

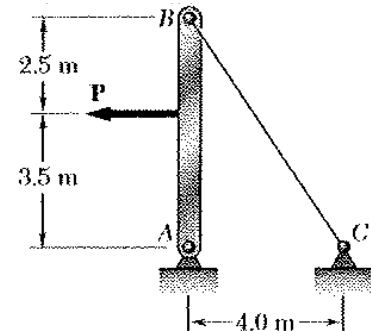
MIDTERM ME 208-1

Q1	Q2	Q3	Q4	TOTAL

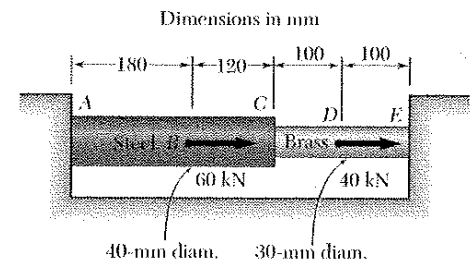
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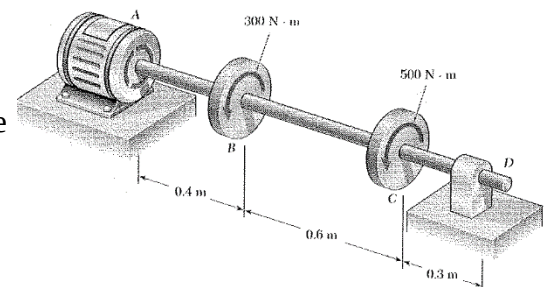
- 1) The 4 mm-diameter cable BC is made of steel with $E = 200 \text{ GPa}$. Knowing that the maximum stress in the cable must not exceed 190 MPa and that the elongation of the cable must not exceed 6 mm . Find the maximum load P that can be applied as shown.



- 2) Two cylindrical rods, one of steel and the other brass, are joined at C and restrained by rigid supports at A and E. For the loading shown and knowing that $E_s = 200 \text{ GPa}$ and $E_b = 105 \text{ GPa}$, determine a) the reactions at A and E, b) the deflection of point C.



- 3) The electric motor exerts a torque of $800 \text{ N}\cdot\text{m}$ on the steel shaft ABCD when it is rotating at a constant speed. Design specification require that the diameter of the shaft be uniform from A to D and that the angle of twist between A and D not exceed 1.5° . Knowing that $\tau_{\max} \leq 60 \text{ MPa}$ and $G = 77 \text{ GPa}$, determine the minimum diameter shaft may be used.



- 4) The steel beam shown is made of a grade steel for which $\sigma_u = 400 \text{ MPa}$. Using a factor of safety 2.5, Determine the largest couple that can be applied to the beam when it is bent about x axis.

