GOVERNMENT POLYTECHNIC, NABARANGPUR

DEPARTMENT OF MECHANICAL ENGINEERING

Discipline: **MECHANICAL ENGG**	Semester: **3RD**	Name of the Teaching Faculty: Er. Deepak ranjan pattnaik
Subject: **STRENGTH OF MATERIAL**	No. of days/per week class allotted: **4**	Semester From date: 16-08-2024 To Date: 08-11-2024 No. of Weeks: 12
COURSE OUTCOMES	**CO1:** Determination of stress, strain under uniaxial loading (due to static or impact load and temperature) in simple and single core composite bars **CO2:** Determination of stress, strain and change in geometrical parameters of cylindrical and spherical shells due to pressure. Realization of shear stress besides normal stress and computation of resultant stress in two dimensional objects. **CO3:** Drawing bending moment and shear force diagram and locating points in a beam where the effect is maximum or minimum. **CO4:** Determination of bending stress and torsional shear stress in simple cases **CO5:** Understanding of critical load in slender columns thus realizing combined effect of axial and bending load.	

Week	Class Day	Theory/Practical Topics
1ST	1ST	1.0 Simple stress& strain 1.1 Types of load, stresses & strains,(Axial and tangential) Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants
	2ND	1.1 Types of load, stresses & strains,(Axial and tangential) Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants
	3RD	1.1 Types of load, stresses & strains,(Axial and tangential) Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants
	4TH	QUIZ & ASSIGNMENT - I
2ND	1ST	1.2 Principle of super position, stresses in composite section 1.3 Temperature stress, determine the temperature stress in composite bar (single core)
	2ND	1.2 Principle of super position, stresses in composite section 1.3 Temperature stress, determine the temperature stress in composite bar (single core)
	3RD	1.4 Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load
	4TH	QUIZ & ASSIGNMENT - II
3RD	1ST	1.5 Simple problems on above.
	2ND	1.5 Simple problems on above.
	3RD	2.0 Thin cylinder and spherical shell under internal pressure
	4TH	QUIZ & ASSIGNMENT - III
4TH	1ST	2.1 Definition of hoop and longitudinal stress, strain
	2ND	2.2 Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain
	3RD	2.2 Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain
	4TH	QUIZ & ASSIGNMENT - IV
5TH	1ST	2.3 Computation of the change in length, diameter and volume 2.4 Simple problems on above

	2ND	3.0 Two dimensional stress systems 3.1 Determination of normal stress, shear stress and resultant stress on oblique plane
	3RD	3.0 Two dimensional stress systems 3.1 Determination of normal stress, shear stress and resultant stress on oblique plane
	4TH	QUIZ & ASSIGNMENT - V
6TH	1ST	3.2 Location of principal plane and computation of principal stress
	2ND	3.3 Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	3RD	3.3 Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	4TH	QUIZ & ASSIGNMENT - VI
7TH	1ST	4.0 Bending moment& shear force
	2ND	4.1 Types of beam and load 4.2 Concepts of Shear force and bending moment
	3RD	4.1 Types of beam and load 4.2 Concepts of Shear force and bending moment
	4TH	QUIZ & ASSIGNMENT - VII
8TH	1ST	4.3 Shear Force and Bending moment diagram and its salient features illustration in cantilever beam, simply supported beam and over hanging beam under point load and uniformly distributed load
	2ND	4.3 Shear Force and Bending moment diagram and its salient features illustration in cantilever beam, simply supported beam and over hanging beam under point load and uniformly distributed load
	3RD	5.0 Theory of simple bending 5.1 Assumptions in the theory of bending
	4TH	5.0 Theory of simple bending 5.1 Assumptions in the theory of bending
9TH	1ST	PYQ DISCUSSION
	2ND	5.2 Bending equation, Moment of resistance, Section modulus& neutral axis.
	3RD	5.3 Solve simple problems.
	4TH	QUIZ & ASSIGNMENT - VIII
10TH	1ST	5.3 Solve simple problems.
	2ND	6.0 Combined direct & bending stresses
	3RD	6.0 Combined direct & bending stresses 6.1 Define column
	4TH	6.0 Combined direct & bending stresses 6.1 Define column
11TH	1ST	6.2 Axial load, Eccentric load on column
	2ND	6.2 Axial load, Eccentric load on column
	3RD	6.3 Direct stresses, Bending stresses
	4TH	6.3 Direct stresses, Bending stresses, Maximum& Minimum stresses. Numerical problems on above.
12TH	1ST	Numerical problems on above.
	2ND	6.4 Buckling load computation using Euler's formula (no derivation) in Columns with various end conditions
	3RD	7.0 Torsion
	4TH	7.1 The torsion equation for solid and hollow circular shaft 7.2 Comparison between solid and hollow shaft subjected to pure torsion

LEARNING RESOURCES:

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

Deepak ranjan pattnaik.
16.08.2024

Sign. Of Faculty concerned

Academic coordinator

Sign. Of HOD

Principal
21.09.24