GOVERNMENT POLYTECHNIC JAJPUR

A/ P: Ragadi, Block: Korei, Dist.: Jajpur, Odisha- 755019

Website: https://www.gpjajpur.org E-mail: principalgpjajpur@yahoo.co.in

DEPARTMENT OF MECHANICAL ENGINEERING (2024-2025)

LESSON PLAN

Discipline: Mechanical	Semester: 3rd	Name of the Teaching faculty: GEETANJALI SETHI, Sr. Lecturer,Mechanical Engg.
Subject: Strength of Material(Th-2)	No of Days/ Week class alloted: 3	Semester from Date: 14/07/2025 To Date: / /2025 No of weeks: 15

Week	Class Day	Topics
1st	1st	**CH-1.0 -SIMPLE STRESS AND STRAIN** Types of forces; Stress, Strain and their nature
	2nd	Mechanical properties of common engineering materials
	3rd	Significance of various points on stress – strain diagram for M.S. and C.I. specimens; Significance of factor of safety
2nd	1st	Relation between elastic constants
	2nd	Stress and strain values in bodies of uniform section under the influence of normal forces
	3rd	Stress and strain values in bodies of composite section under the influence of normal forces
3rd	1st	Thermal stresses in bodies of uniform section and composite sections; Related numerical problems on the above topics
	2nd	**Strain energy:** Strain energy or resilience, proof resilience and modulus of resilience
	3rd	Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load
4th	1st	iii) Impact/ shock load; Related numerical problems
	2nd	**CH-2.0 -Shear Force & Bending Moment Diagrams:** 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 only for the following cases: a) Cantilever with point loads
	2nd	b) Cantilever with uniformly distributed load
	3rd	c) Simply supported beam with point loads
6th	1st	d) Simply supported beam with UDL,
	2nd	e) Over hanging beam with point loads, at the centre and at free ends,
	3rd	f) Over hanging beam with UDL throughout
7th	1st	g) Combination of point and UDL for the above; Related numerical problems.
	2nd	**CH-3.0 -Theory of Simple Bending and Deflection of Beams:** Explanation of terms: Neutral layer, Neutral Axis
	3rd	Modulus of Section, Moment of Resistance
8th	1st	Bending stress, Radius of curvature
	2nd	Assumptions in theory of simple bending; Bending Equation $M/I = \sigma/Y = E/R$ with derivation
	3rd	Problems involving calculations of bending stress, modulus of section and moment of resistance
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 with point load and UDL only (Standard cases only)
	3rd	Definition and explanation of deflection as applied to beams; Deflection formulae without proof for simply supported beams with point load and UDL only (Standard cases only)
10th	1st	Related numerical problems
	2nd	**CH-4.0 -Torsion in Shafts and Springs:** 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	Numerical Problems related to comparison of strength and weight of solid and hollow shafts
12th	1st	Classification of springs; Nomenclature of closed coil helical spring
	2nd	Deflection formula for closed coil helical spring (without derivation); stiffness of spring
	3rd	Numerical problems on closed coil helical spring to find safe load, deflection
13th	1st	Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils
	2nd	**CH-5.0 - Thin Cylindrical Shells** Explanation & derivation of longitudinal and hoop stresses in the light of circumferential failure of shell for seamless shells
	3rd	Related numerical Problems for safe thickness and safe working pressure.
14th	1st	Explanation & derivation of longitudinal and hoop stresses in the light of circumferential failure of shell for seam shells
	2nd	Related numerical Problems for safe thickness and safe working pressure.
	3rd	Explanation & derivation of longitudinal and hoop stresses in the light of longitudinal failure of shell for seamless shells
15th	1st	Related numerical Problems for safe thickness and safe working pressure.
	2nd	Explanation & derivation of longitudinal and hoop stresses in the light of longitudinal failure of shell for seam shells
	3rd	Related numerical Problems for safe thickness and safe working pressure.

REFERENCES:

1. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
2. Strength of Materials – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publica- tions, New Delhi, 2013
3. Strength of Materials – R.S. Khurmi, S,Chand Company Ltd. Delhi

10.7.25

Signature of the faculty