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$$l = 40 \text{ m}$$

$$w = 1.5 \text{ cm}$$

$$t = 0.1 \text{ cm}$$

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

$$\rho_{Ni} = 5.1 \rho_{Cu} \text{ from Table 1.2}$$

$$= (5.1)(1.7 \times 10^{-8} \Omega \cdot \text{m})$$

$$= 8.67 \times 10^{-8} \Omega \cdot \text{m}$$

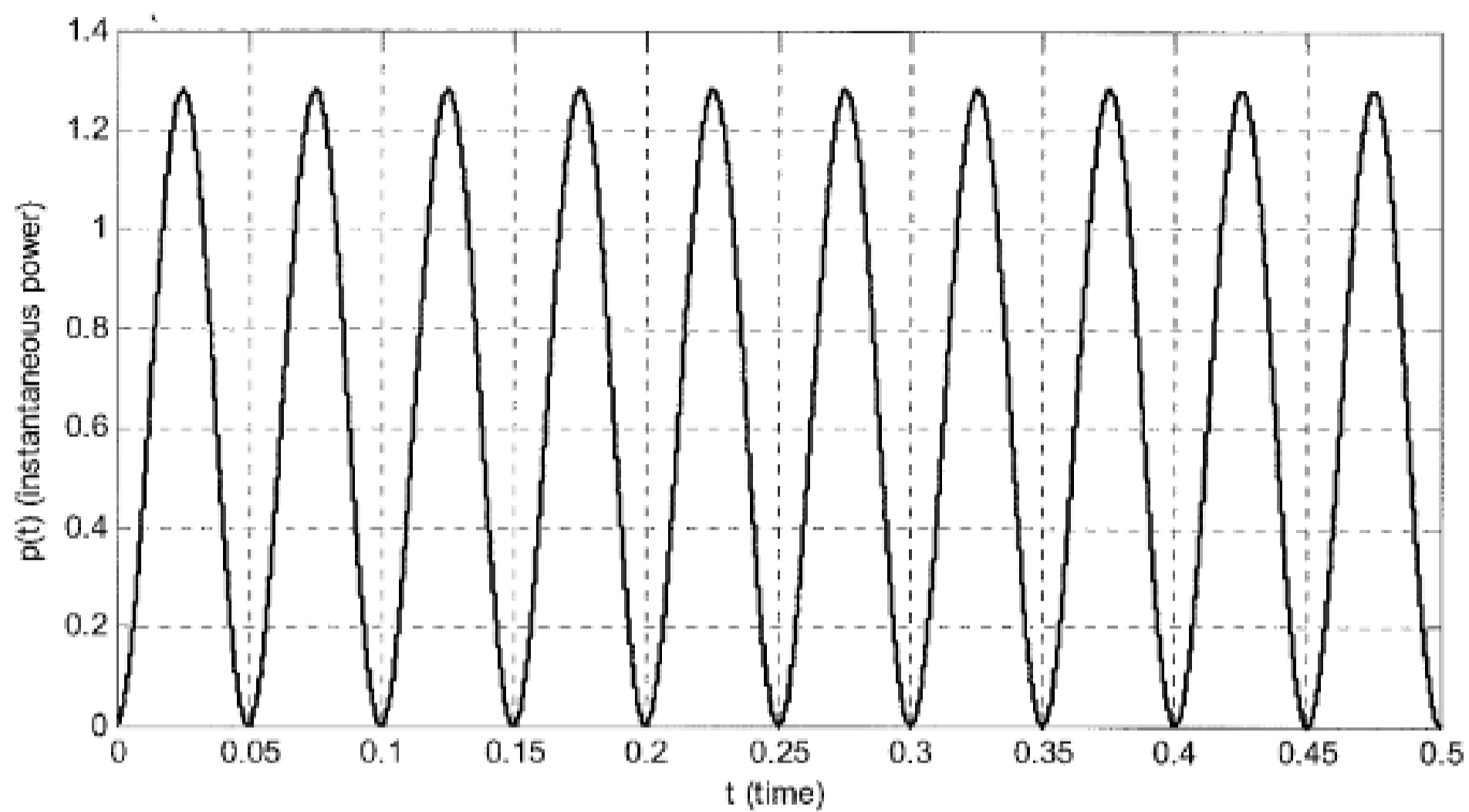
$$A = wt = (1.5 \text{ cm})(0.1 \text{ cm}) = 0.15 \text{ cm}^2$$

$$R = \frac{(8.67 \times 10^{-8} \Omega \cdot \text{m})(40 \text{ m})}{0.15 \text{ cm}^2} \frac{10^4 \text{ cm}^2}{\text{m}^2}$$

$$R = 0.23 \Omega$$

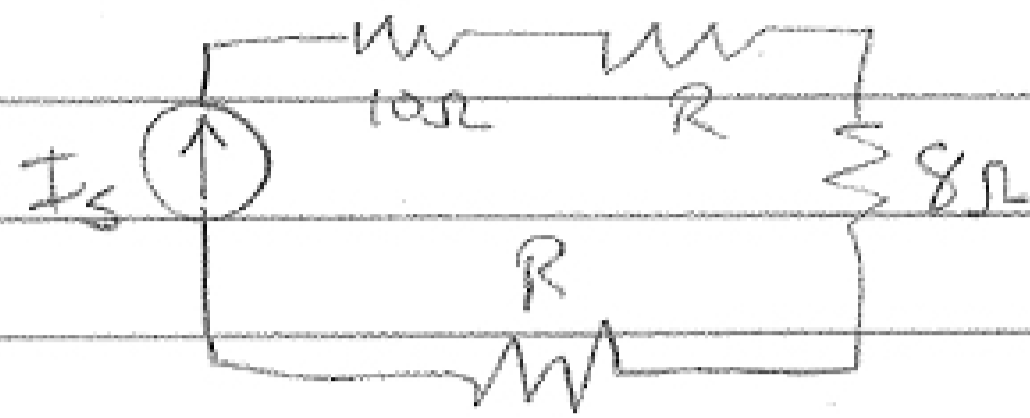
$$(a) P(t) = i^2(t)R = (400 \sin(20\pi t) \times 10^{-3})^2 \times (R + 2R + 5R) = 0.16 \times (\sin(20\pi t))^2 \times 8 =$$

$$= 1.28 \times \sin^2(20\pi t) (\text{W})$$



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>> t=[0:0.0001:0.5];
>> p=1.28*(sin(20*pi*t)).^2;
>> plot(t,p);
>> grid;
>> xlabel('t (time)');
>> ylabel('p(t) (instantaneous power)');
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$$P_s = 750 \text{ W}$$

$$(a) P_s = P_{10\Omega} + P_R + P_{8\Omega} + P_R$$

$$= I_s^2 10\Omega + I_s^2 R + I_s^2 (8\Omega) + I_s^2 R$$

$$= I_s^2 (18\Omega + 2R)$$

$$\frac{P_s}{I_s^2} = 18\Omega + 2R$$

$$R = \frac{P_s}{2I_s^2} - 9\Omega = \frac{750 \text{ W}}{2(5\text{ A})^2} - 9\Omega$$

$$\boxed{R = 6\Omega}$$

$$(b) P_s = I_s^2 (18\Omega + 2R)$$

$$\Rightarrow I_s = \sqrt{\frac{P_s}{18\Omega + 2R}} = \sqrt{\frac{750 \text{ W}}{18\Omega + 2\Omega}}$$

$$\boxed{I_s = 4.33 \text{ A}}$$