COURSE TEACHING STRUCTURE
Course: Solid Mechanics

Dept: MECHANICAL   **Class: SE**

1) Simple Stress & Strain

Sr. No.	Topic	Duration	Topic based
1	Introduction to types of loads (Static, Dynamic & Impact Loading) and Interrelation between elastic constants,	1	Numerical & theory
2	Various types of stresses with applications, Hooke's law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus.	1	Numerical & theory
3	Stress-strain diagram for ductile and brittle materials, factor of safety,	1	Numerical & theory
4	Stresses and strains in determinate and	1	Numerical & theory
5	Indeterminate beam, homogeneous and composite bars under concentrated loads and self-weight,	2	Numerical & theory
6	Thermal stresses in plain and composite members	1	Numerical & theory

2) Shear Force and Bending Moment Diagram

Sr. No.	Topic	Duration	Topic based
7	Introduction to SFD, BMD with application,	1	Numerical & theory
8	SFD & BMD for statically determinate beam due to concentrated load,	1	Numerical & theory
9	uniformly distributed load,	2	Numerical & theory
10	uniformly varying load, couple and combined loading,	2	Numerical & theory
11	Relationship between rate of loading, shear force and bending moment,	1	Numerical & theory

12	Concept of zero shear force, Maximum bending moment, point of contra-flexure	1	Numerical & theory

3) Stresses, Slope & Deflection on Beams

Sr. No.	Topic	Duration	Topic based
13	Bending Stress on a Beam: Introduction to bending stress on a beam with application, Theory of Simple bending, assumptions in pure bending,	1	Numerical & theory
14	derivation of flexural formula, Moment of inertia of common cross section (Circular, Hollow circular, Rectangular, I & T), Bending stress distribution along the same cross-section	1	Numerical & theory
15	Shear Stress on a Beam: Introduction to transverse shear stress on a beam with application,	1	Numerical & theory
16	shear stress distribution diagram along the Circular, Hollow circular, Rectangular, I & T cross-section	1	Numerical & theory
17	Slope & Deflection on a Beam: Introduction to slope & deflection on a beam with application,	1	Numerical & theory
18	slope, deflection and Radius of Curvature, Macaulay's Method, Slope and Deflection for all standard beams	1	Numerical & theory

4) Torsion, Buckling

Sr. No.	Topic	Duration	Topic based
19	**Torsion of circular shafts**: Introduction to torsion on a shaft with application,	1	Numerical & theory
20	Basic torsion formulae and assumption in torsion theory, Torsion in stepped and composite shafts,	1	Numerical & theory
21	Torque transmission on strength and rigidity basis, Torsional Resilience	1	Numerical & theory
22	**Torsion on Thin-Walled Tubes**: Introduction of Torsion on Thin-Walled Tubes Shaft and its application	1	Numerical & theory

Sr. No.	Topic	Duration	Topic based
23	**Buckling of columns**: Introduction to buckling of column with its application,	1	Numerical & theory
24	Different column conditions and critical, safe load determination by Euler's theory. Limitations of Euler's Theory	1	Numerical & theory

5) Principal Stresses, Theories of Failure

Sr. No.	Topic	Duration	Topic based
25	Principal Stresses: Introduction to principal stresses with application,	1	Numerical & theory
26	Transformation of Plane Stress, Principal Stresses and planes (Analytical method and Mohr's Circle)	1	Numerical & theory
27	Stresses due to combined Normal and Shear stresses	1	Numerical & theory
28	Theories of Elastic failure: Introduction to theories of failure with application,	1	Numerical & theory
29	Maximum principal stress theory, Maximum shear stress theory	1	Numerical & theory
30	Maximum distortion energy theory, Maximum principal strain theory, Maximum strain energy theory	1	Numerical & theory

6) Application based combined loading & stresses

Sr. No.	Topic	Duration	Topic based
31	Introduction to the Combined Loading and various stresses with application,	1	Numerical & theory
32	Free Body Diagram and condition of Equilibrium for determining internal reaction forces, couples for 2-D system,	1	Numerical & theory
33	Combined stresses at any cross-section or at any particular point for Industrial and Real life example for the following cases:	1	Numerical & theory
34	Combined problem of Normal type of Stresses (Tensile, Compressive and Bending stress),	1	Numerical & theory
35	Combined problem of Shear type of stresses (Direct and Torsional Shear stresses),	1	Numerical & theory

| 36 | Combined problem of Normal and Shear type of Stresses | 1 | Numerical & theory |