GATE 2023 EC

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EE23BTECH11049

Q 12.7.1: A 100 Ω resistor is connected to $220V$, $50Hz$ AC supply.
(1) What is the rms value of current in the circuit?
(2) What is the net power consumed over a full cycle?
Solution:

Symbol	Value	Description
V_{rms}	220V	rms value of voltage
I_{rms}	$\frac{V_{rms}}{R}$	rms value of current
P_{avg}	$V_{rms}.I_{rms}$	Average power consumed per cycle
R	100Ω	Resistance

TABLE 0
VARIABLE DESCRIPTION

1)

$$\begin{aligned} I_{rms} &= \frac{V_{rms}}{R} \\ &= \frac{220V}{100\Omega} \\ &= 2.2A \end{aligned}$$

2)

$$\begin{aligned} \text{Net power consumed} &= \frac{V^2}{R} \\ &= \frac{220^2}{100} \\ &= 484W \end{aligned}$$

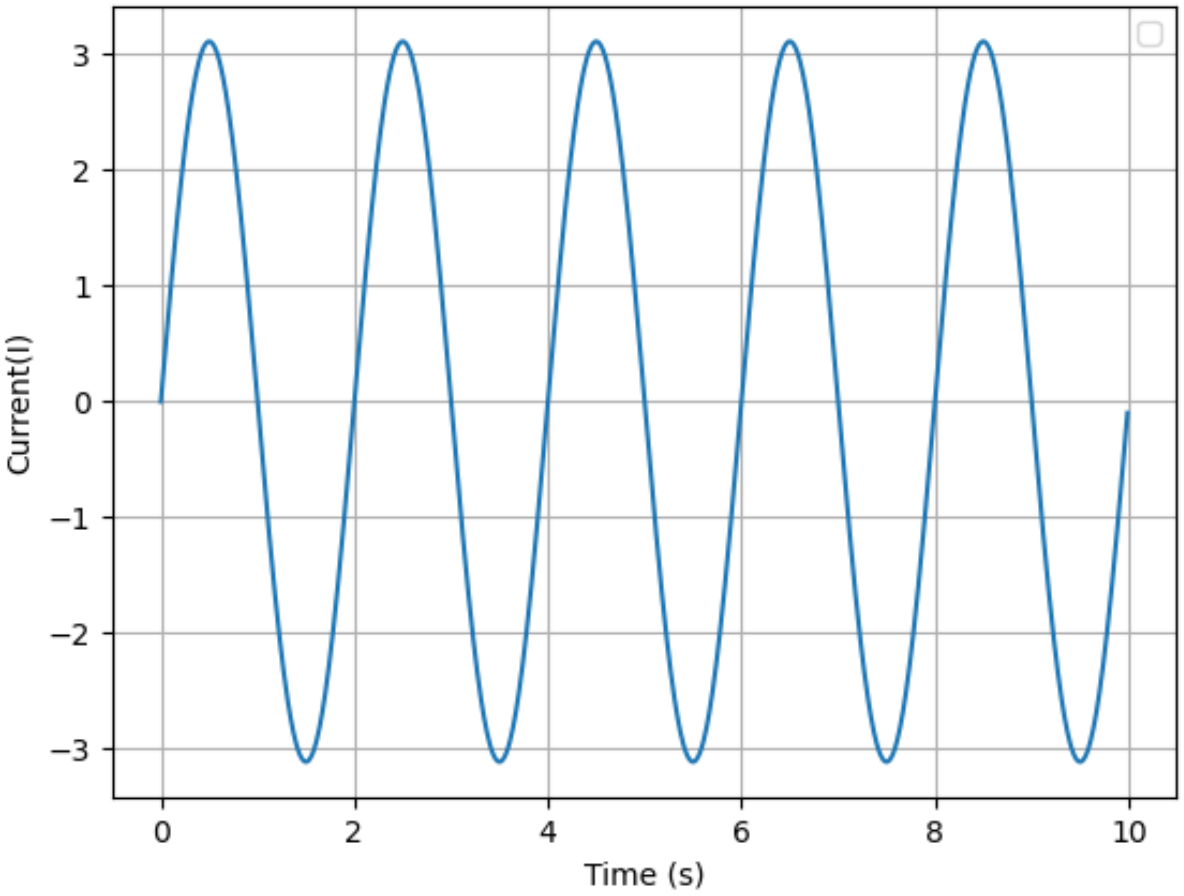

Fig. 0. Current v/s time