

PHYSICS - X-PART-14 CLASS 28



Watt -Hour Meter

- Watt - hour meter is a device that is used to measure electrical energy. Electrical energy is measured using the unit kilowatt hour. This is also known as a unit.



1 unit electrical energy = 1 kWh

The commercial unit of electrical energy is kilowatt hour (kWh). A device of power 1000 watt (1 kW), when used for one hour (1h), consumes one unit of electrical energy (1 kWh)

$$\text{Energy in kilowatt hour} = \frac{\text{Power in watt} \times \text{time in hour}}{1000}$$

$$1 \text{ kWh} = 1000 \times 60 \times 60 = 3600000 \text{ J}$$

1. A grinder of power 750 W works for 2 hours. Calculate the energy consumed

$$\text{Energy Consumed} = (P \times t) / 1000$$

$$\text{Energy Consumed} = (750 \times 2) / 1000 = 1.5 \text{ unit}$$

2. A bulb of power 100 W works for 1 hours. Calculate the energy consumed

$$\text{Energy Consumed} = (P \times t) / 1000$$

$$\text{Energy Consumed} = (100 \times 1) / 1000 = 0.1 \text{ unit}$$

3. A CFL of power 15 W works for 1 hours. Calculate the energy consumed

$$\text{Energy Consumed} = (P \times t) / 1000$$

$$\text{Energy Consumed} = (15 \times 1) / 1000 = 0.015 \text{ unit}$$

4. A LED of power 9 W works for 1 hours. Calculate the energy consumed

$$\text{Energy Consumed} = (P \times t) / 1000$$

$$\text{Energy Consumed} = (9 \times 1) / 1000 = 0.009 \text{ unit}$$

* Low power electrical appliances consume less electrical energy

5. In a house, 5 CFL lamps each of 20 W, works for 4 hours, 4 fans each of 60 W work for 5 hours and a TV of 100 W works for 4 hours in a day. What will be the daily consumption shown by the watt hour meter?

$$\begin{aligned} \text{Electrical energy consumed by 5 CFL in kWh} &= P \times t / 1000 \\ &= (20 \times 5 \times 4) / 1000 \\ &= 400 / 1000 = 0.4 \text{ unit} \end{aligned}$$

$$\begin{aligned} \text{Electrical energy consumed by 4 Fan in kWh} &= P \times t / 1000 \\ &= (60 \times 4 \times 5) / 1000 \\ &= 1200 / 1000 = 1.2 \text{ unit} \end{aligned}$$

$$\begin{aligned} \text{Electrical energy consumed by TV in kWh} &= P \times t / 1000 \\ &= (100 \times 4) / 1000 \\ &= 400 / 1000 = 0.4 \text{ unit} \end{aligned}$$

$$\begin{aligned} \text{Daily consumption shown by the watt hour meter} \\ &= 0.4 + 1.2 + 0.4 = 2 \text{ unit (2 kWh)} \end{aligned}$$

Worksheet

* Find the power of each electrical appliance in your home and how many hours it takes for each appliance to use one unit of electrical energy?