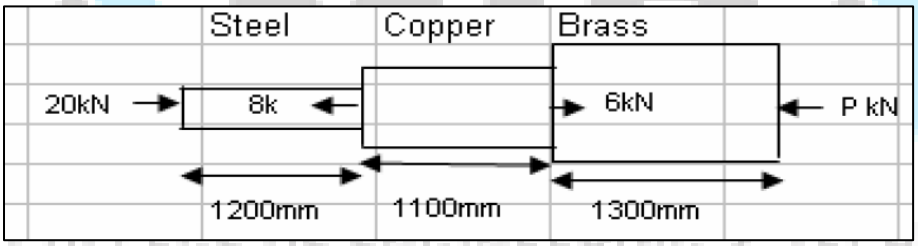
MECHANICS OFSOLIDS

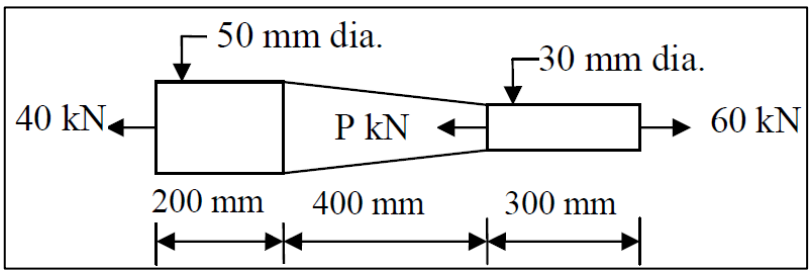
ASSIGNMENT: 4

1) Explain the terms compressive strain, shear strain, volumetric strain

A stepped bar made of steel, copper and brass is under axial force as shown in following figure and is in equilibrium. The diameter of steel is 12mm, diameter of copper is 16mm and the diameter of brass is 20mm.Determine (i) Magnitude of unknown force P (ii) stresses in each material and (iii) Total change in length of the bar. Take Esteel= 200GPa, Ecopper=100GPa and Ebrass= 80GPa.

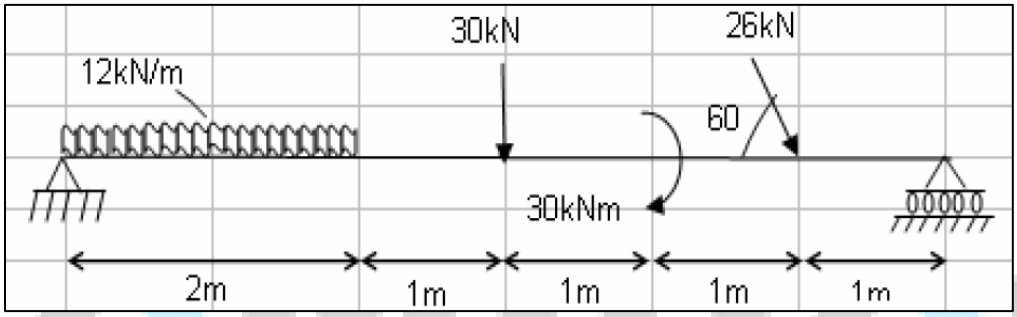


2) An assembly of steel bars as shown in the fig. is in equilibrium. Find force P and the net elongation of the assembly. Take Es= 2 x 105 MPa.

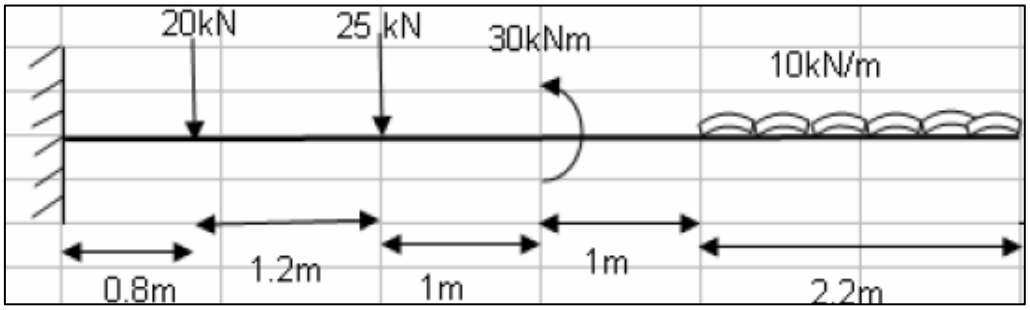


3) At a point in a strained material two mutually perpendicular tensile stresses of 420 N/mm^2 and 280 N/mm^2 are acting. There is also a clockwise shear stress of 200 N/mm^2. Determine the values of principal stresses and location of principal plane.

4) Determine support reactions for following beam.



5) Draw shear force and bending moment diagram for the beam shown in figure.



6) Prove that the maximum shear stress in a circular section of a beam is 4/3 times of average shear stress.

7) A mild steel simply supported beam of 3 m span has cross section 20 mm (width) x 50 mm (depth). Find the maximum uniformly distributed load that beam can carry in addition to its self-weight, if maximum bending and shear stresses are limited to 150 N/mm2 and 100 N/mm2.Self weight of beam is75N/m.