ANSWER KEY
AITS (NEET)
Class-XI
Part Test-01

PHYSICS

Q.1 (4)	**Q.2** (2)	**Q.3** (4)	**Q.4** (1)	**Q.5** (1)	**Q.6** (3)	**Q.7** (2)	**Q.8** (1)	**Q.9** (1)	**Q.10** (4)
Q.11 (1)	**Q.12** (2)	**Q.13** (4)	**Q.14** (2)	**Q.15** (2)	**Q.16** (3)	**Q.17** (4)	**Q.18** (3)	**Q.19** (1)	**Q.20** (1)
Q.21 (4)	**Q.22** (2)	**Q.23** (1)	**Q.24** (3)	**Q.25** (4)	**Q.26** (2)	**Q.27** (3)	**Q.28** (1)	**Q.29** (4)	**Q.30** (3)
Q.31 (3)	**Q.32** (2)	**Q.33** (1)	**Q.34** (3)	**Q.35** (1)	**Q.36** (1)	**Q.37** (2)	**Q.38** (4)	**Q.39** (1)	**Q.40** (3)
Q.41 (1)	**Q.42** (4)	**Q.43** (4)	**Q.44** (4)	**Q.45** (4)	**Q.46** (1)	**Q.47** (4)	**Q48** (2)	**Q.49** (3)	**Q.50** (3)

CHEMISTRY

Q.51 (1)	**Q.52** (1)	**Q.53** (4)	**Q.54** (3)	**Q.55** (3)	**Q.56** (2)	**Q.57** (1)	**Q.58** (4)	**Q.59** (3)	**Q.60** (2)
Q.61 (3)	**Q.62** (3)	**Q.63** (2)	**Q.64** (3)	**Q.65** (3)	**Q.66** (2)	**Q.67** (1)	**Q.68** (2)	**Q.69** (3)	**Q.70** (3)
Q.71 (2)	**Q.72** (3)	**Q.73** (1)	**Q.74** (3)	**Q.75** (3)	**Q.76** (3)	**Q.77** (3)	**Q.78** (4)	**Q.79** (1)	**Q.80** (1)
Q.81 (4)	**Q.82** (2)	**Q.83** (2)	**Q.84** (1)	**Q.85** (3)	**Q.86** (1)	**Q.87** (4)	**Q.88** (1)	**Q.89** (3)	**Q.90** (2)
Q.91 (1)	**Q.92** (2)	**Q.93** (3)	**Q.94** (4)	**Q.95** (1)	**Q.96** (4)	**Q.97** (3)	**Q.98** (3)	**Q.99** (3)	**Q.100** (3)

BIOLOGY

Q.101 (3)	**Q.102** (2)	**Q.103** (4)	**Q.104** (4)	**Q.105** (2)	**Q.106** (3)	**Q.107** (1)	**Q.108** (4)	**Q.109** (3)	**Q.110** (3)
Q.111 (1)	**Q.112** (2)	**Q.113** (1)	**Q.114** (1)	**Q.115** (2)	**Q.116** (3)	**Q.117** (1)	**Q.118** (3)	**Q.119** (4)	**Q.120** (2)
Q.121-(1)	**Q.122** (4)	**Q.123** (2)	**Q.124** (1)	**Q.125** (4)	**Q.126** (1)	**Q.127** (1)	**Q.128** (3)	**Q.129** (3)	**Q.130** (3)
Q.131 (1)	**Q.132** (1)	**Q.133** (4)	**Q.134**-(3)	**Q.135** (2)	**Q.136** (2)	**Q.137**-(1)	**Q.138** (2)	**Q.139** (3)	**Q.140** (4)
Q.141 (2)	**Q.142**-(1)	**Q.143** (4)	**Q.144** (2)	**Q.145** (4)	**Q.146** (2)	**Q.147** (4)	**Q.148** (1)	**Q.149** (3)	**Q.150** (2)
Q.151 (2)	**Q.152**-(2)	**Q.153** (1)	**Q.154** (1)	**Q.155**-(1)	**Q.156** (1)	**Q.157** (2)	**Q.158** (4)	**Q.159** (4)	**Q.160** (3)
Q.161 (3)	**Q.162** (3)	**Q.163** (3)	**Q.164** (3)	**Q.165** (4)	**Q.166** (3)	**Q.167** (3)	**Q.168** (2)	**Q.169** (2)	**Q.170** (4)
Q.171 (3)	**Q.172** (4)	**Q.173** (3)	**Q.174** (3)	**Q.175** (2)	**Q.176** (3)	**Q.177** (3)	**Q.178** (1)	**Q.179** (1)	**Q.180** (2)
Q.181 (2)	**Q.182** (3)	**Q.183**-(3)	**Q.184** (2)	**Q.185** (1)	**Q.186** (2)	**Q.187** (3)	**Q.188** (1)	**Q.189** (2)	**Q.190** (3)
Q.191 (2)	**Q.192** (3)	**Q.193** (4)	**Q.194**-(2)	**Q.195** (1)	**Q.196** (1)	**Q.197** (1)	**Q.198** (3)	**Q.199** (1)	**Q.200** (2)

