

Department of Mechanical Engineering

Lesson Plan

Name of the Subject : Strength of Materials (14BT30301)
Class & Semester : II B.Tech - I Semester
Name of the faculty Member : XYZ

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
UNIT – I: SIMPLE STRESSES AND STRAINS				
1	Elasticity and Plasticity, Types of stresses and strains	1	T1	Bars of tapering sections
2	Hooke's Law, Stress – Strain diagram working stress, Factor of safety	1	T1	
3	Lateral strain, Poisson's ratio and volumetric strain	1	T1	
4	Elastic moduli and the relationship between them	1	T1 & T2	
5	Bars of varying section, Composite bars	2	T1 & T2	
6	Temperature stresses	1	T1 & R1	
7	Strain energy- Resilience – Gradual, sudden, impact and shock loadings	2	T1, T2, & R2	
8	Principal Stresses Mohr's circle	1	T1, R1, & R2	
Total periods required:		10		
UNIT – II: SHEAR FORCE AND BENDING MOMENT				
9	Concept of shear force and bending moment, Point of contra flexure	1	T1 & T2	Over hanging beams
10	S.F. and B.M. diagrams for cantilever beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads	3	T1, T2 & R2	
11	S.F. and B.M. diagrams for simply supported beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads	3	T1, T2 & R2	
12	Relation between S.F., B.M. and rate of loading at a section of a beam	1	T1	
Total periods required:		08		

UNIT-III: FLEXURAL STRESSES				
13	Theory of simple bending, Assumptions, Neutral axis, Bending equation	1	T1, T2 & R1	
14	Determination of bending stresses for simple cases-	2	T1, T2 & R1	
15	Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections	2	T1, T2 & R1	
16	Shear stress formula	1	T1, T2 & R3	
17	Shear stress distribution across various beams & sections like rectangular, Circular, Triangular, I, T sections	2	T1, T2 & R3	
18	Theory of pure torsion, Torsion Equation	1	T1 & R2	
19	Assumptions made in the theory of pure torsion, Torsional moment of resistance	2	T1 & R2	
20	Polar section modulus and simple problems	2	T1, R1 & R2	
Total periods required:		13		
UNIT – IV: DEFLECTION OF BEAMS				
21	Relationship between curvature, slope and deflection	1	T1 & T2	
22	Double Integration method slope and deflection of cantilever and simply supported beams subjected to point loads, uniformly distributed load	2	T1 & T2	
23	Macaulay's method slope and deflection for cantilever and simply supported beams subjected to point loads, uniformly distributed load	2	T1 & T2	
24	Moment area method slope and deflection for cantilever and simply supported beams subjected to point loads, uniformly distributed load	2	T1 & T2	
Total periods required:		07		
UNIT – V: PRESSURE VESSELS				
25	Thin seamless cylindrical shells	1	T1, R1, & R2	
26	Derivation of formula for longitudinal and circumferential stresses, volumetric strain	2	T1, R1, & R2	
27	Thin spherical shells	2	T1, R1, & R2	

28	Thick cylinders under internal and external pressure.	2	T1, R1, & R2	
Total periods required:		07		
Grand total periods required:		45		

Text Books:

1. Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Mechanics of Materials, Laxmi Publications, 1st edition, 2009.
2. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publications, 14th edition, 2011.

Reference Books:

1. James M. Gere, Stephen Timoshenko, Mechanics of Materials, CBS Publications, 2nd edition, 2004.
2. Beer, Johnston & Dewolf, Mechanics of Materials, Tata McGraw-Hill Education
3rd edition, 2004.
3. S.S Rattan, Strength of materials, Tata McGraw Hill Publications, 2nd edition, 2011.