

The peak power consumed by a resistive coil, when connected to an AC source, is 80 W. Find the energy consumed by the coil in 100 seconds, which is many times larger than the time period of the source.

$$P_{\max} = 80\text{W} \quad ; \quad t = 100\text{s}$$

$$\begin{aligned} \text{We know that } P_{\text{av}} &= \frac{P_{\max}}{2} \\ &= \frac{80}{2} \end{aligned}$$

$$\Rightarrow \boxed{P_{\text{av}} = 40\text{W}}$$

$$\begin{aligned} \text{Hence, energy consumed} &= P_{\text{av}} \times t \\ &= 40 \times 100 \end{aligned}$$

$$\boxed{E = 4000\text{J}}$$