HINT AND SOLUTIONS

PHYSICS
SECTION-A

Q.1 (4)

[At] = 1

$$[A] = \frac{1}{[t]} = T^{-1}$$

$$\left[\frac{A}{B}\right] = [x] = [L]$$

$$\frac{[T^{-1}]}{[B]} = [L]$$

$[B] = [L^{-1}\,T^{-1}]$

$$\left[\frac{A^3}{B}\right] = \left[\frac{T^{-3}}{L^{-1}T^{-1}}\right] = \left[LT^{-2}\right]$$

Q.2 (2)

For (A) : A and $\frac{A^3}{B}$ may have same dimension.

For (B) : As A and B have different dimension so exp $\left(-\frac{A}{B}\right)$ is meaningless.

for (C) : AB^2 is meaninfgul.

for (D) : AB^{-4} is meaningful

Q.3 (4)

Energy per unit volume

$$= \frac{\left[ML^2T^{-2}\right]}{\left[L^3\right]} = \left[ML^{-1}T^{-2}\right]$$

Force per unit area = $\frac{[MLT^{-2}]}{[L^2]} = [ML^{-1}T^{-2}]$

Product of voltage and charge per unit volume

$$= \frac{[ML^2T^{-2}]}{[L^3]} = [ML^{-1}T^{-2}]$$

Angular momentum per unit mass = $[L^2T^{-1}]$

Q.4 (1)
SI System is based on seven fundamental units. Rest three depends on mass, length and time.

Q.5 (1)
$[S] = [M^1T^{-2}]$
Let, $[S] = [K^a v^b t^c]$
$[M^1T^{-2}] = [M^1L^2T^{-2}]^a\,[L^1T^{-1}]^b\,[T^1]^c$
or $[M^1T^{-2}] = [M^aL^{2a+b}T^{-2a+b+c}]$
Comparing powers,
a = 1; 2a + b = 0; –2a – b + c = –2
Solving, we get
a = 1, b = –2, c = –2.

Q.6 (3)
option (3) is dimensionless but remaining three are dimensional quantity (Reynolds no.)

Q.7 (2)
Among the given quantities displacement gradient is unitless quantity.

Q.8 (1)

$$\frac{\Delta P}{P} = \frac{\Delta x}{x} + \frac{\Delta y}{y}$$

$$= \left(\frac{0.6}{12} + \frac{0.2}{5}\right)$$

$$\frac{\Delta P}{P} \times 100 = 9\%$$

Also, $\frac{\Delta D}{D} \times 100 = 9\%$

$\Delta R = \Delta x + \Delta y = 0.8$

$$\frac{\Delta R}{R} \times 100 = \frac{0.8}{17} \times 100 = \frac{80}{17}\,\%$$

$$\frac{\Delta S}{S} \times 100 = \frac{0.8}{7} \times 100 = \frac{80}{7}\,\%$$

Q.9 (1)
Factual.

