**TRUSSES**
	14th	1st	66	**8.1** Types of trusses, statically determinate and indeterminate trusses
		2nd	67	Determination of degree of indeterminacy and stability of trusses.
		3rd	68	**8.2** Analysis of Truss by Method of joints.
		4th	69	Analysis of Truss by Method of section.
		5th	70	DISCUSSION OF ASSIGNMENT-3 QUESTIONS.
9	15th	1st	71	CLASS TEST
		2nd	72	PREVIOUS SEMESTER QUESTIONS DISCUSSION
		3rd	73	PREVIOUS SEMESTER QUESTIONS DISCUSSION
		4th	74	PREVIOUS SEMESTER QUESTIONS DISCUSSION
		5th	75	PREVIOUS SEMESTER QUESTIONS DISCUSSION

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Signature of Faculty Member	Counter Signature of H.O.D.