20/2/2023

Code No.: ME301PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - February- 2023
MECHANICS OF SOLIDS
(MECH)

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

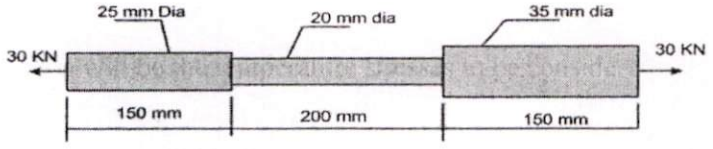
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1.	a)	Explain Hooke's Law.	[2M]
	b)	When will be the temperature stresses to be considered? Explain.	[2M]
	c)	Draw the cantilever beam with point load at the free end.	[2M]
	d)	Write about Relation between Load, Shear Force and Bending Moment.	[2M]
	e)	Write Assumptions that are made in theory of Simple Bending.	[2M]
	f)	Draw the shear stress distribution across the I-section beam.	[2M]
	g)	Explain the importance of Mohr's circle.	[2M]
	h)	Classify the various theories of failure.	[2M]
	i)	Write the Torsion equation.	[2M]
	j)	What is the relationship between Circumferential and Longitudinal Stresses in thin cylinders and explain with neat sketches.	[2M]

PART-B **(50 Marks)**

2.a) A Copper bar shown in figure is subjected to a tensile load of 30KN. Determine elongation of the bar if E=100GPa. Also find maximum stress induced. [6M]



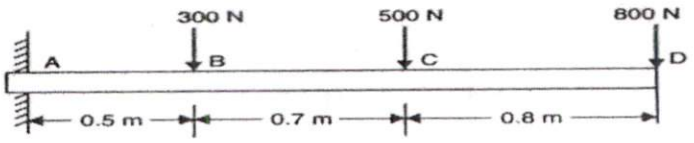
b) A circular rod of diameter 20mm and 500mm long is subjected to a tensile force 45KN. The modulus of elasticity for steel may be taken as 200 KN/mm^2. Find the stress, Stain and elongation of the bar due to applied load. [4M]

OR

3. Define Strain Energy and Derive equations of Strain Energy when it is subjected to

i)	Gradually Applied Load	[2.5M]
ii)	Suddenly Applied Load	[2.5M]
iii)	Impact Load	[2.5M]
iv)	Shock Load	[2.5M]

4. Draw Shear Force and Bending Moment diagram for loading shown below [10M]



OR

5. A beam of length 6m is simply supported at its ends. It is loaded with a gradually varying load of 750 N/m from left end to 1500 N/m to the right end. Construct SFD and BMD and find magnitude and position of the maximum. [10M]

6. A Rolled steel joist of I-Section has flange length of 300 mm wide and 30 mm thick with a web thickness of 20mm and overall depth of I-Section is 600 mm. If this beam carries a UDL of 40 KN/m over the simply supported beam of span 10m, find the maximum stress produced in the beam. [10M]

OR

7. What are the Assumptions made in theory of simple bending and derive the Bending Equation. [10M]

8. Define Principal Stress and Strain? What are methods to find out the stresses on oblique/inclined sections of a body and explain any one of the above method. [10M]

OR

9. A Steel tube of 40mm mean diameter and 2mm thickness is under simple tension. Determine the torque that can be transmitted by the tube if the criterion of failure is [10M]

   i) Maximum shear stress
   ii) Maximum strain energy
   iii) Maximum Shear strain energy

10. Compare the weight of a solid shaft with that of a hollow one having the same length to transmit a given power at a given speed, if the material used both the shafts is the same. Take the inside diameter of the hollow shaft as 0.6 times the outer diameter. [10M]

OR

11. A Cylindrical shell 2m long has 200mm diameter and thickness of metal 10mm. It is filled completely with a fluid at atmospheric pressure. If an additional 25000mm^3 fluid is pumped in, find the pressure developed and hoop stress developed. Find also the change in diameter and length, take E= 2x10^5 N/mm^2 and μ=0.3. [10M]

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