Q.10 **(4)**
Best graph is to plot is as a straight line having same slope and y intercept.

$$h = ut - \frac{1}{2}gt^2$$

$$\Rightarrow \frac{h}{t} = u - \frac{1}{2}gt$$

Let $\frac{h}{t} = y$ & $t = x$

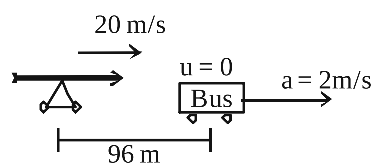
$$y = u - \frac{g}{2}x \text{ ie. } y = mx + c$$

Q.11 (1)
velocity v = a + bx

$$a = v\frac{dv}{dx} = ab + b^2x$$

so a increases with increase in distance x

Q.12 (2)



Considering relative motion of cyclist w.r.t Bus
$S_{rel} = 96$ m
$U_{rel} = U_{cyclist} - U_{Bus} = 20 - 0 = 20$ m/s
$a_{rel} = a_{cyclist} - a_{Bus} = 0 - (2) = -2$ m/s^2
appling IInd equation of motion

$$S_{rel} = U_{rel}t + \frac{1}{2}a_{rel}t^2$$

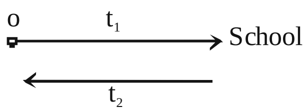
$$96 = 20t + \frac{1}{2}(-2)t^2$$

$96 = 20t - t^2$
$\Rightarrow t^2 - 20t + 96 = 0$
$\Rightarrow t^2 - 12t - 8t + 96 = 0$
$\Rightarrow t(t - 12) - 8(t - 12) = 0$
$\Rightarrow (t - 8)(t - 12) = 0 \Rightarrow t = 8$ sec
or 12 sec
so, at t = 8 sec, cyclist overtake the bus and again at t = 12 sec, bus overtake the cyclist as bus is accelerated

Q.13 (4)
Distance = Area under v – t graph
Distance = 100 m

Avg speed = $\frac{100}{5} = 20$m/s

Q.14 (2)



$$t_1 = \frac{\text{distance}}{\text{speed}} = \frac{6\text{km}}{2.5\text{km/hr}} = 2.4\text{hr}$$

$$t_2 = \frac{\text{distance}}{\text{speed}} = \frac{6\text{km}}{4\text{km/hr}} = 1.5\text{hr}$$

so, average speed = $\frac{\text{Total distance}}{\text{Total time}} = \frac{6+6}{t_1+t_2}$

$$= \frac{12}{2.4+1.5} = \frac{12}{3.9} = \frac{4}{1.3} = \frac{40}{13}$$

Q.15 (2)

$$S = \sqrt{(4)^2 + (4)^2} = 4\sqrt{2}\text{m}$$

Q.16 (3)

$$26 = u + \frac{19a}{2} \quad \text{...(1)}$$

$$28 = u + \frac{21a}{2} \quad \text{...(2)}$$

$\Rightarrow$ u = 7 and a = 2

Q.17 (4)

A particle could be moving to the right (positive velocity), in which case the acceleration speeds the particle up. The particle could be moving to the lift (negative velocity), in which case the acceleration is causing the particle to slow down. There is no information about the velocity of the particle, so no conclusion can be made.

