UNIT TEST-01

Subject : Physics

Class : XI

Q.1 (1)	**Q.2** (1)	**Q.3** (4)	**Q.4** (1)	**Q.5** (3)	**Q.6** (2)	**Q.7** (4)	**Q.8** (2)	**Q.9** (4)	**Q.10** (3)
Q.11 (2)	**Q.12** (1)	**Q.13** (2)	**Q.14** (3)	**Q.15** (3)	**Q.16** (2)	**Q.17** (3)	**Q.18** (2)	**Q.19** (4)	**Q.20** (1)
Q.21 (2)	**Q.22** (2)	**Q.23** (2)	**Q.24** (3)	**Q.25** (3)	**Q.26** (1)	**Q.27** (1)	**Q.28** (2)	**Q.29** (2)	**Q.30** (3)
Q.31 (3)	**Q.32** (3)	**Q.33** (4)	**Q.34** (1)	**Q.35** (1)	**Q.36** (3)	**Q.37** (1)	**Q.38** (4)	**Q.39** (3)	**Q.40** (3)
Q.41 (2)	**Q.42** (4)	**Q.43** (4)	**Q.44** (1)	**Q.45** (1)	**Q.46** (2)	**Q.47** (3)	**Q.48** (3)	**Q.49** (2)	**Q.50** (2)

Q.1 (1)

The 7 basic units are: meter, kilogram, second, Ampere, candela, mole, and Kelvin

Q.2 (1)

SI System is based on seven fundamental units. Rest three depends on mass, length and time.

Q.3 (4)

The dimensional correctness of an equation is verified using the principle of homogeneity and all the unitless quantities are dimensionless.

Q.4 (1)

$$\text{Power} = \frac{\text{Energy}}{\text{Time}}$$

Q.5 (3)

Q.6 (2)

Q.7 (4)

$$F \propto v \Rightarrow F = kv \Rightarrow [k] = \left[\frac{F}{v}\right] = \left[\frac{MLT^2}{LT^{-1}}\right]$$

$$= [MT^{-1}]$$

Q.8 (2)

$$4\ g\ cm^{-3} = \frac{?}{n_2} M^2 L_2^{-3} \quad n_2 = 4\left[\frac{g}{M_2}\right]\left[\frac{cm}{L_2}\right]^{-3}$$

$$= 4\left[\frac{g}{100g}\right]\left[\frac{cm}{10cm}\right]^{-3} = 40$$

Q.9 (4)

$LT = [L^2T^{-1}]^n [LT^2]^m$

$LT = L^{2n+m}T^{2m-n}$

$2n + m = 1$ ....(i)

$-n + 2m = 1$ ....(ii)

————————

Sovling $\quad n = \frac{1}{5}, m = \frac{3}{5}$

Q.10 (3)

Let $Z = \frac{a^2b}{c^4}$

Then $\frac{\Delta Z}{Z} \times 100 = \left[2\left(\frac{\Delta a}{a}\right) + \left(\frac{\Delta b}{b}\right) + 4\left(\frac{\Delta c}{c}\right)\right] \times 100$

$$= \left[2\left(\frac{0.1}{10}\right) \times 100 + \left(\frac{0.2}{20}\right) \times 100 + 4\left(\frac{0.4}{80}\right) \times 100\right]$$

$= (0.02 + 0.01 + 0.02) \times 100$

$= 5\%$

Q.11 (2)

According to the rules of significant figures,

1.64×10^{20} kg has three significant figures

0.006 m^2 has one significant figures

7.2180 J has five significant figures

5.045 J has four significant figures

Q.12 (1)

Q.13 (2)

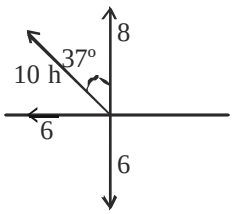
If student measure 3.50 cm it means that there in an uncertainty of order 0.01 cm

L.C of V.C = 1 MSD – 1VSD

$$= \frac{1}{10}\left[1 - \frac{9}{10}\right] = \frac{1}{100}\text{ cm}$$

So (2) is Correct option

Q.14 (3)



$\vec{S} = -6\hat{i} + 2\hat{j}$

Co-ordinate = (–6,2)

Q.15 (3)

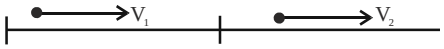
Ratio of distance travelled in equal consecutive time interval is 1 : 3.

