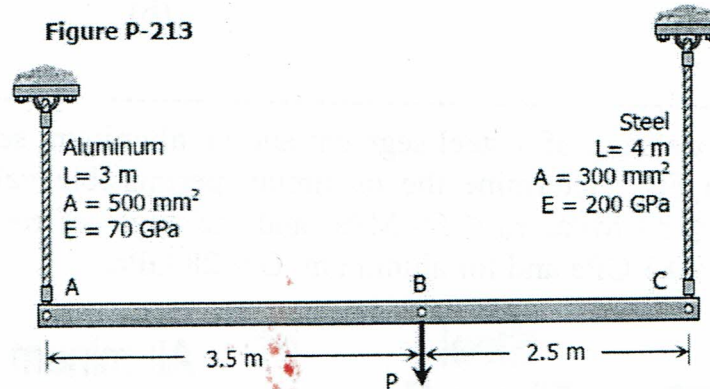




Note: Answer Only Five Questions

Q1/ Rigid bar is horizontal before $P = 50 \text{ kN}$ is applied as shown in fig. below, find the vertical movement of P



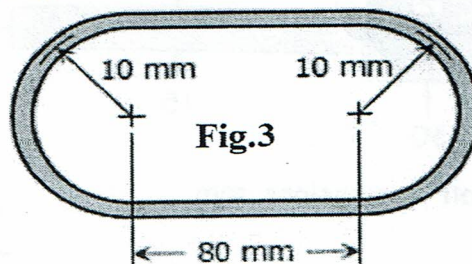
20 M

Q2/ For a given loading conditions the state of stress in the wall of a cylinder is expressed as follows:

- (a) 85 MN/m^2 tensile
- (b) 25 MN/m^2 tensile at right angles to (a)
- (c) Shear stresses of 60 MN/m^2 on the planes on which the stresses (a) and (b) act; the sheer couple acting on planes carrying the 25 MN/m^2 stress is clockwise in effect. By analytically and graphically, calculate the principal stresses and the planes on which they act. What would be the effect on these results if owing to a change of loading (a) becomes compressive while stresses (b) and (c) remain unchanged

20 M

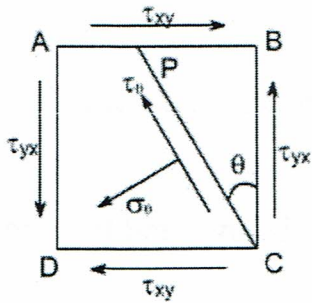
Q3/ A thin tube 2 mm thick has the shape shown in Fig below. Find the shearing stress caused by a torque of $600 \text{ N}\cdot\text{m}$.



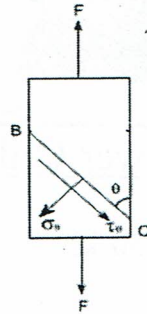
20M

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Q4/ Drive the direct and shear stresses acts on the following two plane cases (a) and (b).



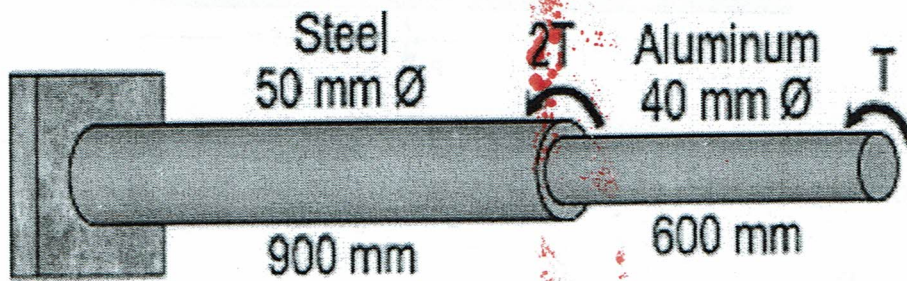
(a)



(b)

20M

Q5/ A compound shaft consisting of a steel segment and an aluminum segment is acted upon by two torques as shown in Fig. Determine the maximum permissible value of T subject to the following conditions: $\tau_{st} \leq 83 \text{ MPa}$, $\tau_{al} \leq 55 \text{ MPa}$, and the angle of rotation of the free end is limited to 6° . For steel, $G = 83 \text{ GPa}$ and for aluminum, $G = 28 \text{ GPa}$.



20M

Q6/ Determine the stress in each section of the bar shown in Fig. below when subjected to an axial tensile load of 20 kN. The central section is 30 mm square cross-section; the other portions are of circular section, their diameters being indicated. What will be the total extension of the bar? For the bar material $E = 210 \text{ GN/m}^2$.

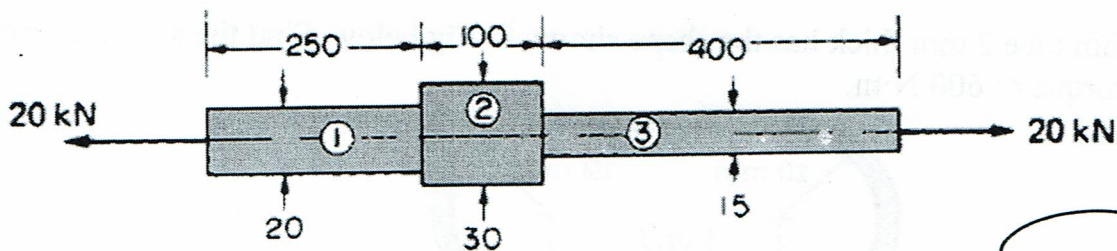


Fig all dimensions mm

20 M

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