



1. As shown in Figure 1, determine the average normal stress at section $a-a$ and average shear stress at section $b-b$ in member AB . The cross section of member AB is square, 0.5 in. on each side. (25%)

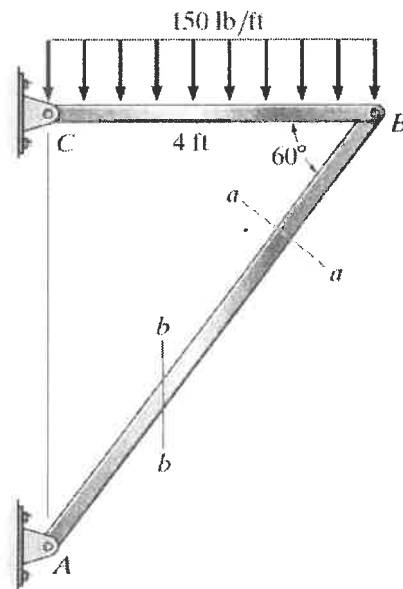


Figure 1

2. In Figure 2, the assembly consists of two copper rods AB and CD of diameter 30 mm, a stainless steel rod EF of diameter 40 mm, and a rigid cap G . The Young's modulus of copper is $E_{copper} = 101$ GPa, and the young modulus of stainless steel alloy is $E_{steel} = 193$ GPa. If the support A , C and F are rigid, determine the average normal stress developed in rods AB , CD , and EF . (25%)

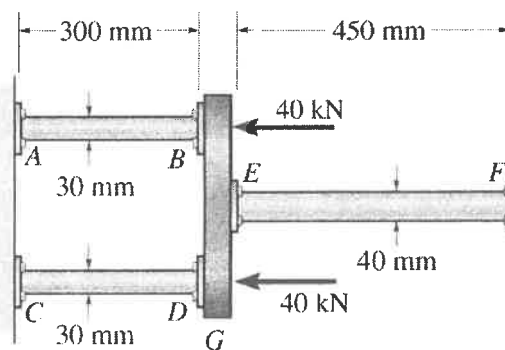


Figure 2



3. The 80-mm-diameter solid shaft is subjected to the $1000\text{ N}\cdot\text{m}/\text{m}$ distributed loading and $600\text{ N}\cdot\text{m}$ concentrated torsional loading as shown in Fig. 3. Determine the absolute maximum shear stresses in the shaft. (25%)

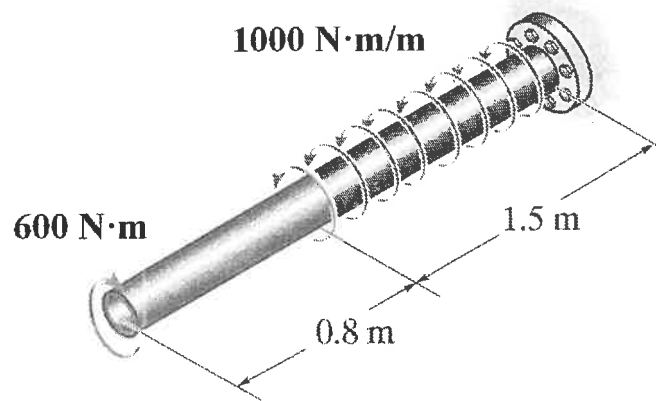


Fig. 3

4. A steel wide-flange beam has the dimensions shown in Fig. 4. Determine the maximum shear stress in the beam if it is subjected to a shear force of $V = 10\text{ kN}$. (25%)

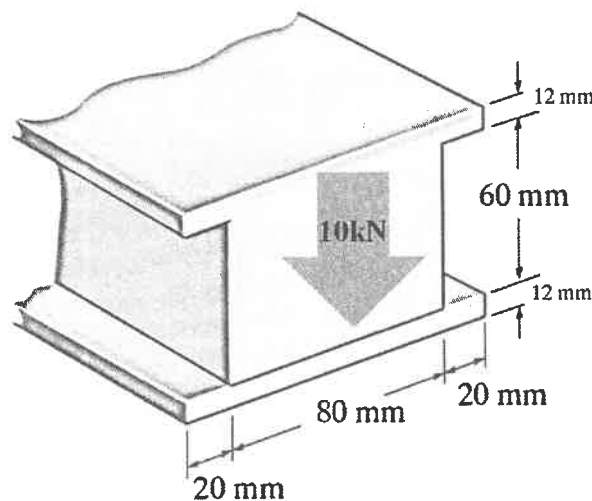


Fig. 4