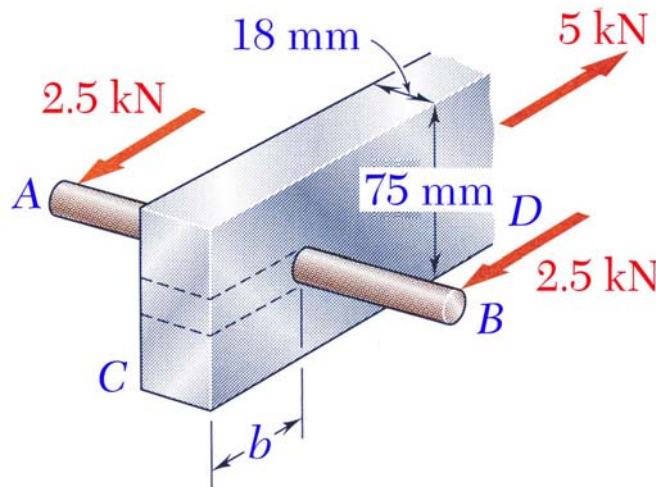A 15-mm-diameter steel rod *AB* is fitted to a round hole near end *C* of the wooden member *CD*. For the loading shown, determine (*a*) the maximum average normal stress in the wood, (*b*) the distance *b* for which the average shearing stress is 600 kPa on the surface indicated by the dashed lines, (*c*) the average bearing stress on the wood.

(*a*)

$$A_{net} = 0.018(0.075-0.015)\ \text{m}^2 = 1.08 \times 10^{-3}\ \text{m}^2$$

$$\sigma = \frac{5 \times 10^3\ \text{N}}{1.08 \times 10^{-3}\ \text{m}^2} = 4.6296 \times 10^6\ \text{Pa} \qquad \sigma = 4.63\ \text{MPa} \quad ④$$

(*b*)

$$\tau = \frac{5 \times 10^3}{0.018b(2)} = 600 \times 10^3 \quad b = 0.23148\ \text{m} \quad b = 231\ \text{mm} \quad ③$$

(*c*)

$$\sigma_b = \frac{5 \times 10^3}{0.018(0.015)} = 18.5185 \times 10^6 \qquad \sigma_b = 18.52\ \text{MPa} \quad ③$$