CHAPTER - 2

CLASS 10

PHYSICS

Important Questions with their answers

Q1 Define work.

Ans Work is said to be done only when the force applied on a body makes the body move in the direction of the force.

Q2 How is the work done by a force measured when
i) Force is in the direction of displacement
(ii) Force is ~~in the~~ at an angle to the direction of displacement ?

Ans (i) $W = F \times \vec{S}$

(ii) $W = F \times S\cos\theta$

Q3 A body is acted upon by a force. State two conditions when the work done is zero.

Work done is zero when
i) there is no displacement. $[\vec{S} = 0]$
ii) the displacement is normal to the direction of force. [i.e $\theta = 90°$]

Q4 When a body moves in a circular path, how much work is done by the body? Give reason.

Ans Work done is zero because the centripetal force is normal to the displacement.

Q5 Give an example when work done by the force of gravity acting on a body is zero even though

the body gets displaced from its initial position

Ans A coolie holding a load on his head and moving on a horizontal plane (ground) does no work against the force of gravity

Q6 Express joule in terms of erg.

Ans 1 joule = $10^7$ erg.

Q7 Name the physical quantity which is measured in calories. How is it related to the S.I unit of that quantity?

Ans Heat energy

1 calorie = 4.2 joule

Q8 Name the quantity which is measured in kilowatt hour. How is kilowatt related to joule?

Ans Energy

1 kilowatt hour = $3.6 \times 10^6$ joule

Q9 Is it possible that no transfer of energy takes place even when a force is applied to a body?

Ans Yes, when force is normal to the displacement.

Q10 i) Name the physical quantity measured in terms of horse power

ii) How is horse power related to the S.I unit of power.

Ans (i) Power

(ii) 1 horse power = 746 W.

CLASS 10
CHAPTER - 2 NUMERICALS
EXERCISE 2(A)

Q1 Work done by the force when the displacement is

i) in the direction of the force

$\therefore W = F \times \vec{s}$

$= 100 \times 0.5$

$= 50 J$ (Ans)

$\because 1 kgf = 10 N$

$\therefore 10 kgf = 100 N$

(ii) $W = F s \cos\theta$

$= 100 \times 0.5 \times \cos 60^\circ$

$= 100 \times 0.5 \times \frac{1}{2}$

$= 25 J$ (Ans)

$\because \cos 60^\circ = \frac{1}{2}$

(iii) $W = F s \cos\theta$

$= 100 \times 0.5 \times \cos 90^\circ$

$= 50 \times 0$

$= 0 J$ (Ans)

$\cos 90^\circ = 0$

Q2 i) Force of gravity $= m \times g$

$= 40 \times 10$

$= 400 N$ (Ans)

(ii) Work done by him against the force of gravity $= F \times \vec{s}$

$= 400 N \times 8 m$

$= 3200 J$ (Ans)

(iii) The power spent by the boy $= \frac{W}{t}$

$= \frac{3200}{5}$

$= 640\ W$ (Ans)

3 i) $W = F \times \vec{S}$

$6.4 \times 1000 = F \times 64$ $\quad \because 1\ KJ = 1000\ J$

$\frac{6.4 \times 1000}{64} = F$

$100\ N = F$ (Ans)

(ii) $P = \frac{W}{t}$

$= \frac{6.4 \times 1000}{2.5}$

$= \frac{64 \times 1000}{25}$

$= 2560\ W$

$P = \frac{2560}{746}\ H.P$ $\quad \because 746\ W = 1\ H.P$

$= 3.43\ H.P$ [Ans]

Q5 i) Energy spent $= W = F \times \vec{S}$

$= 750 \times 16$

$= 12000\ J$ (Ans)

(ii) Power of the machine $= \frac{W}{t} = \frac{12000}{5}$

$= 2400\ W$ (Ans)

Q6 Power = 3 kW

$t = 10h$

(i) $W = P \times t$

$= 3\,kW \times 10\,h$

~~$= 3 \times 1000$~~

$= 30\,kWh$ (Ans)

(ii) $W = P \times t$

$= 3 \times 1000 \times 10 \times 60 \times 60$

$= 108 \times 10^6\,J$

$= 1.08 \times 10^8\,J$ (Ans)

Q7 V of water = 50 litre

∵ 1 litre of water has mass = 1 kg

∴ 50 litre of water will have mass = 50 kg

∵ d of water = $1000\,kg\,m^{-3}$ at 4°c.

$$P = \frac{mgh}{t}$$

$$= \frac{50 \times 10 \times 25}{5}$$

$= 2500\,W$ (Ans)

Q8 $m = 500\,kg$ depth = 80 m $t = 10\,s$

(i) Work done by the pump = $mgh$

$= 500 \times 10 \times 80$

$= 400000\,J$ (Ans)

(ii) power at which the pump works = $\frac{W}{t}$

$$= \frac{400000}{10}$$

$= 40000\,W$ (Ans)

(iii) efficiency $= \frac{\text{Work output}}{\text{Work input}} = \frac{W_O}{W_I}$

$$\eta = \frac{P_O \times t}{P_I \times t}$$

$$\eta = \frac{\text{useful power}}{\text{power input}} \quad \text{or} \quad \eta = \frac{P_O}{P_I}$$

$$\frac{40}{100} = \frac{40000}{\text{power input}}$$

$$P_I = \frac{40000 \times 100}{40}$$

$$P_I = 100000\ W$$

power rating = Power input = 100000 W (Ans)

Q9 Power developed by the OX = F X V

$= 1000 \times 30$

$= 30000\ W$ (Ans)

Q10 $P = 40\ kW = 40000\ W$

$F = 20000N$

$P = F \times V$

$40000 = 20000 \times V$

$\frac{40000}{20000} = V$

$2\ m\,s^{-1} = V$

$\therefore$ speed of the motor $= 2\ m\,s^{-1}$ (Ans)

Date / /
Page

Q12 Weight of the boy = 350 N

$\vec{S}$ or $h$ = 30 X 20
= 600 cm
= 6 m

time = 60 s (1 minute)

(i) Work done = $F \times \vec{S}$
= 350 X 6
= 2100 J (Ans)

(ii) power spent = $\frac{W}{t}$

$= \frac{2100}{60}$

= 35 W (Ans)

Q13 i) $W_A : W_B$

$mgh : mgh$ ∵ m is same, g is same, h is same

1 : 1 (Ans)

(ii) Power developed by person A and B

$P_A : P_B$

$\frac{W_A}{t_A} : \frac{W_B}{t_B}$

$\frac{1}{t_A} : \frac{1}{t_B}$ ∵ $W_A = W_B$

$\frac{1}{20} : \frac{1}{15}$

15 : 20

3 : 4

∴ $P_A : P_B = 3:4$ (Ans)