

Ch-work, Power and Energy

* Kilowatt hour : $\rightarrow$ $1\text{ kW} \times 1\text{ hour}$
 $1000\text{ W} \times 1\text{ hour}$
 $= 1000\text{ W} \times 3600\text{ sec.}$
 $= 36 \times 10^5 \text{ Watt sec.}$
 $= 3.6 \times 10^6 \text{ J/s} \times \text{second}$
 $\text{or } 3.6 \times 10^6 \text{ joules}$

$1\text{ kWh} = 3.6 \times 10^6 \text{ J}$

* Calorie : $\rightarrow$ Heat energy is usually measured in Calories.
 $1\text{ Calorie} = 4.18 \text{ J} \approx 4.2 \text{ J} \checkmark$
 $1\text{ KCalorie} = 1000 \text{ Cal}$

* Election Volt : $\rightarrow$ one election volt is the energy gained by an election when it is accelerated through a potential difference of one volt.

$1\text{ eV} = \text{Charge on one election} \times 1\text{ Volt}$

$1\text{ eV} = 1.6 \times 10^{-19} \text{ Coulomb} \times 1\text{ Volt}$

* $1\text{ eV} = 1.6 \times 10^{-19} \text{ Joules}$

$\Rightarrow$ Ch-work Power and Energy 2(b) : $\rightarrow$ different forms of Energy

$\Rightarrow$ Mechanical Energy : $\rightarrow$ It is the energy possessed by the body due to its state of rest or of motion.

$\Rightarrow$ types of mechanical Energy : —

(a) Potential Energy

(b) Kinetic Energy.

$\Rightarrow$ Potential Energy : $\rightarrow$ It is the energy possessed by a body at rest due to its position or size and shape.

It is denoted by the symbol U .

Page 2

For e.g. :- A body at a height above the ground, A stretched rubber string etc.

⇒ Types of Potential Energy :-

- (a) Gravitational potential Energy
- (b) Elastic potential Energy.

(a) Gravitational Potential Energy :- It is the energy possessed by the body due to the force of attraction of earth on it. or It is the amount of work done in bringing a body from infinity to a point in the gravitational field of the earth.

(b) Elastic Potential Energy :- It is the energy possessed by the body in the deformed state due to change in its size and shape is called elastic Potential Energy or It is the amount of work done in deforming the body.

⇒ Expression for Gravitational Potential Energy :-

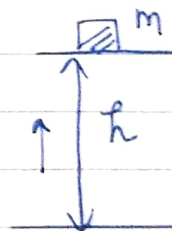
Let a body of mass ' m ' be lifted from the ground to a vertical height h .

∴ Force required to lift the body is $F = mg$

So, the work done W , on the body in lifting it to a height ' h ' is $W = \text{Force of gravity} \times \text{displacement}$

$$= mg \times h$$

$W = mgh$



$$\text{Gravitational Potential Energy (U)} = mgh$$

* When a body of mass ' m ' is taken up from a height h_1 to a height h_2 above the ground ($h_2 > h_1$),

therefore, gain in Potential Energy is

$$\Rightarrow \text{Final Potential Energy} - \text{Initial P.E}$$

$$\Rightarrow mgh_2 - mgh_1 = mg(h_2 - h_1)$$