Q.18 (3)

$$h = \frac{1}{2}gt^2$$

$$\frac{9}{16}h = \frac{1}{2}g(t-1)^2$$

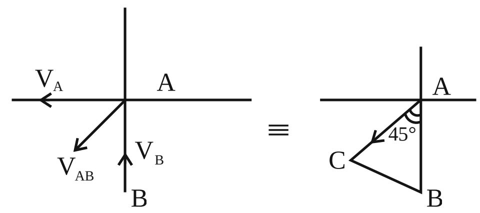
$$\Rightarrow \frac{9}{16} \times \frac{1}{2}gt^2 = \frac{1}{2}g(t-1)^2$$

$$\Rightarrow \frac{3}{4}t = t-1$$

$\Rightarrow 3t = 4t - 4$

$\Rightarrow t = 4s$

Q.19 (1)



$$t = \frac{AC}{V_{A/B}} = \frac{AB\cos 45}{10\sqrt{2}} = \frac{100/\sqrt{2}}{10\sqrt{2}} = 5\text{hr}$$

Q.20 (1)

$$x(t) = \int v(t)\,dt,\ v(t) = 10 - 5t;\ x(t) = 10t - \frac{5t^2}{2} + c,$$

at t = 0, x = 5m So $x(t) = 10t - 2.5t^2 + 5$

Q.21 (4)

$$\cos\theta = \frac{\vec{A}\cdot\vec{B}}{|\vec{A}||\vec{B}|} = \frac{42+24-12}{\sqrt{81}\times\sqrt{81}}$$

$$\cos\theta = \frac{54}{9\times 9} = \frac{2}{3}$$

$\{\theta = \cos^{-1}(2/3)\}$

Q.22 (2)

$$\frac{R_{max}}{R_{min}} = \frac{P+Q}{P-Q}$$

$$\frac{P+Q}{P-Q} = \frac{2}{1}$$

$2P - 2Q = P + Q$

$P = 3Q$

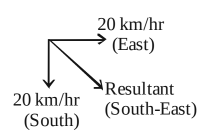
Q.23 (1)

Length of projection on xy plane is = $\sqrt{3^2+4^2} = 5$.

Q.24 (3)

as car is moving due to north with 20 km/hr flag points in south.

So,



Q.25 (4)

Relative velocity of stone = 5 m/s

Relative acceleration of stone

$= 10 + 5 = 15\ \text{m/s}^2$

$\therefore$ v = u + at

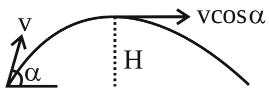
$= 5 + 15 \times 2 = 35$ m/s

Q.26 (2)

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

Q.27 (3)

$$H = \frac{v^2 \sin^2 \alpha}{2g}$$



Angular momentum

$= (mv\cos\alpha)H$

$$= mv\cos\alpha \times \frac{v^2 \sin^2 \alpha}{2g}$$

$$= \frac{mv^3 \cos\alpha \sin^2 \alpha}{2g}$$

Q.28 (1)

$v \cos 30° = 10 \cos 60°$

$$\Rightarrow v = \frac{10 \cos 60°}{\cos 30°}$$

Q.29 (4)

$T = 10$ s

$R = 500$

$$H = \frac{u^2 \sin^2 \theta}{2g}$$

$$10 = \frac{2u \sin\theta}{g} \Rightarrow u \sin\theta = 50$$

$$H == \frac{u^2 \sin^2 \theta}{2g} = \frac{2500}{20}$$

$H = 125$ m

Q.30 (3)

$$R = \frac{u^2 \sin 2\theta}{g}$$

or $R \propto \sin 2\theta$

$$\text{or } \frac{R_1}{R_2} = \frac{\sin 2\theta_1}{\sin 2\theta_2}$$

$\theta_1 = 30°, \theta_2 = 40°$

$$\text{So, } \frac{R_1}{R_2} = \frac{\sin 60°}{\sin 40°} > 1$$

$\Rightarrow R_1 > R_2$

at 30°;

It will fall beyond enemy target

Q.31 (3)

$$v_y^2 = u_y^2 - 2gh$$

$$\Rightarrow u_y^2 = v_y^2 + 2gh = (2)2 + 2 \times 10 \times 0.4 = 12$$

$\therefore u_y = \sqrt{12}$ and $u_x = 6$

$$\tan\theta = \frac{u_y}{u_x} = \frac{\sqrt{12}}{6} = \frac{1}{\sqrt{3}}$$

$\Rightarrow \theta = 30°$

Q.32 (2)

