



GOVERNMENT POLYTECHNIC, NABARANGPUR

DEPARTMENT OF AUTOMOBILE ENGINEERING

Discipline: AUTOMOBILE ENGG.	Semester: 3RD	Name of the Teaching Faculty: KIRAN KUMAR BEHERA
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
1 ST	1 ST	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
	2 ND	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
	3 RD	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
	4 TH	QUIZ & ASSIGNMENT - I
2 ND	1 ST	1.2 Principle of super position, stresses in composite section 1.3 Temperature stress, determine the temperature stress in composite bar (single core)
	2 ND	1.2 Principle of super position, stresses in composite section 1.3 Temperature stress, determine the temperature stress in composite bar (single core)
	3 RD	1.4 Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load
	4 TH	QUIZ & ASSIGNMENT - II
3 RD	1 ST	1.5 Simple problems on above.
	2 ND	1.5 Simple problems on above.
	3 RD	2.0 Thin cylinder and spherical shell under internal pressure
	4 TH	QUIZ & ASSIGNMENT - III
4 TH	1 ST	2.1 Definition of hoop and longitudinal stress, strain
	2 ND	2.2 Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain
	3 RD	2.2 Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain
	4 TH	QUIZ & ASSIGNMENT - IV
5 TH	1 ST	2.3 Computation of the change in length, diameter and volume 2.4 Simple problems on above

	2 ND	3.0 Two dimensional stress systems 3.1 Determination of normal stress, shear stress and resultant stress on oblique plane
	3 RD	3.0 Two dimensional stress systems 3.1 Determination of normal stress, shear stress and resultant stress on oblique plane
	4 TH	QUIZ & ASSIGNMENT - V
6 TH	1 ST	3.2 Location of principal plane and computation of principal stress
	2 ND	3.3 Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	3 RD	3.3 Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	4 TH	QUIZ & ASSIGNMENT - VI
7 TH	1 ST	4.0 Bending moment & shear force
	2 ND	4.1 Types of beam and load 4.2 Concepts of Shear force and bending moment
	3 RD	4.1 Types of beam and load 4.2 Concepts of Shear force and bending moment
	4 TH	QUIZ & ASSIGNMENT - VII
8 TH	1 ST	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
	2 ND	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
	3 RD	5.0 Theory of simple bending 5.1 Assumptions in the theory of bending
	4 TH	5.0 Theory of simple bending 5.1 Assumptions in the theory of bending
9 TH	1 ST	PYQ DISCUSSION
	2 ND	5.2 Bending equation, Moment of resistance, Section modulus & neutral axis.
	3 RD	5.3 Solve simple problems.
	4 TH	QUIZ & ASSIGNMENT - VIII
10 TH	1 ST	5.3 Solve simple problems.
	2 ND	6.0 Combined direct & bending stresses
	3 RD	6.0 Combined direct & bending stresses 6.1 Define column
	4 TH	6.0 Combined direct & bending stresses 6.1 Define column
11 TH	1 ST	6.2 Axial load, Eccentric load on column
	2 ND	6.2 Axial load, Eccentric load on column
	3 RD	6.3 Direct stresses, Bending stresses
	4 TH	6.3 Direct stresses, Bending stresses, Maximum & Minimum stresses. Numerical problems on above.
12 TH	1 ST	Numerical problems on above.
	2 ND	6.4 Buckling load computation using Euler's formula (no derivation) in Columns with various end conditions
	3 RD	7.0 Torsion
	4 TH	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. lmtl
- 05 S Timoshenko and D H Young Strength of Materials TMH

Yitong Yu. Behara

Sign. Of Faculty
concerned

Academic coordinator

Payal
21/08/24
Sign. Of HOD

Principal