UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

LESSON PLAN

SESSION-2022-23

SUBJECT: STRENGTH OF MATERIAL (THEORY- 02)

DEPARTMENT OF

MECHANICAL ENGINEERING

Discipline: Mechanical Engineering	Semester: 3rd	Name of the Teaching Faculty: Er SISIR KUMAR DALAI
Subject: Strength of Material (Th-2)	No of Days/Week Class Allotted: 04	Semester starts From Date: 15.09.2022 to Date: 22.12.2022 No. Of Weeks: 15
Week	**Class/Day**	**Theory/Practical Topics**
1st	1st	**CH.1 SIMPLE STRESS & STRAIN**. Introduction to Strength of Material. Types of load, stresses & strains (Axial and tangential)
	2nd	Poisson's ratio, Lateral and Linear strain. Numerical to find stress, strain,elongation and Poisson's ratio.
	3rd	Hooke's law. Young's modulus, bulk modulus, modulus of rigidity, Relationbetween E & C, E & K.
	4th	Relation between three elastic constants. Numerical
2nd	1st	Principle of super position. Numerical
	2nd	*Numerical on above.*
	3rd	*Numerical on above.*
	4th	Stresses in composite section. Numerical
3rd	1st	Temperature stress and strain, Temperature stress in composite bar (single core). Numerical
	2nd	*Numerical on above.*
	3rd	Strain energy and resilience, Stress due to gradually applied load.
	4th	Stress due to suddenly applied and impact load
4th	1st	**CH.2 THIN CYLINDER AND SPHERICAL SHELL UNDER INTERNAL PRESSURE.** Introduction to Thin cylinder and spherical shell. Assumption for thin cylindrical shell. Hoop and longitudinal stress and strain.
	2nd	Determination of hoop stress and longitudinal stress.
	3rd	Numerical to find safe pressure, thickness and diameter.
	4th	Determination of Hoop strain, longitudinal strain and volumetric strain
5th	1st	Determination of Change in length, diameter and volume of thin cylindrical shell.
	2nd	Numerical to find change in dimensions of thin cylindrical shell.
	3rd	Numerical to find change in dimensions of thin cylindrical shell.
	4th	**CH. 3. TWO-DIMENSIONAL STRESS SYSTEM.** Introduction to 2-dimensional stress system; Concept of Principal plane, Principal stress and strain; Stresses in oblique plane
6th	1st	Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (i) direct stress in one direction only. Numerical
	2nd	*Numerical*

	3rd	Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (ii) direct stress in two perpendicular directions. Numerical
	4th	Numerical.
7th	1st	Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (iii) shear stress only; Numerical
	2nd	*Numerical.*
	3rd	Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (iv) direct stress in one direction and followed by shear stress. Problem
	4th	Numerical on above.
8th	1st	Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (iv) direct stress in two perpendicular directions and followed byshear stress. Problem.
	2nd	*Numerical on above.*
	3rd	Concept of Mohr's circle. Mohr's circle Problems.
	4th	Mohr's circle Problems.
9th	1st	**CH. 4 BENDING MOMENT AND SHEAR FORCE.** Types of beam and load.
	2nd	Concepts of Shear force and bending moment.
	3rd	Sign convention. Relationship between SF, BM and Loading
	4th	Numerical to determine Shear Force and Bending moment diagram in cantilever beamsubjected to point load.
10th	1st	Numerical to determine Shear Force and Bending moment diagram in cantilever beamsubjected to U.D.L
	2nd	Numerical to determine Shear Force and Bending moment diagram in simply supportedbeam subjected to point load.
	3rd	Numerical to determine Shear Force and Bending moment diagram in simply supported beam subjected U.D.L.
	4th	Numerical to determine Shear Force and Bending moment diagram in overhanging beamsubjected to point load.
11th	1st	Numerical to determine Shear Force and Bending moment diagram in overhanging beamsubjected U.D.L.
	2nd	**CH. 5 THEORY OF SIMPLE BENDING.** Introduction to Theory of simple bending, Assumptions in the theory of bending
	3rd	Neutral axis, Theory of simple bending
	4th	Moment of resistance, Bending equation

12th	1st	Section modulus of rectangular and circular beam sections
	2nd	*Numerical*
	3rd	*Numerical*
	4th	**CH. 6 COMBINED DIRECT AND BENDING STRESS.** Define column, types of column, Axial load, Eccentric load on column.
13th	1st	Direct stresses, Bending stresses, Maximum & Minimum stresses in short column:for uniaxial system
	2nd	Direct stresses, Bending stresses, Maximum & Minimum stresses in short column: forbiaxial system
	3rd	*Numerical*
	4th	Buckling load computation using Euler's formula (no derivation) in Columns with variousend conditions
14th	1st	*Numerical on above.*
	2nd	**CH. 7 TORSION.** Torsion in shafts, Assumption of pure torsion
	3rd	Theory of pure torsion
	4th	Torsion equation for solid and hollow circular shaft, Numerical
15th	1st	Comparison between solid and hollow shaft subjected to pure torsion, torsional rigidity,Numerical
	2nd	*Numerical*
	3rd	Class test 2
	4th	*Previous year question discussion.*

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	S Ramamrutham	Strength of Materials	Dhanpat Rai
02	R K Rajput	Strength of Materials	S.Chand
03	R.S khurmi	Strength of Materials	S.Chand
04	G H Ryder	Strength of Materials	Mc Millon and co. lmtd
05	S Timoshenko and D H Young	Strength of Materials	TMH