

1. As shown in Figure 1, a T-beam is subjected to a bending moment of 15 kN-m. Please determine the maximum normal stress in the beam and the orientation of the neutral axis. (20%)

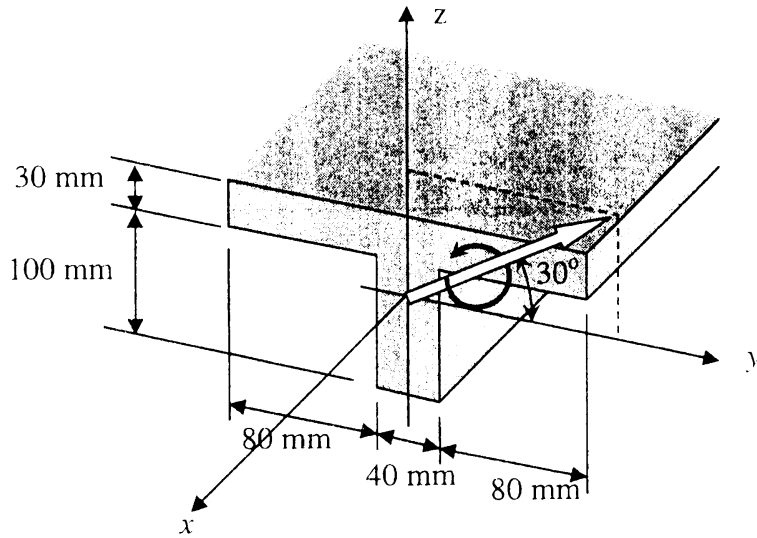


Figure 1

2. Determine the shear stress at point B on the web of the cantilevered strut at section $a-a$ as shown in Figure 2. (20%)

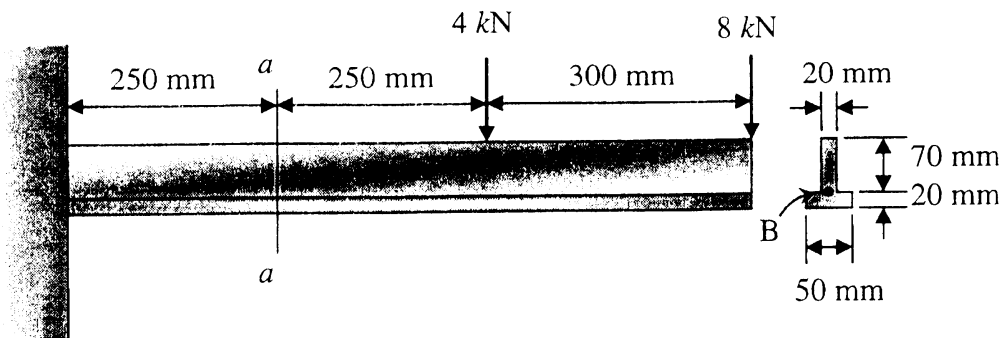


Figure 2

(背面仍有題目,請繼續作答)

3. As shown in Figure 3, a 45° strain rosette is mounted on a sample under loadings. The following readings are obtained from each gauge: $\epsilon_a = 300 \times 10^{-6}$, $\epsilon_b = 180 \times 10^{-6}$, and $\epsilon_c = -250 \times 10^{-6}$. Determine the in-plane principal strains and their orientation. (20%)

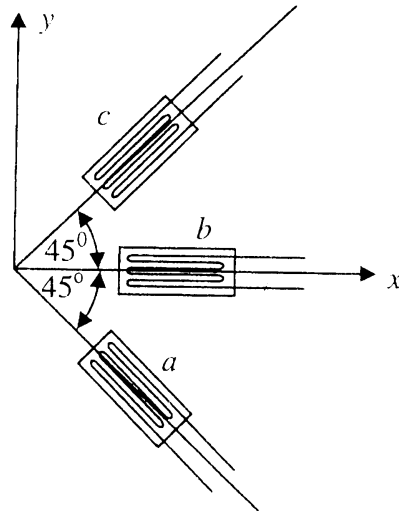


Figure 3

4. As shown in Figure 4, determine the reactions at supports A and B when the beam is subjected to a uniformly distributed loading of w . EI is constant. (20%)

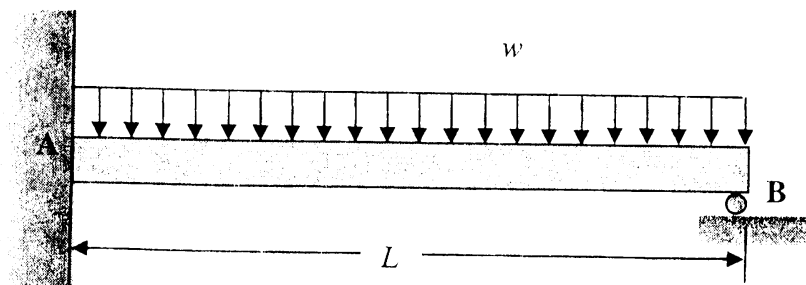


Figure 4

5. As shown in Figure 5, determine the vertical displacement of point B. All members have a cross-sectional area of 2000 mm^2 and a Young's Modulus $E = 210 \text{ GPa}$. (20%)

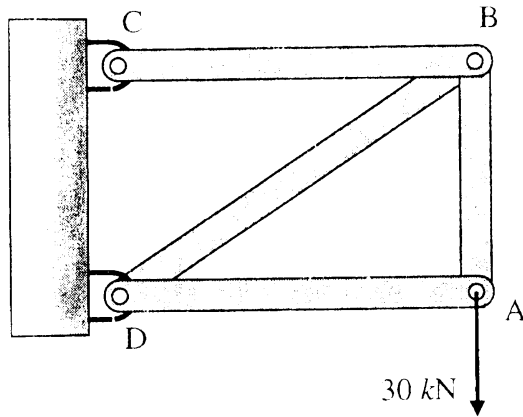


Figure 5