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 Regular End Examination, January-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)	State and explain Hooke's law	2M	CO1	TL2
	b)	Define the terms: Poison's ratio and Young's modulus	2M	CO1	TL2
	c)	Define point of contra flexure? In which beam it occurs?	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)	State the main assumptions while deriving the general formula for shear stresses	2M	CO3	TL2
	g)	State the condition for the use of Macaulay's method.	2M	CO4	TL2
	h)	Define deflection of beam with neat sketch.	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)	Find the young's modulus of a rod of diameter 30mm and of length 300mm which is subjected to a tensile load of 60 KN and the extension of the rod is equal to 0.4 mm.	5M	CO1	TL3
	b)	The ultimate stress for a hollow steel column which carries an axial load of 2MN is 500 N/mm^2 .If the external diameter of the column is 250mm, determine the internal diameter Take the factor of safety as 4.0.	5M	CO1	TL3
		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 effective span 6 m carries three point loads of30 KN, 25 KN and 40 KN at 1m, 3m and 4.5m respectively from the left support. Draw the SFD and BMD.	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 rectangular beam 100mm wide is subjected to a maximum shear force of 100kN. Find the depth of the beam if the maximum shear stress is $6N/mm^2$	10M	CO3	TL3
8	a)	List the advantages of Macaulay method over the double integration method, for finding the slope and deflections of beams?	5M	CO4	TL2
	b)	A cantilever beam of spring 4m is carrying a point load of 3N at its free end. Calculate the slope at the free end. Assume $EI = 2X10^5 N/mm\ 2$	5M	CO4	TL3
		OR			
9		Derive double integration method for cantilever beam concentrated load at 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/mm2 (tensile), 100 N/mm2 (tensile) and 50 N/mm2 (compressive). If the elastic limit in simple tension is 220 N/mm2 and $\mu = 0.3$, then determine whether the failure of material will occur or not according to Maximum principal stress theory	10M	CO5	TL3

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