Q.16 (2)

$v = u + at \Rightarrow -2 = 10 + a \times 4 \Rightarrow a = -3 m/sec^2$

Q. 17 (3)

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time taken}}$$



$$\Rightarrow V_{avg} = \frac{\frac{S}{4}+\frac{3S}{4}}{t_1+t_2}$$

$$= \frac{S}{\frac{S}{4}\left(\frac{1}{V_1}+\frac{3}{V_2}\right)} = \frac{4V_1V_2}{V_2+3V_1}$$

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$t_1 = \frac{\frac{S}{4}}{V_1} = \frac{S}{4V_1}$$

$$t_2 = \frac{3S}{4V_2}$$

Q.18 (2)

Applying third equation of motion

$v^2 = u^2 + 2as$

$\Rightarrow 0 = 400 + 2a(10)$

$$\Rightarrow a = \frac{-400}{20} = -20$$

$a = -20 \text{ m/sec}^2$

Q.19 (4)

Let the body be projected upwards with velocity u from top of tower. Taking vertical downward motion of boy form top of tower to ground, we have

$u = -u, a = g = 10 ms^{-2}, s = 50 m, t = 10 s$

As $s = ut + \frac{1}{2}at^2$,

So, $50 = -u \times 10 + \frac{1}{2} \times 10 \times 10^2$

On solving $u = 45 ms^{-1}$

If t_1 and t_2 are the timings taken by the ball to reach points A and B respectively, then

$20 = 45t_1 + \frac{1}{2} \times 10 \times t_1^2$

and $40 = -45t_2 + \frac{1}{2} \times 10 \times t_2^2$

On solving, we get $t_1 = 9.4$ s and $t_2 = 9.8$s

Time taken to cover the distance AB

$= (t_2 - t_1) = 9.8 = 9.4 = 0.4$s

Q. 20 (1)

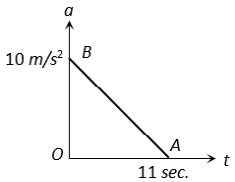
Applying relative motion (solving in elevator frame)

$$t = \sqrt{\frac{2h}{a_{relative}}} = \sqrt{\frac{2\times1.2}{10+2}}$$

$$= \sqrt{\frac{2.4}{12}} = \sqrt{0.2} = \frac{1}{\sqrt{5}}$$

Q.21 (2)

The area under acceleration time graph gives change in velocity. As acceleration is zero at the end of 11 sec



i.e. v_{max} = Area of ΔOAB

$$= \frac{1}{2} \times 11 \times 10 = 55 \text{ m/s}$$

Q.22 (2)

$\hat{A} = \hat{i} + \hat{j}$

Equation of x-axis $\vec{B} = \hat{i}$

Angle between $\vec{A}$ and $\vec{B}$,

$$\cos\theta = \frac{\vec{A}.\vec{B}}{(\vec{A})(\vec{B})}$$

$$= \frac{(\hat{i}+\hat{j})\cdot\hat{i}}{\sqrt{(1)^2+(1)^2}\times1}$$

$$= \frac{1\times1+1\times0}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

$= \cos 45^\circ$

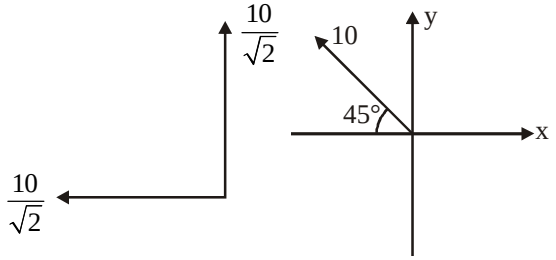
$\therefore \quad \theta = 45^\circ$

Q.23 (2)

