

WORK-POWER-ENERGY

1. When every body is displaced in the directions the force acting on the body, work is said to be done

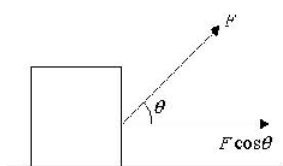
Units: S.I. system - Joule

C.G.S- Erg

1Joule = 10^{+7} ergs

2. If a force F acts on a body at an angle θ and displaces the body through a distance 'S' work

done, $w = (F \cos \theta) s = \vec{F} \cdot \vec{S}$



When $\theta = 90^\circ$, $W = 0$

3. a. The work done is independent of path followed by the body and time taken.
 b. If the work done in moving a body between two given points is independent of path chosen, the force acting on it is a conservative force.
 c. The work done by a conservative force in coming back to same point in closed loop is equal to zero.
 d. If the work done in moving a body between two points is dependent on the path chosen, the force acting on it is called a non-conservative force.
 e. Work done by a non conservative force is equal to force $\times$ distance i.e., work done by a non conservation force in a closed loop incoming back to same point it not equal to zero.

4. a. $P = \frac{Fs}{t}$

b. $P = \frac{w}{t}$

c. $P = F \times V$

d. $P = \vec{F} \cdot \vec{V}$

Power is a scalar. The units of power in SI system are watt.

1 Horse Power H. P. = 746 watt

5. The power of a machine gun firing 'n' bullets, each of mass 'm' in one second with velocity is

$$p = \frac{1}{2} mnv^2$$

6. The capacity of doing work is called energy. It is a scalar, its units are same as those of work.

SI - Joule

C. G S - Erg

1 K. W. H = $3.6 \times 10^6 J$

7. Energy possessed by a body by virtue of its position or state is known as potential energy.

a. The P. E. of a body at a height h

P. E. = mgh, where h is small

b. The elastic P.E. stored in a compressed spring is

$$P.E. = \frac{1}{2} kx^2 = \frac{1}{2} Fx = \frac{1}{2} \cdot \frac{F^2}{K}$$

8. The energy possessed by a body by virtue of its motion is called K.E.

A flying bird, moving aeroplane, freely falling body, a body moving on an incline, oscillating pendulum posses both P. E. and K. E.

9. The K.E. of a body of mass 'm' moving with

velocity 'v' is $E = \frac{P^2}{2m}$

$E \propto P^2$ for a given body and $p \propto \sqrt{E}$

10. If bodies of unequal masses have equal kinetic energies, the heavier body has greater momentum $p^2 \propto m$ when E is same

11. If bodies of unequal masses have equal momentum the lighter body has greater K. E.

$E \propto \frac{1}{m}$ when P is same.

12. According to law of conservation of energy the total energy of a closed system is constant.

For a body projected vertically up, the K. E. of projection is equal to P. E. at the maximum height.

13. A body falling from a height 'h' rebounds to a height 'h' from a hard surfac. Energy lost in collision = $mg(h - h^1)$.

14. In perfectly elastic collisions both K. E. and linear momentum is conserved and K. E. is not conserved.

15. A body can have energy without momentum but it cannot have momentum without energy.