

Code No: 09A30304

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, November/December-2013

Mechanics of Solids

(Common to ME, MCT, MMT, AE, AME, MIM, MSNT)

Time: 3 hours

Max. Marks: 75

Answer any five questions  
All questions carry equal marks

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- 1.a) Explain lateral strain, poisson's ratio, modulus of rigidity.  
b) A bar of 25 mm. dia. is tested in tension under a load of 40 kN. The extension measured over a length of 220 mm is 0.14 mm and construction in diameter is 0.004 mm. Find Poisson's ratio and elastic constants, E and G (Modulus of elasticity and modulus of rigidity). [15]
2. Draw SF and BM diagrams for the cantilever shown in Figure 1. [15]

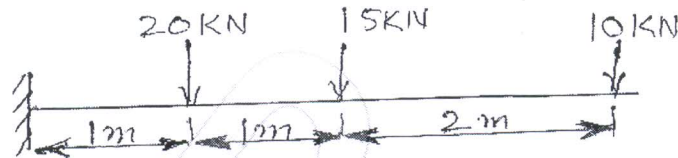


Figure: 1

- 3.a) What are the assumptions made in simple theory of bending?  
b) A circular pipe of external dia. of 80 mm and thickness 10 mm is used as simply supported beam over an effective span 3m. Find the maximum concentrated load that can be applied at the center of span if permissible stress in tube is 150 N/sq.mm. [15]
4. Derive an equation to find the shear across a rectangular cross section of beam and draw the curve for shear stress distribution. [15]
- 5.a) Derive an equation to find slope and deflection for a simply supported beam with concentrated load at the middle.  
b) A cantilever of 2.5 m carries a UDL of 3 kN/m for the entire length. If the beam has rectangular section of 100 mm width and 200 mm depth. Find the deflections at the free end. Take  $E = 100 \text{ kN/sq.mm}$ . [15]
- 6.a) Explain longitudinal and hoop stress in thin cylinders.  
b) A cylindrical thin drum of 900 mm internal dia and 4m length has a shell thickness of 8 mm. If the drum is subjected to an internal pressure of 3 N/sq. mm, determine change in length, change in dia and change in volume. Take  $E = 200 \text{ kN/sq.mm}$  and  $m = 3$ . [15]
7. A thick pipe of 500 mm internal dia and 100 mm thickness contains fluid under a pressure of 10 N/sq.mm. Find the section. Also sketch the radial pressure distribution and hoop stress distribution across the section. [15]

8. Find graphically or analytically the magnitude and nature of the stresses in all the members of the truss shown in Figure 2. [15]

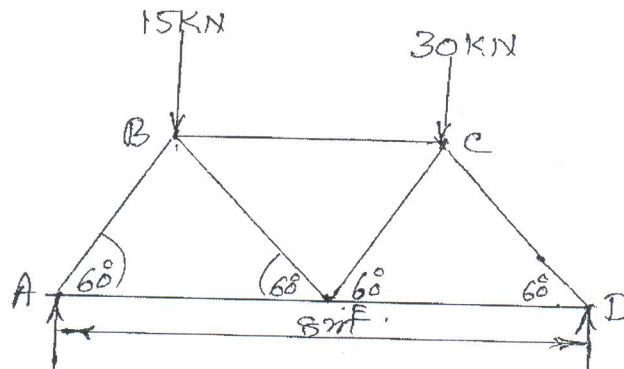


Figure: 2

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