Course Code: 2030112 Roll No: MLRS- R20

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Supply End Examination, July-2022

Strength of Materials - I

(Civil Engineering)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	Define the terms: Elasticity and Young's Modulus	2M	CO1	TL2
	b)	State the relationship between Young's Modulus and Modulus of Rigidity	2M	CO1	TL2
	c)	Define and explain the terms Shear force and Bending moment.	2M	CO2	TL2
	d)	Write the assumption in the theory of simple bending?	2M	CO2	TL2
	e)	Define the terms: bending stress in beams and neutral axis	2M	CO3	TL2
	f)	Draw shear stress diagram for following sections i. Inverted T- section ii. T- section iii. Rectangular section iv. Circular section	2M	CO3	TL2
	g)	List any four methods of determining slope and deflection of loaded beam?	2M	CO4	TL2
	h)	Why moment area method is more useful, when compared with double integration?	2M	CO4	TL2
	i)	Define the terms: Principle Plane and Principle stress	2M	CO5	TL2
	j)	Explain the terms: Obliquity and Mohr's circle	2M	CO5	TL2

PART- B

(10*5 Marks = 50 Marks)

2	a)	i. State and explain the Hooke's law. ii. Draw the stress-strain diagram for mild steel and explain salient points.	5M	CO1	TL2
	b)	Find the elongation of a bar, length L and cross-sectional area A, under the actionof its own weight. Assume the unit weight of the bar is w/unit length	5M	CO1	TL2
		OR			
3		A rod 200cm long and of diameter 3.0cm is subjected to an axial pull of 30kN. If the Young's modulus of the material for the rod is $2x10^5$ N/mm^2. Determine (i) Stress (ii) Strain and (iii) the Elongation of the rod	10M	CO1	TL3

4	a)	What are the different types of loads acting on a beam? Differentiate between a point load and a uniformly distributed load.	5M	CO2	TL2
	b)	What are different types of beams? Differentiate between a cantilever and a simply supported beam	5M	CO2	TL2
		OR			
5		A simply supported beam of length of 8m carries point loads of 4kN and 6kN at a distance of 2m and 4m from the left end. Draw shear force and bending moment diagrams for the beam	10M	CO2	TL3
6	a)	What do you mean by pure bending? Derive the bending equation.	5M	CO3	TL2
	b)	What do you mean by section modulus? Find an expression for section modulus for a rectangular, circular and hollow circular sections.	5M	CO3	TL2
		OR			
7		A timber beam is 120mm wide and 20mm deep and is used on a span of 4m. The beam carries a UDL of 2.8kN/m run over the entire length. Find the maximum bending stress induced.	10M	CO3	TL3
8	a)	Derive the slope and deflection equations for a simply supported beam carrying point load at the Centre.	5M	CO4	TL2
	b)	What is moment area method? Find the slope and deflection of simply supported beam carrying a Point load at the center	5M	CO4	TL2
		OR			
9		A cantilever of length 30m, carries a UDL of 24kN/m length over the entire length. If moment of inertia of the beam = $10^8 mm^4$ and Value of E = 200GPa. Determine the slope and deflection at the free end.	10M	CO4	TL3
10	a)	List the various theories of failure of materials and explain any one theory.	5M	CO5	TL2
	b)	A body is subjected to direct stresses in two mutually perpendicular principal tensile stresses accompanied by a simple shear stress. Draw the Mohr's circle of stresses and explain how you will obtain the principal stresses and strains.	5M	CO5	TL2
		OR			
11		The principal stresses at a point in an elastic material are 25 N/mm^2 (tensile), 100 N/mm^2 (tensile) and 50 N/mm^2 (compressive). If the elastic limit in simple tension is 220 N/mm^2 and μ = 0.3, then determine whether the failure of material will occur or not according to i. Maximum principal stress theory ii. Maximum principal strain theory	10M	CO5	TL3

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