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: 3rd	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
1ST	1ST	Types of forces; Mechanical properties of common engineering materials
	2ND	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;
	3RD	Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants,
2ND	1ST	Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces;
	2ND	Thermal stresses in bodies of uniform section and composite sections;
	3RD	Simple problems on above
3RD	1ST	Simple problems on above
	2ND	**Strain Energy**: Strain energy or resilience, proof resilience and modulus of resilience; Derivation of strain energy for Gradually applied load.
	3RD	Derivation of strain energy for Suddenly applied load &Impact/ shock load.
4TH	1ST	Simple problems on above
		Shear Force & Bending Moment Diagrams
	2ND	Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam;
	3RD	Types of Loads – Point load, UDL and UVL. Definition and explanation of shear force and bending moment
5TH	1ST	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.
	2ND	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.
	3RD	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.

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

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

LearningResouces:

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,Mcmillonandco.lmtd
05. Strength of MaterialsbyS Timoshenko and DH,T

14/7/25

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