

SYNERGY SCHOOL OF ENGINEERING, DHENKANAL

Academic Lesson Plan for Strength of Material (Winter-2026)

Discipline: Mechanical Engineering	Semester: 3rd	Name of Faculty: SOMANATH SETHY
Subject: Strength of Materials	No. of days/per week Class Allotted: 3	Semester from: 1/7/26 End Date: 5/11/26
		No. of weeks: 15
Week	Class Day	Theory Topics
1st	1st	Simple Stresses and Strains: Types of forces; Stress, Strain and their nature; Mechanical properties of common engineering materials
	2nd	Significance of various points on stress – strain diagram for M.S. and C.I. specimens
	3rd	Significance of factor of safety; Relation between 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
	3rd	Thermal stresses in bodies of composite section
3rd	1st	Related numerical problems on the above topic
	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, iii) Impact/ shock load; Related numerical problems.
	1st	Cantilever beam
	2nd	Simply supported beam

4th	3rd	Over hanging beam
5th	1st	Continuous beam
	2nd	Fixed beam
	3rd	Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment; Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method
6th	1st	a) Cantilever with point loads, b) Cantilever with uniformly distributed load, c) Simply supported beam with point loads
	2nd	d) Simply supported beam with UDL, e) Over hanging beam with point loads, at the center and at free ends
	3rd	f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above; Related numerical problems.
7th	1st	Theory of Simple Bending and Deflection of Beams: Explanation of terms: Neutral layer
	2nd	Neutral Axis
	3rd	Modulus of Section

8th	1st	Moment of Resistance
	2nd	Bending stress, Radius of curvature
	3rd	Assumptions in theory of simple bending; Bending Equation $M/I = \sigma/Y = E/R$ with derivation; Problems involving calculations of bending stress, modulus of section and moment of resistance
	1st	Calculation of safe loads and safe span and dimensions of cross-section; Definition and

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9th		explanation of deflection as applied to beams
	2nd	Deflection formulae without proof for cantilever and simply supported beams with point load
	3rd	UDL only (Standard cases only); Related numerical problems.
10th	1st	Torsion in Shafts and Springs: Definition and function of shaft
	2nd	Calculation of polar M.I. for solid and hollow shafts
	3rd	Assumptions in simple torsion
11th	1st	Derivation of the equation $T/J = \tau/r = G\theta/L$
	2nd	Problems on design of shaft based on strength and rigidity
	3rd	Numerical Problems related to comparison of strength and weight of solid and hollow shaft.
	1st	Classification of springs; Nomenclature of closed coil helical spring

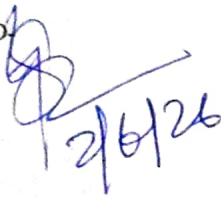
12th	2nd	Deflection formula for closed coil helical spring (without derivation); stiffness of spring
	3rd	Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
13th	1st	Explanation of longitudinal and hoop stresses in the light of circumferential
	2nd	Explanation of longitudinal and hoop stresses in the light of longitudinal failure of shell
	3rd	Derivation of expressions for the longitudinal shells
14th	1st	hoop stress for seamless and seam shell

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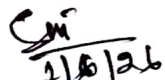
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15th	2nd	Related numerical Problems for safe thickness
	3rd	Related numerical Problems for safe working pressure.
	1st	Problem solve
	2nd	Problem solve
	3rd	Problem solve

VERIFIED BY HOD


26/6/26

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