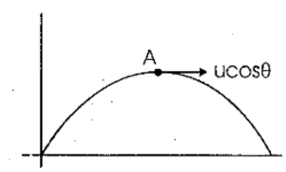
Magnitude of change in velocity = $2u \sin\theta$

$= 2 \times 50 \times \sin 37°$

$$= 100 \times \frac{3}{5}$$

= 60 m/sec

Q.33 (1)



$$\frac{U_A}{K_A} = 3 \Rightarrow \frac{mgH_{max}}{\frac{1}{2}m(u\cos\theta)^2} = 3$$

$$\frac{20\left(\frac{u^2 \sin^2 \theta}{20}\right)}{u^2 \cos^2 \theta} = 3$$

$\tan\theta = \sqrt{3} \Rightarrow \theta = 60°$

Q.34 (3)

$$\frac{v_1^2}{r_1} = \frac{v_2^2}{r_2} \backslash; \Rightarrow \frac{v_1}{v_2} = \sqrt{\frac{r_1}{r_2}} = \frac{1}{\sqrt{2}}$$

Q.35 (1)

$r = 100$m

$v = 200$ m/s

$a_T = 100$ m/s²

$$a_C = \frac{v^2}{r} = \frac{200^2}{100} = \frac{200 \times 200}{100} = 400 \text{ m/s}^2$$

$$a = \sqrt{a_C^2 + a_T^2}$$

$= 100\sqrt{17}$ m/s²

SECTION-B

Q.36 (1)

$n_1\left[M_1L_1^2T_1^{-2}\right] = n_2\left[M_2L_2^2T_2^{-2}\right]$

$n_1 = \left[\frac{M_2}{M_1}\times\left(\frac{L_2}{L_1}\right)^2\times\left(\frac{T_2}{T_1}\right)^{-2}\right]$

$= [5 \times (20)^2 \times (10)^{-2}] = \left[400\times5\times\frac{1}{100}\right] = 20$ Joule

Q.37 (2)
Shake is unit of time, While light year is the unit of distance
Also,
[Work] = [Torque].

Q.38 (4)

$\because\ V = \frac{d}{t}$

$\frac{\Delta V}{V} = \frac{\Delta d}{d} + \frac{\Delta t}{t}$

$\Delta V = \left(\frac{0.2}{24}+\frac{0.1}{6}\right)\times 4 = 0.1 \therefore$ Velocity $= (4 \pm 0.1)$ m/s

Q.39 (1)
Power of exponential is dimensionless,
$2\,Ct = M^0L^0T^0$
$CT^1 = M^0L^0T^0$
$C = M^0L^0T^{-1}$

and $\frac{dv}{v^{3/2}} = BC$

$\frac{[L^1T^{-1}]}{[L^1T^{-1}]^{3/2}} = B[M^0L^0T^{-1}]$

$B = [L^{-\frac{1}{2}}T^{\frac{3}{2}}]$

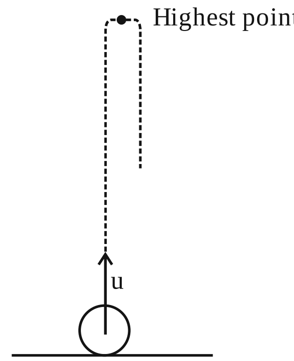
Q.40 (3)
The statement given in option (3) is incorrect.
for e.g., acceleration has zero dimension of mass (base quantity).

Q.41 (1)
$12.589 - 12.4 = 0.189$
Rounding off above result upto one decimal place,
We get, 0.2.

Q.42 (4)
Let
$[F] = [P^aM^bV^c]$
$[M^1L^1T^{-2}] = [M^1L^{-1}T^{-2}]^a\,[M^1]^b\,[L^1T^{-1}]^c$
$[M^1L^1T^{-2}] = [M^{a+b}L^{-a+c}T^{-2a-c}]$
Comparing powers,
$a + b = 1; -a + c = 1\ \&\ -2a - c = -2$
Soving we get

$a = \frac{1}{3}, b = \frac{2}{3}\ \&\ c = \frac{4}{3}$.

