

# POWER

$$Power = \frac{Work}{time}, \quad P = \frac{\Delta W}{\Delta t}$$

- **W** may be mechanical work, or work done by a battery driving an electric current.
- In this definition, **Work** can also be replaced with **Heat**. That will be thermal power rather than mechanical or electric one.
- Units of power are Watts [W]: 1W=1J/s (Joule per second)

## POWER IN ELECTRIC CIRCUIT

$$Power = Current \times Voltage, \quad P = I \cdot V$$

# Homework

**Problem 1.** Derive expression for Power  $P$  consumed by a resistor or a light bulb with resistance  $R$ , for two cases : (a) you know the current  $I$  flowing through it, (b) you know the voltage  $V$  applied to it.

## **Problem 2.**

A light bulb has power  $P= 100$  W when plugged into 110 Volt outlet. Find the total power of three such light bulbs, when they are plugged into the same outlet

- a) in parallel,
- b) in series.

## **Problem 3**

An electric motor is used to lift a load of mass  $m=50$  kg to height  $h=10$ m , over time  $t=10$ s  
Find the power of the motor and current that runs through it, if the voltage on the motor is  $V=110$ V.