

#1

$$\alpha = 0.0045$$

$$T_0 = 20^\circ\text{C}$$

$$P_f = 0.1 P_0$$

$$\Rightarrow P_0(0.1) = P_0(1 + 0.0045(T - 20))$$

$$-0.9 = 0.0045(20 - T)$$

$$-200 = 20 - T$$

$$T = 220$$

$$R // T = 220^\circ\text{C}$$

#2

a

$$R = \rho \frac{L}{A}$$

$$\rho = 1.5 \times 10^{-6} \Omega$$

$$\alpha = 0.4 \times 10^{-3}$$

$$R = \frac{1.5 \times 10^{-6} (25)}{\pi \left(\frac{0.4}{2}\right)^2}$$

$$R = 2.98 \times 10^{-4} \Omega$$

$$P = RI^2$$

$$P = (2.98 \times 10^{-4}) (500 \times 10^{-3})^2$$

$$P = 7.45 \times 10^{-5} \text{ Watts}$$

c

$$J = \frac{I}{\pi \left(\frac{0.4}{2}\right)^2}$$

$$J = 3.98 \frac{\text{A}}{\text{m}^2}$$

d

$$\frac{V}{I} = V$$

$$V = 1.49 \times 10^{-4} \text{ Volts}$$

e

$$\rho \vec{L} = \vec{E}$$

$$(1.5 \times 10^{-6}) (3.98) = E$$

$$5.97 \times 10^{-6} \frac{\text{V}}{\text{m}} = E$$

f

$$\frac{P_0}{R_0} = \frac{P_f}{R_f}$$

$$R_f P_0 = R_0 P_f$$

$$P_0 [1 + \alpha(T - T_0)] P_0 = R_0 P_f$$

$$[1 + \alpha(240 - 20)] (7.45 \times 10^{-5}) = P_f$$

$$P_f = 8.4036 \times 10^{-5}$$

#3

$$P = \frac{W}{t}$$

$$W = (100 \text{ W})(100 \text{ h}) \cdot \frac{1.5 \text{ Q}}{1 \text{ kWh}} = \text{Q } 15$$

$$W = (20 \text{ W})(100 \text{ h}) \cdot \frac{1.5 \text{ Q}}{1 \text{ kWh}} = \text{Q } 3$$

$$\Rightarrow \Delta W = 12$$

R// Q 12.00

#4

$$W = (120 \text{ V})(10 \text{ A})(45 \text{ min}) \Rightarrow W = (V) I t$$

$$W = 0.9 \text{ kWh} \cdot \frac{1.25}{1 \text{ kWh}} = \text{Q } 1.125$$

R// Q 1.13