Q.43 (4)



At highest point of path, speed of body is zero but acceleration is acting downwards and equal to g.

Q.44 (4)

$v = \frac{ds}{dt} = \beta + 2\gamma t + 4\delta t^3 = \beta(\text{at } t = 0)$

$a = \frac{dv}{dt} = 2\gamma + 12\delta t^2 = 2\gamma(\text{at } t = 0)$

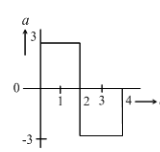
Ratio $= \frac{\beta}{2\gamma}$

Q.45 (4)
In vertical directin (4-direction)
$U_y = 0; a_y = -\,gm/s^2; t = 1$ sec
$V_y = U_y + a_yt \Rightarrow V_y = -g = -10$ m/s
as speed remain same in horizontal direction

So, $v_{res} = \sqrt{V_x^2 + V_y^2}$

$= \sqrt{(10)^2 + (-10)^2} = 10\sqrt{2} = 14.14$ m/s

Q.46 (1)



Taking the motion from 0 to 2 s
$u = 0, a = 3ms^{-2}, t = 2s, v = ?$
$v = u + at = 0 + 3 \times 2 = 6ms^{-1}$
Taking the motion from 2 s to 4 s
$v = 6 + (-3)(2) = 0ms^{-1}$

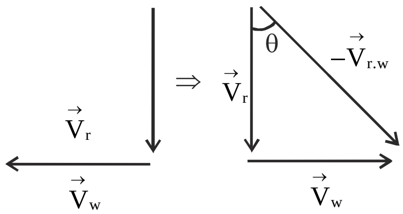
Q.47 (4)

$\vec{S} = 6\hat{i} + 8\hat{j} - 21$ (i)

$= -15\hat{i} + 8\hat{j}$

$\therefore |\vec{S}| = 17$]

Q48 (2)



$\vec{v}_{r,w} = \vec{v}_r - \vec{v}_w$

$\tan\theta = \frac{12}{30} = \frac{2}{5}$

$\theta = \tan^{-1}\left(\frac{2}{5}\right)$ with vertical toward the west

$\theta = \tan^{-1}\left(\frac{2}{5}\right)$ with vertical toward the west

Q.49 (3)

Comparing the given equation with the standard equation

$y = x\tan\theta - \frac{1}{2}g\frac{x^2}{u^2\cos^2\theta}$

We get,

$\tan\theta = 1 \Rightarrow \theta = 45°$

$\frac{1}{2}\times\frac{g}{u^2\cos^2 45°} = 3$

$u^2 = \frac{10}{3}$

$u = \sqrt{\frac{10}{3}}$

$H = \frac{u^2\sin^2\theta}{2g}$

$= \frac{10}{3}\times\frac{\sin^2 45°}{2\times 10}$

$H = \frac{1}{12}$

$R\tan\theta = 4H$

$R = \frac{1}{3}$

$H = \frac{1}{8}gT^2$

$T = \frac{1}{\sqrt{15}}$

Q.50 (3)

Displacement, velocity and acceleration change continuously with respect to time because of change in direction.

CHEMISTRY
SECTION-A

Q.51 (1)

$CaCO_3 \rightarrow CaO + CO_2$

$\frac{56\times10^3}{56}$ mol

Moles of $CaCO_3$ = moles of CaO

$= \frac{56\times10^3}{56} = 1\times10^3$ mole

wt of $CaCO_3 = 1 \times 10^3 \times 100$ g

$= 100$ kg

Q.52 (1)

Equivalent weight = $\frac{\text{molecular weight}}{\text{valency factor}}$

Q.53 (4)

