2. Work and Energy

Q. 1 Identify the direction of force and displacement in following case

A cricketer while catching ball, which is thrown towards him.

Ans- The Force applied in catching ball, is in opposite direction to that of motion of ball.

Q. 2 When a person is climbing and descending on stairs, or climbing tree, and coming down.

Ans- The force is applied to go upstairs and upwards, while displacement takes place in opposite direction.

Q. 3 When brakes are applied to stop a moving car.

Ans- The force applied by brakes. is in opposite direction to the displacement of the car.

Q. 4 Why are dams constructed on the river for the hydroelectric projects.

Ans. Dams construct the flow of the water from the river. The height of water increases, as the flow stops and waters starts getting stored. Water has potential energy. Due to gravitational force, water flows through gates. The potential energy of water gets converted to Kinetic energy, which is used to rotate the turbines between strong magnets to generate electricity.

Q. 5 An object of 0.9 kg thrown upwards reaches a maximum height of 10m. Find the work done by force of gravity during this vertical displacement.

Ans- Mass (m) = 0.9 kg

Acceleration due to gravity (g) = - 9.8 m/s^2

Displacement (S) = 10 m

Work done (W) = ?

∴ We know that , W = P. E = mgh

∴ W = mgh

= 0.9 × (-9.8) × 10

= 88.2

The work done by object is 88.2 J

Q. 6 The energy of a ball falling from a height of 10 m is reduced by 50%. How high will it rebound ?

Solution –

Initial height (h_1) = 10m. Initial (P.E) = 100

Final ($P.E_2$) = 100 – 50

= 50

Final height (h_2) = ?

We know that P.E = mgh.

∴ $P.E_1 = mgh_1$, and $P.E_2 = mgh_2$

Dividing 2 by 1, $\frac{P.E_2}{P.E_1} = \frac{mg\,h_2}{mg\,h_1}$

$$\frac{50}{100} = \frac{h_2}{10}$$

$\frac{50}{100} \times 10 = h_2$

$h_2 = 5m$

The ball will rebound by 5m.