

A.K. Sawhney Example 12.5

A 230V, single phase, watthour meter has a constant load of 4A passing through it for 6 hours at unity power factor. If the meter disc makes 2208 revolutions during this period, what is the meter constant in revolutions per kWh? Calculate the power factor of the load if the number of revolutions made by the meter are 1472 when operating at 230V and 5A for 4 hours.

$$\begin{aligned}\text{Energy supplied} &= VI \cos \theta \times t \times 10^{-3} \\ &= 230 \times 4 \times 1 \times 6 \times 10^{-3} \\ &= 5.52 \text{ kWh}\end{aligned}$$

$$\Rightarrow \text{meter constant} = \frac{2208}{5.52} = 400 \text{ rev/kWh}$$

$$\begin{aligned}\text{Energy consumed when the meter makes} \\ 1472 \text{ revolutions} &= \frac{1472}{400} = 3.68 \text{ kWh}\end{aligned}$$

$$\begin{aligned}\text{As energy consumed} &= VI \cos \theta \times t \times 10^{-3} \\ \Rightarrow \cos \theta &= 0.8\end{aligned}$$