ACE Engineering College
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Question Paper Code: ME302PC

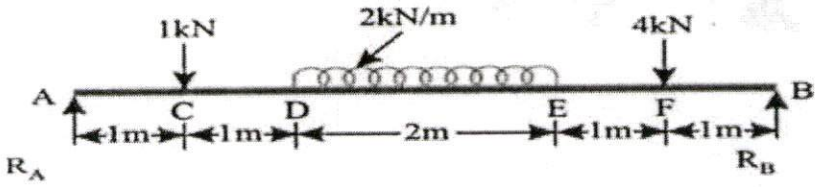
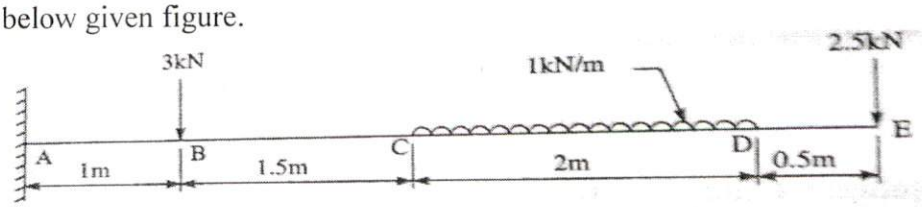
ACE-R20

Semester End Examination
II B. Tech- I Semester- MARCH-2022
MECHANICS OF SOLIDS
(Mechanical Engineering)

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

H. T. No										

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks
1. a)	Distinguish between tensile stress and compressive stress .	4
b)	The following data refer to a tensile test conducted on a mild steel bar. Diameter of the steel bar = 30 mm Gauge length = 200 mm Extension at a load of 100 kN = 0.139 mm Load at elastic limit = 230 kN Maximum load = 36 kN Total extension = 56 mm Diameter of the rod at failure = 22.25 mm. Calculate: Young's modulus; the stress at elastic limit; the percentage elongation and the percentage decrease in area.	10
2. a)	Explain thermal stresses and strain.	4
b)	For the given material Young's modulus is 1.08×10^5 N/mm^2 and modulus of rigidity is 0.417×10^5 N/mm^2. Find the Bulk modulus and lateral contraction of the round bar of 40 mm diameter and 2.4 m long when stretched 2.5 mm.	10
3. a)	Explain different types of Beams and loads.	4
b)	Draw shear force and bending moment diagrams for the beam shown in Fig. Indicate the numerical values at all important sections. 	10
4. a)	What are the assumptions made for drawing SFD and BMD?	4
b)	Draw shear force and bending moment diagrams for the cantilever beam shown in below given figure. 	10

5. a)	Define Section Modulus.	4
b)	An I-section beam 350 mm×150 mm has a web thickness of 10 mm and a flange thickness of 20 mm. If the shear force acting on the section is 40 kN, sketch the shear stress distribution across the section. Also calculate the total shear force carried by the web.	10
6. a)	Explain with reasons which theory of failure is best suited for i) Ductile materials and ii) Brittle materials.	4
b)	An element is subjected to tensile stresses of 60 N/mm^2 and 20 N/mm^2 acting on two perpendicular planes and is also accompanied by shear stress of 20 N/mm^2 on these planes. Draw the Mohr's circle of stresses and determine the magnitudes and directions of principal stresses and also the greatest shear stress.	10
7.	A solid shaft of 75 mm diameter transmits 70 kW at 100 RPM. Find i. Torque ii. Maximum Shear stress iii. Angle of twist over a length of 600 mm, and iv. Shear stress at a radius of 30 mm Take G= 0.8 X 10^5 N/mm^2	14
8. a)	Define thin cylinders.	4
b)	Derive an expression for i. Hoop stress & ii. Longitudinal stress and Shear stress in a thin cylinder subjected to an internal fluid pressure 'p'	10