# Work and Energy

1) Define Work.

Ans: Work done by force acting on an object is equal to the magnitude of the force multiplied by the distance moved in the direction of the force. Work has only magnitude and no direction.

The Unit of work is Newton metre (Nm) or Joule (J)

1 Joule is the amount of work done on an object when a force of 1 N displaces it by 1 M along the line of action of force.

$W = F \times S$

$1\ J = 1\ N \times 1\ M$

2) Define Positive, Negative and Zero Work.

| Positive work | Negative work | Zero work |
|---|---|---|
| Work done is positive when the force is in the direction of displacement. | Work done is negative when the force acts opposite to the direction of displacement | Work done is zero if either<br>1) Displacement is Zero<br>2) Force and displacement are perpendicular to each other |

3) Examples for Positive, Negative and Zero Work

Ans: Example for Positive work:

- Work done by gravity on a freely felling object is Positive.
- When a spring is stretched work done by stretching force is Positive

Example for Negative work:

- Work done by the gravity on an object moving upwards is negative
- Work done by the frictional force is negative when object is moved over a rough horizontal surface.

Example for Zero work:

- Work done is zero when an object moves in a circular path.
- When a person carrying a bag moves along a horizontal road work done by him is zero.

4) Look at the activities listed below reason out whether or not work is done in the light of your understanding of the team 'work'.

a) Suma is swimming in a pond.

Ans: Force applied by her brings displacement of her Body.

b) A Donkey is carrying a load on its back.

Ans: Work is not done, Displacement = 0

c) A Wind mill is lifting water from a well.

Ans: Work is done, Force exerted by the windmill or water displaces it.

d) A green plant is carrying but photosynthesis.

Ans: Work is not done, Displacement = 0

e) An engine is pulling a train.

Ans: Work is done, Force is applied and their train moves.

f) Food grain are getting dried in the sun.

Ans: Work is not done, displacement = 0

g) A Sailboat is moving due to wind energy.

Ans: Work is done, Force exerted by wind mover sailboat.

5) Define Energy.

Ans: Energy of an object is the capacity to do work. The amount of energy poses by the object is numerically equal to amount of work done by it.

Unit of energy is Joule

1 KJ = 1000 Joule

6) What are the forms of Energy?

Ans: The various forms of energy include mechanical energy, heat energy, light energy, electrical energy, and chemical energy.

Mechanical energy is of two types

a) Kinetic Energy

b) Potential Energy

7) Define Kinetic energy.

Ans: The energy possessed by the object by the virtue of its motion is called Kinetic energy.

K.E of a body = Work done to move

8) Expression of Kinetic energy of a body.

Ans: Consider of an object of mass ‘M’ moving with a velocity U. let it be displaced through a distance S, when force F is applied.

9) A Battery lights a bulb. Describe the energy changes involved in the process.

Ans: Chemical ➡ Electrical ➡ Light + Heat