$Fe + 5\,CO \longrightarrow Fe\,(CO)_5$

41g   70g

mole $\frac{41}{56}$ $\frac{70}{28}$

L·R· $\frac{41}{56\times1}$ $\frac{70}{14\times2}$

So CO is L·R·m while Fe is excess Reagent

5 mol of CO reacts with 1 mol of Fe

1 mol of CO $\longrightarrow \frac{1}{5}$ mol of Fe

5/2 mole of CO reacts with $\frac{\cancel{5}}{2}\times\frac{1}{\cancel{5}}$ mol of Fe

W_{Fe} reacted = $\frac{1}{2}\times 56 = 28$g

W_{Fe} left = 41 – 28 = 13g

Q.54 (3)

Statement (i) (ii) (iii) and (iv) are correct.

Q.55 (3)

mall of 1 C - atom = 12 amu

1 mass of 1 mol of C - atom

$= 12 \times 1\text{amu} \times 6.02 \times 10^{23} \times 10^3$

$= 12 \times 1000$ g = 12 kg

Q.56 (2)

According to the reaction

3 mol of $KClO_4$ formed from 4 mol of $KClO_3$

1 mol of $KClO_4$ is formed by $\frac{4}{3}$ mol of $KClO_3$

$\frac{1385}{138.5} = 10$ mol of $KClO_4 \longrightarrow \frac{40}{3}$ mol of $KClO_3$

from eq II

1 mol of $KClO_3$ formed by 3mol KClO

$\frac{40}{3}$ mole is formed by $\frac{40}{3} \times 3 = 40$ mol of KClO

40 mol of KClO is formed by 40 mol of Cl_2

$W_{Cl_2} = 40 \times 71 = 2840g$

Q.57 (1)

MCl is the compound V.F. of metal(m) = 1

Molar mass of MCl = 32.7 + 35.5 = 68.2

Q.58 **(4)**

(1) $n_w = \frac{10}{18} \times 6.022 \times 10^{23} = 3.34 \times 10^{23}$ o - atom

(2) $0.1 \text{mole } V_2O_5 = 5 \times 0.1 \times 6.022 \times 10^{23} = 3.011 \times 10^{23}$ O - atom

(3) $12g\, O_3 = \frac{12}{48} \times 6.022 \times 10^{23} \times 3 = 4.51 \times 10^{23}$

(4) 1 12.44 × 10^{22} molecules of $CO_2 = 2 \times 12.044 \times 10^{22}$
= 2.4088 × 10^{23} O - atom

Q.59 (3)

$$\frac{M_1V_1}{n_1} = \frac{M_2V_2}{n_2}$$

$$\frac{0.1 \times V_1}{2} = \frac{0.05 \times 20}{1}$$

$$\boxed{V_1 = 20ml}$$

Q.60 (2)

Statement - I is correct but Statement - II is incorrect

Q.61 (3)

$$3A + 2B + 4C \rightarrow 5D$$

$$\frac{3}{2}A + B + 2C \rightarrow \frac{5}{2}D$$

Given moles 8 6 8 $\rightarrow$ 0

(i) For 6 moles of B = 12 mole C is needed

(ii) For $\frac{3}{2}$ mole of A = 2 mole of C is needed

(iii) For 8 moles of A = $\frac{8 \times 2}{3/2} = \frac{32}{3}$ mols of C is needed

$\therefore$ C is Limiting reagent.

$\because$ 2 mole C produced = $\frac{5}{2}$ moles of of D

$\therefore$ 8 moles of C produced = $\frac{5}{2} \times \frac{8}{2} = 10$ mols of D

yied % = 80%10 = 8

Q.62 (3)

$$50 = \frac{18 \times n}{(142 + 18n)} \times 100$$

142 + 18 n = 36 n

$$n = \frac{142}{18} = 8$$

Q.63 (2)

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + CO_2 + H_2O$$

0.88 g of $CO_2 = \frac{0.88}{44} = 0.02$ mol

0.02 mol of CO_2 formed by 0.02 mol of $CaCO_3$

pure $W_{CaCO_3} = 0.02 \times 100 = 2g$

% purity = $\frac{2}{4} \times 100 = 50\%$

Q.64 (3)

