Utkalmani Gopabandhu Institute of engineering, Rourkela
Department of mechanical Engineering
LESSON PLAN

Session :: Winter – 2025

Semester date::14/07/25 to 15/11/25

Course Type :: Theory

Semester/Branch :: 3rd Semester, Mechanical Engineering

Subject (with code) :: Strength of material (Th-2)

Contact hours/week :: 3

Name of Faculty :: Kalebar Singh

week	class	topic
1st	1	Lesson plan, Syllabus importance and Course Outcomes, pattern of Internal assessment, class test **Unit-01** Types of forces
	2	Stress, strain definition and types
	3	Mechanical properties of common engineering materials
2nd	1	Significance of various points on stress – strain diagram for M.S. and C.I. specimens; Significance of factor of safety
	2	Relation between elastic constants
	3	Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces
3rd	1	Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces
	2	Thermal stresses in bodies of uniform section and composite sections and numerical
	3	Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience
4th	1	Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load
	2	Impact/ shock load and numerical
	3	**Unit-02** 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
5th	1		Class test
	2		Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment
	3		Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only a) Cantilever with point loads
6th	1		b) Cantilever with uniformly distributed load
	2		c) Simply supported beam with point loads
	3		d) Simply supported beam with UDL
7th	1		e) Over hanging beam with point loads, at the center and at free ends
	2		f) Over hanging beam with UDL throughout
	3		g) Combination of point and UDL for the above and related numerical
8th	1		**Unit-03** Theory of Simple Bending and Deflection of Beams: Explanation of terms: Neutral layer, Neutral Axis
	2		Modulus of Section, Moment of Resistance
	3		Bending stress, Radius of curvature; Assumptions in theory of simple bending; Bending Equation $M/I = \sigma/Y = E/R$ with derivation
9th	1		Problems involving calculations of bending stress, modulus of section and moment of resistance
	2		QUIZZ/Class test
	3		Calculation of safe loads and safe span and dimensions of cross-section
10th	1		Definition and explanation of deflection as applied to beams; Deflection formulae without proof for cantilever and simply supported beams with point load and UDL and numericals (Standard cases only)
	2		**Unit-04** Torsion in Shafts and Springs: Definition and function of shaft; Calculation of polar M.I. for solid and hollow shafts
	3		Assumptions in simple torsion; Derivation of the equation $T/J=fs/R=G\theta/L$
11th	1		Problems on design of shaft based on strength and rigidity
	2		Numerical Problems related to comparison of strength and weight of solid and hollow shafts
	3		Classification of springs; Nomenclature of closed coil helical spring
12th	1		Class test
	2		Deflection formula for closed coil helical spring (without derivation); stiffness of spring
	3		Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils
13th	1		Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils
	2		**Unit-V:** Thin Cylindrical Shells: Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell
	3		Derivation of expressions for the longitudinal and hoop stress for seamless shells

14th	1	Derivation of expressions for the longitudinal and hoop stress for seam shells
	2	Related numerical Problems for safe thickness and safe working pressure
	3	Related numerical Problems for safe thickness and safe working pressure
15th	1	Revision of syllabus and numericals
	2	Revision of syllabus and numericals
	3	Previous year question discussion

Learning Resources

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 Publications, New Delhi, 2013

3. Strength of Materials – R.S. Khurmi, S.Chand CompanyLtd. Delh

11/07/25