Q.24 (3)

$\alpha \propto \beta$ if $A > B$

Q.25 (3)



$\vec{F} = \frac{10}{\sqrt{2}}(-\hat{i}) + \frac{10}{\sqrt{2}}\hat{j} = -5\sqrt{2}\hat{i} + 5\sqrt{2}\hat{j}$

Q.26 (1)

Workdone = $\int \vec{F}.d\vec{S} = \vec{F}.\vec{S}$

$\vec{S} = \left(5\hat{i} + 4\hat{j} + 3\hat{k}\right) - \left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$

$= 3\hat{i} + \hat{j} - \hat{k}$

$\vec{F} = \vec{F}_1 + \vec{F}_2 = 2\hat{i} + 3\hat{j} + 4\hat{k}$

$W = (2\hat{i} + 3\hat{j} + 4\hat{k}) \cdot (3\hat{i} + \hat{j} - \hat{k})$

$= 6 + 3 - 4 = 5$ J

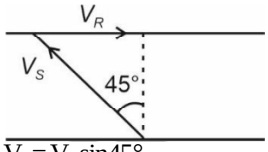
$= 5$ Joule

Q.27 (1)

Q.28 (2)

All the objects outside train will appear to move with same velocity.

Q.29 (2)

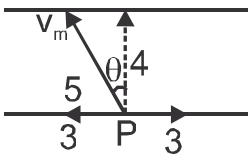


$V_R = V_S \sin 45°$

$\frac{V_S}{V_R} = \frac{1}{\sin 45°}$

$= \sqrt{2} : 1$

Q.30 (3)



For directly opposite $v_m \sin\theta = 3$

$\therefore$ Required velocity $v_m \cos\theta = 4$ m/s

Q.31 (3)

On a horizontal ground projectile $R = \frac{u^2 \sin 2\theta}{g}$

For R_{max} $\sin(2\theta) = 1 \quad \Rightarrow \theta = 45°$

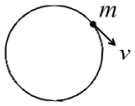
Q.32 (3)

$x = t \times u = \sqrt{\frac{2h}{g}} \times u = \sqrt{\frac{2 \times 490}{9.8}} \times 50 = 500\text{m}$

Q.33 (4)

Q.34 (1)

$\frac{v^2}{r} = a$, the centripetal acceleration [Given]



If v is doubled, a" = $\frac{4v^2}{r} = 4a$

Q.35 (1)

Here, a = 15 m s–2

R = 2.5 m

From figure,

$a_c = a\cos 30° = 15 \times \frac{\sqrt{3}}{2}\text{m s}^{-2}$

As we know, $a_c = \frac{v^2}{R} \Rightarrow v = \sqrt{a_c R}$

$\therefore \quad v = \sqrt{15 \times \frac{\sqrt{3}}{2} \times 2.5} = 5.69 \simeq 5.7\text{m s}^{-1}$

Q.36 (3)

$P\frac{N}{m} = Q\frac{\text{dyne}}{\text{cm}}$

$P \times \frac{10^5 \text{dyne}}{100\text{cm}} = Q\frac{\text{dyne}}{\text{cm}}$

$Q = 10^3 P$

$\frac{P}{Q} = 10^{-3}$

Q.37 (1)

$\frac{\beta^2}{\mu_0 qv} = y$

$\beta = [M^1L^0T^{-2}I^{-1}]$

$\mu_0 = [M^1L^1T^{-2}I^{-2}]$

$q = [IT]$

$V = [ML^2T^3I^{-1}]$

Q.38 (4)

