

#1-1

$$q'' = 500 \text{ W/m}^2 \quad k?$$

$$\Delta T = 200^\circ\text{C}$$

$$L = 0.04 \text{ m}$$

$$q'' = k \frac{\Delta T}{L} = k = \frac{q'' L}{\Delta T}$$

$$k = \frac{(500)(0.04)}{200} = 0.10 \text{ W/(m}\cdot\text{K)}$$

#1-10

$$T_F = 10^\circ\text{C} \quad T_W = 110^\circ\text{C}$$

$$D = 0.02 \text{ m} \quad L = 5 \text{ m}$$

$$h = 100 \text{ W/(m}^2\cdot\text{C}^\circ)$$

$$Q = h \cdot A_s (T_W - T_F)$$

$$A_s = \pi \cdot D \cdot L = (\pi)(0.02)(5) = 0.31416 \text{ m}^2$$

$$Q = (100 \text{ W/(m}^2\cdot\text{C}^\circ))(0.31416 \text{ m}^2)(100^\circ\text{C})$$

$$Q = 3,141.59 \text{ W}$$

#1-25

$$\alpha = 0.80 \quad G = 1000 \text{ W/m}^2$$

$$A = 4 \text{ m}^2 \quad t = 2 \text{ hr} = 2(3600) = 7200 \text{ s}$$

$$q'' = \alpha G = (0.80)(1000) = 800 \text{ W/m}^2$$

$$\dot{Q} = q'' A = (800)(4) = 3200 \text{ W}$$

$$Q = \dot{Q} t = (3200)(7200 \text{ s}) = 23,040,000 \text{ J}$$

$$2.304 \times 10^7 \text{ J or } 23.04 \text{ MJ}$$