

LESSON PLAN

SUB: STRENGTH OF MATERIAL

BRANCH:- MECHANICAL ENGG.

SEMESTER: 3rd

NAME OF FACULTY: ER. SABYASACHI JAGANNATH MISHRA



**GOVERNMENT POLYTECHNIC,
BHADRAK**

SESSION:2025-26

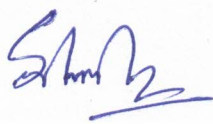
Hod ,Mechanical

Academic Co-ordinator
Academic Co-ordinator

Principal
Govt. Polytechnic, Bhadrak

ACADEMIC LESSON PLAN FOR STRENGTH OF MATERIAL(TH-2)

Discipline: MECHANICAL E NGG	Semester: 3 rd	Name of the Teaching Faculty: SABYASACHI JAGANNATH MISHRA
Subject: STRENGTH OF MATERIAL	No. of days/per week class allotted: 03	Semester From date: 14/07/2025 To Date: 15/11/2025
		No. of Weeks: 15
Week	Class Day	Theory Topics
		Simple Stresses and Strains
1 ST	1 ST	Types of forces; Mechanical properties of common engineering materials
	2 ND	Stress, Strain and their nature; Significance of various points on stress – strain diagram for M.S. and C.I. specimens; Significance of factor of safety;
	3 RD	Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants,
2 ND	1 ST	Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces;
	2 ND	Thermal stresses in bodies of uniform section and composite sections;
	3 RD	Simple problems on above
3 RD	1 ST	Simple problems on above
	2 ND	Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience; Derivation of strain energy for Gradually applied load.
	3 RD	Derivation of strain energy for Suddenly applied load & Impact/shock load.
4 TH	1 ST	Simple problems on above
		Shear Force & Bending Moment Diagrams
	2 ND	Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam;
	3 RD	Types of Loads – Point load, UDL and UVL. Definition and explanation of shear force and bending moment
5 TH	1 ST	Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for a) Cantilever with point loads, b) Cantilever with uniformly distributed load.
	2 ND	Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for c) Simply supported beam with point loads, d) Simply supported beam with UDL.
	3 RD	Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for e) Over hanging beam with point loads, at the center and at free ends, f) Over hanging beam with UDL throughout.



6 TH	1 ST	Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for Combination of point and UDL for the above beams.
	2 ND	Simple problems on above
	3 RD	Simple problems on above
7 TH	1 ST	Simple problems on above
		Theory of Simple Bending and Deflection of Beams
	2 ND	Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section,
	3 RD	Moment of Resistance, Bending stress, Radius of curvature. Assumptions in theory of simple bending;
8 TH	1 ST	Bending Equation $M/I = \sigma/Y = E/R$ with derivation
	2 ND	Simple problems on above
	3 RD	Simple problems on above
9 TH	1 ST	Calculation of safe loads and safe span and dimensions of cross- section;
	2 ND	Definition and explanation of deflection as applied to beams; Deflection formulae without proof for cantilever and simply supported beams with point load and UDL.
	3 RD	Simple problems on above
10 TH	1 ST	Simple problems on above
		Torsion in Shafts and Springs:
	2 ND	Definition and function of shaft; Calculation of polar M.I. for solid and hollow shafts.
	3 RD	Assumptions in simple torsion; Derivation of the equation $T/J = fs/R = G\theta/L$.
11 TH	1 ST	Problems on design of shaft based on strength and rigidity;
	2 ND	Numerical Problems related to comparison of strength and weight of solid and hollow shafts.
	3 RD	Classification of springs; Nomenclature of closed coil helical spring; Deflection formula for closed coil helical spring (without derivation);
12 TH	1 ST	stiffness of spring; Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
	2 ND	Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils
	3 RD	Simple problems on above
13 TH	1 ST	Simple problems on above
		Thin Cylindrical Shells
	2 ND	Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell.

	3 RD	Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell
14 TH	1 ST	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells;
	2 ND	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells;
	3 RD	Numerical Problems for safe thickness and safe working pressure.
15 TH	1 ST	Numerical Problems for safe thickness and safe working pressure.
	2 ND	Discussion of important questions and solving of problems.
	3 RD	Discussion of important questions and solving of problems.

Learning Resources:

01. Strength of Materials, by S Ramamrutham, Dhanpat Rai
02. Strength of Materials by R K Rajput, S. Chand
03. Strength of Materials, by R. S khurmi, S. Chand
04. Strength of Materials, by G H Ryder, Mcmillon and co. lmt d
05. Strength of Materials by S Timoshenko and DH, T


14/7/25



SABYASACHI JAGANNATH MISHRA
LECT. STAGE-I (MECHANICAL ENGG.)
GOVT. POLYTECHNIC, BHADRAK