$F = at + bt^2$

$[at] = MLT^{-2}$

$[a] = MLT^{-3}$

$[bt^{2}] = MLT^{-2}$
$[b] = MLT^{-4}$
$\Rightarrow y = [M^{0}L^{-3}T^{0}]$

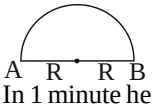
Q.39 (3)

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{6.237}{3.5} = 1.782$$

In this question density should be reported to two significant figures. As rounding of the number, we get density = 1.8 g/cm^3

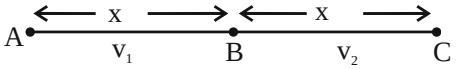
Q.40 (3)
Factual

Q.41 (2)



In 1 minute he is complte 3 round after 10 second he is at point B so displacement is 2R

Q.42 (4)



$$\text{Average velocity} = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{x + x}{\frac{x}{v_1} + \frac{x}{v_2}} = \frac{2v_1v_2}{v_1 + v_2}$$

Q.43 (4)
By using $v^2 = u^2 + 2aS$

$$u = 72 \times \frac{5}{18} \text{ m/sec} = 20 \text{ m/sec}$$

$$\Rightarrow 0 = (20)^2 - 2 \times a \times 200$$

$$\Rightarrow a = \frac{400}{400} = 1$$

$$\Rightarrow a = 1 \text{ m/s}^2$$

Q.44 (1)
$u = 0,\ a = g$

$$S(0 \text{ to } 1s) = 0 + \frac{1}{2}g(1)^2 = \frac{g}{2}$$

$$S(0 \text{ to } 6s) = 0 + \frac{1}{2}g(6)^2 = 18g = \frac{36g}{2}$$

$$S(0 \text{ to } 5s) = 0 + \frac{1}{2}g(5)^2 = \frac{25g}{2}$$

$$S(5 \text{ to } 6s) = \frac{36g}{2} - \frac{25g}{2} = \frac{11g}{2}$$

Q.45 (1)
Distance travelled = Area under the u-t graph

$$\therefore \Delta S = \frac{1}{2} \times 5 \times 8 = 20$$

Q.46 (2)

Unit vector $= 0.5\hat{i} + 0.8\hat{j} + c\hat{k}$

The magnitude of unit vector = 1

$$\therefore \sqrt{(0.5)^2 + (0.8)^2 + c^2} = 1$$

$$\therefore (0.5)^2 + (0.8)^2 + c^2 = 1$$

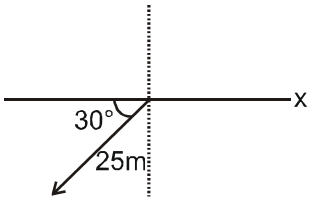
$$0.25 + 0.64 + c^2 = 1$$

$$c^2 = 1 - 0.25 - 0.64$$

$$= 1 - 0.89 = 0.11$$

$$c = \sqrt{0.11}$$

Q.47 (3)



x-component = –25 cos 30°

Q.48 (3)
$v \rightarrow$ velocity of boat in still water
$u \rightarrow$ velocity of river = 4km/h

$$\text{Given : } \frac{2 \times 8\text{km}}{v} = 2 \text{ hrs} \rightarrow v = 8 \text{ km/h}$$

$$t = \frac{8}{v-u} + \frac{8}{v+u} = \frac{8}{8-4} + \frac{8}{8+4} = \left(2 + \frac{2}{3}\right)\text{hr}$$

$$= 120 \text{ min} + \frac{2}{3} \times 60 \text{ min} = 160 \text{ min}$$

Q.49 (2)

$$u\cos\theta = \frac{\sqrt{3}u}{2} \Rightarrow \cos\theta = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \theta = 30°$$

$$T = \frac{2u\sin 30°}{g} = \frac{u}{g}$$

Option 2.

Q.50 (2)
Acceleration of the particle is
$a = r\omega^2 = r(2\pi n)^2$
$= 0.25 \times (2\pi \times 2)^2$
$= 16\pi^2 \times 0.25$
$= 4\pi^2 \text{ ms}^{-2}$