MLRS- R19

Course Code: 1930311 Roll No:

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech I Sem Regular End Examination, March 2021

MECHANICS OF SOLIDS

(MECH)

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

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	State Hooke's law and factor of safety. Sketch and explain the stress-strain diagram for a ductile material like mild steel tested under tension put destruction, marketing the salient points on it.	7M	CO	BL
	b)	A circular pipe of internal diameter 45 mm and thickness 5.5 mm is subjected to a force of 50 KN and elongation was measured as 1.75 mm. If the length of pipe is 2.75 m. Find the value of Young's modulus and stress in the pipe.	7M	CO	BL
2	a)	Define thermal stress. What is the procedure of finding thermal stresses in a composite bar?	7M	CO	BL
	b)	Derive an expression between modulus of elasticity and modulus of rigidity.	7M	CO	BL
3	a)	What do you mean by statically indeterminate beam? What are sagging and hogging bending moments?	7M	CO	BL
	b)	A cantilever beam AB of span 6 m is subjected to a uniformly distributed load of 8 KN/m intensity from A to B. Draw the shear force and bending moment diagrams	7M	CO	BL
4	a)	Prove that the maximum shear stresses in a circular section of a beam is 4/3 times the average shear stress.	7M	CO	BL
	b)	Prove the relation $\sigma/y = M/I = E/R$ for simple bending.	7M	CO	BL
5	a)	What do you mean by inflection or point of contraflexure? What is the relation between shear force and loading function of a beam?	7M	CO	BL
	b)	An I-section beam consists of two flanges 160 mm × 25 mm and a web of 320 mm × 12 mm. Find the magnitude of maximum shear stress when it is subjected to a shear force of 60 kN.	7M	CO	BL
6	a)	Derive an equation under maximum principal shear strain energy theory.	7M	CO	BL
	b)	Derive an expression for the stresses on an oblique plane of a rectangular body, when the body is subjected to a simple shear stress.	7M	CO	BL

7	a)	Define and explain the following theories of failure. i) Maximum principal stress theory ii) ii) Maximum Principal strain theory	7M	CO	BL
	b)	A hollow shaft has to transmit 337.5 kW at 100 rpm. If the shear stress is not to exceed 65 N/mm2 and the internal diameter is 0.6 of the external diameter, find the external and internal diameters assuming that the maximum torque is 1.3 times mean	7M	CO	BL
8	a)	Derive the equations for the circumferential and longitudinal stresses induced in the thin spherical shells.	7M	CO	BL
	b)	Determine the diameter of a solid shaft which will transmit 300 KW at 250 rpm. The maximum Shear stress should not exceed $30N/mm^2$ and twist should not be more than 10 in a shaft length of 2.0 m. Take modulus of rigidity = 1.2×105 N/mm^2.	7M	CO	BL

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