

CLASS 10 PHYSICS
NUMERICALS OF EXERCISE 2(C)

1. $m = 0.20 \text{ kg}$
 $u = 20 \text{ ms}^{-1}$

Maximum potential energy

= Kinetic energy at the starting point

$$= \frac{1}{2} m u^2$$

$$= \frac{1}{2} \times 0.20 \times 20^2$$

$$= \frac{1}{2} \times 0.20 \times 20 \times 20$$

$$= 40 \text{ J. (Ans)}$$

$m = 0.20 \text{ kg}$

$u = 20 \text{ ms}^{-1}$

2. $m = 500 \text{ g}$
 $u = 15 \text{ ms}^{-1}$
 $g = 10 \text{ ms}^{-2}$

(i) P.E = (mgh) = K.E at the starting $u = 15 \text{ ms}^{-1}$

P.E at the greatest height = $\frac{1}{2} m u^2$

$$= \frac{1}{2} \times \frac{500}{1000} \times 15^2$$

$$= \frac{1}{2} \times \frac{1}{2} \times 225$$

$$= 56.25 \text{ J (Ans)}$$

(ii) K.E on reaching the ground = P.E at the greatest height

$$= 56.25 \text{ J (Ans)}$$

- (iii) The total energy at its half way point
 \Rightarrow P.E at the greatest height
 $=$ K.E at the starting point.
 $= 56.25 \text{ J (Ans)}$

3. $m = 2 \text{ kg}$
 height $= h = 5 \text{ m}$
 $g = 10 \text{ ms}^{-2}$

- (i) P.E possessed by the ball $= mgh$
 $= 2 \times 10 \times 5$
 $= 100 \text{ J (Ans)}$
- (ii) K.E of the ball just before it hits the ground
 $=$ P.E at the greatest height.
 $= 100 \text{ J (Ans)}$
- (iii) Mechanical energy gets converted into heat and sound energy.

4. Weight of the skier $= 60 \text{ kgf}$
 \therefore mass of the skier $= 60 \text{ kg}$

- (a) Change in the gravitational potential energy of the skier between A and B $= mg [h_A - h_B]$
 $= 60 \times 10 [75 - 15]$
 $= 600 \times 60$
 $= 36000 \text{ J (Ans)}$

b. 75% of energy in part a = K.E at B

$$\frac{75}{100} \times 36000 = \frac{1}{2} \times m \times u^2$$

$$\frac{75}{100} \times 36000 = \frac{1}{2} \times 60 \times u^2$$

$$900 = u^2$$

$$\sqrt{900} = u$$

$$30 \text{ ms}^{-1} = u \quad (\text{Ans})$$

5. $h = 50 \text{ m}$

(η) efficiency = 40%

$$g = 10 \text{ ms}^{-2}$$

power output = 1 MW

$$\eta = \frac{\text{Work output (W}_o\text{)}}{\text{Work input (W}_I\text{)}}$$

$$\eta = \frac{\text{Power output}}{\text{Power input}}$$

$$\eta = \frac{P_o}{P_I}$$

$$\frac{40}{100} = \frac{1000000}{mgh}$$

$$\frac{40}{100} = \frac{1000000}{m \times 10 \times 50}$$

$$m = \frac{1000000 \phi \times 1 \phi \phi}{4 \phi \times 1 \phi \times 5 \phi}$$

$$= \frac{1000000}{20}$$

$$= 5000 \text{ Kg. (Ans)}$$