1. (25 points) Two 5-kN vertical loads are applied to pin B of the assembly shown. Knowing that a 12-mm-diameter pin is used at each connection, determine the maximum value of the average normal stress in (a) link AB, (b) link BC, (c) the average shearing stress in the pin at C, (d) the bearing stress at C in member BC, (e) the bearing stress at B in member BC.

2. (20 points) The rigid bar BDE is supported by two links AB and CD. Link AB is made of aluminum \( E = 70 \text{ GPa} \) and has a cross-sectional area of 500 mm\(^2\); link CD is made of steel \( E = 200 \text{ GPa} \) and has a cross-sectional area of 600 mm\(^2\). For the 30-kN force shown, determine the deflection (a) of B, (b) of D, (c) of E.

3. (20 points) A 3-mm-thick hollow polystyrene cylinder (\( E = 3.1 \text{ GPa} \)) and a rigid circular plate (only part of which is shown) are used to support a 250-mm-long steel rod AB (\( E = 200 \text{ GPa} \)) of 6-mm diameter. If a 3.5-kN load P is applied at B, determine (a) the elongation of rod AB, (b) the deflection of point B, (c) the average normal stress in rod AB.

4. (20 points) A 1.2-m concrete post is reinforced by four steel bars, each of 19-mm diameter. Knowing that \( E_s = 200 \text{ GPa} \), \( \alpha_s = 11.7 \times 10^{-6} /\degree \text{C} \) and \( E_c = 25 \text{ GPa} \), \( \alpha_c = 9.9 \times 10^{-6} /\degree \text{C} \), determine the normal stressed induced in the steel and in the concrete by a temperature rise of 45\degree \text{C}.

5. (25 points) If a force of 3.6 \times 10^5 \text{ N} is applied to the cylinder shown in Figure 5a having a cross-sectional area of 6.25 \times 10^{-4} \text{ m}^2, what is the deflection of the end B as a result of this loading? The stress-strain diagram for the material is shown in Figure 5b.

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