

Chapter 11, Solution 29.

$$T = 20, i(t) = \begin{cases} 60 - 6t & 5 < t < 15 \\ -120 + 6t & 15 < t < 25 \end{cases}$$

$$I_{eff}^2 = \frac{1}{20} \left[\int_5^{15} (60 - 6t)^2 dt + \int_{15}^{25} (-120 + 6t)^2 dt \right]$$

$$I_{eff}^2 = \frac{1}{5} \left[\int_5^{15} (900 - 180t + 9t^2) dt + \int_{15}^{25} (9t^2 - 360t + 3600) dt \right]$$

$$I_{eff}^2 = \frac{1}{5} \left[\left(900t - 90t^2 + 3t^3 \right) \Big|_5^{15} + \left(3t^3 - 180t^2 + 3600t \right) \Big|_{15}^{25} \right]$$

$$I_{eff}^2 = \frac{1}{5} [750 + 750] = 300$$

$$I_{eff} = \mathbf{17.321 \text{ A}}$$

$$P = I_{eff}^2 R = (17.321)^2 \times 12 = \mathbf{3.6 \text{ kW}}.$$