

GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Lesson Plan

Name of the Program		Diploma in Civil Engineering			
Course Name	STRUCTURAL MECHANICS			Course Code	TH1
Course Year	2 ND	Semester	3 rd	Academic Period	2022-2023
No. of Classes allotted per Week		05	Planned Classes Required to Complete the Course		60

Sl. No.	Topic to be covered	Module	No. of hours Required	Mode of Teaching
1	Definitions of Force, Moment, support conditions, Conditions of equilibrium	I	01	BlackBoard
2	centroid of geometrical figures, centroid of composite figures	I	01	BlackBoard
3	Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems.	I	01	BlackBoard
4	MOI of plane lamina & different engineering section.	I	01	BlackBoard
5	Introduction to stresses and strains, Mechanical properties of materials	I	01	BlackBoard
6	Types of stresses, Types of strains, Complimentary shear.	I	01	BlackBoard
7	Hooke's law, Elastic Constants, Derivation of relationship between the elastic constants.	II	01	BlackBoard
8	Concept of Stress-Strain curve of a ductile material.	II	01	BlackBoard
9	Significance of percentage elongation and reduction in area of cross section.	II	01	BlackBoard
10	Deformation of prismatic bars due to uniaxial load.	II	01	BlackBoard
11	Deformation of prismatic bars due to its self weight.	II	01	BlackBoard
12	Elongation and Contraction, Poisson's Ratio, volumetric strain.	II	01	BlackBoard
13	Introduction to Principal stresses and strains, Occurrence of normal and tangential stresses.	II	01	BlackBoard
14	Concept of Principal stress and Principal Planes, major and minor principal stresses .	II	01	BlackBoard
15	Stresses in an oblique section of a body subjected to a direct stress in one plane and in two mutually perpendicular directions	III	01	BlackBoard
16	Stresses in an oblique section of a body subjected to a simple shear stress only and a direct shear stress accompanied by a simple shear stress.	III	01	BlackBoard
17	Stresses in an oblique section of a body subjected to direct stress in two mutually perpendicular directions accompanied by a simple shear stress.	III	01	BlackBoard
18	Mohr's Circle and its basic concepts.	III	01	BlackBoard
19	Application of Mohr's circle to solve problems of complex stresses.	III	01	BlackBoard

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20	Application of Mohr's circle to solve problems of complex stresses.	III	01	Black Board
21	STRESSES IN BEAMS AND SHAFTS Bending stress in beams – Theory of simple bending & its Assumptions	III	01	Black Board
22	Equation for Flexure, Position of N.A. and Centroidal Axis.	III	01	Black Board
23	Flexural rigidity & Significance of Section modulus.	IV	01	Black Board
24	Shear stress distribution in beams and standard sections symmetrical about vertical axis.	IV	01	Black Board
25	Stresses in shafts due to torsion - Concept of torsion, basic assumptions of pure torsion.	IV	01	Black Board
26	torsion of solid and hollow circular sections, polar moment of inertia.	IV	01	Black Board
27	Concept of torsional rigidity, equation of torsion.	IV	01	Black Board
28	Concept of combined bending and direct stresses. Conditions for no tension.	IV	01	Black Board
29	Middle third / fourth rule, Core or Kern for different sections, chimneys, dams and retaining walls.	IV	01	Black Board
30	COLUMNS AND STRUTS Definition of Short and Long columns, End conditions & Effective length.	IV	01	Black Board
31	Slenderness ratio, Euler's theory of long column.	IV	01	Black Board
32	Critical load for Columns with different end conditions.	IV	01	Black Board
33	CLASSTEST	IV	01	Black Board
34	SHEAR FORCE AND BENDING MOMENT Types of Load, Types of Support, Types of Beams based on support conditions.	V	01	Black Board
35	Calculation of support reactions using equations of static equilibrium.	V	01	Black Board
36	Concept of Shear Force and Bending Moment, Signs Convention for S.F. and B.M.	V	01	Black Board
37	Relation between intensity of load, S.F. and B.M.	V	01	Black Board
38	S.F. and B.M. diagrams for Cantilever beams.	V	01	Black Board
39	S.F. and B.M. diagrams for Simply supported beams. X	V	01	Black Board
40	S.F. and B.M. diagrams for Simply supported beams.	V	01	Black Board
41	Discussion of different problems regarding to above concepts	V	01	Black Board
42	S.F. and B.M. diagrams for Overhanging beams.	V	01	Black Board
43	Concept and calculation of maximum BM, Point of contra flexure.	V	01	Black Board
44	Discussion of various problems regarding to above concept.	V	01	Black Board
45	CLASSTEST QUESTIONS DISCUSSION & DISTRIBUTION OF EVALUATED ANSWERS SHEET TO THE STUDENTS FOR THEIR REFERENCES.	V	01	Black Board
46	DISCUSSION OF ASSIGNMENT-1 QUESTIONS	V	01	Black Board

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47	SLOPE AND DEFLECTION Basic concept of slope and deflection for various beam with boundary conditions. Determination of slope and deflection of Cantilever beam- by double integration method.	VI	01	Black Board
48	Determination of slope and deflection of Cantilever beam-by Macaulay's method. Determination of slope and deflection of simply supported beam-by double integration method.	VII	01	Black Board
49	Determination of slope and deflection of simply supported beam-by Macaulay's method. calculation of maximum slope and deflection at free end of a cantilever under various loading condition.	VII	01	Black Board
50	calculation of maximum slope and deflection of a simply supported beam under various loading condition. Discussion of various problems regarding to the above concept. Relationship between slope, deflection and curvature . DISCUSSION OF ASSIGNMENT-2 QUESTIONS	VII	01	Black Board
51	INDETERMINATE BEAMS Concept of determinant and indeterminate structure. calculation of indeterminacy of different beam. Principle of consistent deformation/compatibility.	VIII	01	Black Board
52	Analysis of propped cantilever beam. SF and BM diagrams (point load and udl covering full span) of propped cantilever. Analysis of fixed beam.	VIII	01	Black Board
53	SF and BM diagrams of fixed beam. Analysis of two span continuous beams by principle of superposition. SF and BM diagrams of continuous beam. Discussion of various problems regarding to the above concept	VIII	01	Black Board
54	TRUSSES Types of trusses, statically determinate and indeterminate trusses. Determination of degree of indeterminacy.	VIII	01	Black Board
55	Determination of stability of trusses. Analysis of Truss by Method of joints. Analysis of Truss by Method of joints. (problem solving) Analysis of Truss by Method of section.	VIII	01	Black Board
56	Analysis of Truss by Method of section. (problem solving) DISCUSSION OF ASSIGNMENT-3 QUESTIONS. CLASS TEST.	VIII	01	Black Board
57	SEMESTER QUESTIONS DISCUSSION		01	Black Board

Signature of the Faculty

Signature of the HoD