Oxygen atoms in

$Na_2SO_4 . 10H_2O = \frac{1.61}{322} \times N_A \times 14 = \frac{7N_A}{100}$

$H_2SO_4 = \frac{0.98}{98} \times N_A \times 4 = \frac{4N_A}{100}$

$SO_3 = \frac{0.08}{80} \times N_A \times 3 = \frac{3N_A}{1000}$

$H_2S_2O_7 = \frac{1.78}{178} \times N_A \times 7 = \frac{7N_A}{100}$

$CaCO_3 = \frac{0.05}{100} \times N_A \times 3 = \frac{3N_A}{2000}$

Q.65 (3)

No. of moles of $CO_2 = \frac{W_{CO_2}}{M_{CO_2}} = \frac{0.44}{44} = 0.01$ moles

No. of moles of $CaCO_3$ = 0.01 moles

$W_{CaCO_3} = 1$ g.

% purity of sample = $\frac{1}{1.25} \times 100 = 80\%$

Q.66 (2)

No. of moles of A = $\frac{X}{20}$

No. of moles of B = $\frac{2X}{40} = \frac{X}{20} = Y$

So same moles will contains same no. of atoms.

OR

As we know

mole × Na = No. of atoms
So according to given conditions,

$$X \times \frac{Na}{20} = Y$$

Therefore $2X \times \frac{Na}{40} = Y$

Hence 2X g of B will contain Y atoms.

Q.67 (1)

$$\frac{T_{He^+}}{T_{Li^{2+}}} = \frac{\left(\frac{n^3}{Z^2}\right)_{He^+}}{\left(\frac{n^3}{Z^2}\right)_{Li^{2+}}} = \frac{\left(\frac{2^3}{2^2}\right)}{\left(\frac{4^3}{3^2}\right)} = \frac{9}{32}$$

Q.68 (2)
Greater the value of $(n + \ell)$ more will be the energy of orbital. If two orbitals have same $(n + \ell)$ value then the orbital having greater n value have greater energy.

Q.69 (3)
Electronic configuration of Fe
$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
$n = 3, \ell = 2 \Rightarrow 3d$
6 e^- are present in 3d

Q.70 (3)
$_{19}K \rightarrow 1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
no. of e^- when $\ell = 1$, $6 + 6 = 12$
p subshell.
spherical orbit is symmelrical having zero angular node.
10 e^- are present in d-subshell

Q.71 (2)

$$\frac{\frac{1}{(\lambda_{He^+})} = R(2)^2\left[\frac{1}{2^2} - \frac{1}{\infty}\right]}{\left(\frac{1}{\lambda_{Li^{+2}}}\right) = R(3)^2\left[\frac{1}{3^2} - \frac{1}{4^2}\right]} \Rightarrow \frac{\lambda_{Li^{+2}}}{x} = \frac{1}{7} \times 16$$

$$\lambda_{Li^{+2}} = \frac{16x}{7}$$

Q.72 (3)

$$\frac{E_1}{E_2} = \frac{hc}{\lambda_1} \times \frac{\lambda_2}{hc} = \frac{400}{800}$$

$$\boxed{E_2 = 2E_1}$$

Q.73 (1)
$m = 10^{-10} g = 10^{-13} kg$
$V = 10^{-8} m$
$\Delta V = 10^{-8} \times 10^{-6} = 10^{-14}$

$$\Delta n = \frac{h}{4\pi m \Delta V}$$

$$\Delta V = \frac{6.626 \times 10^{-34} J/s}{4 \times 3.14 \times 10^{-30} \times 10^{-14}} = 5.27 \times 10^{-8} m$$

Q.74 (3)

$$\Delta U = \frac{1}{100} \times 3 \times 10^8$$
$$= 3 \times 10^6$$

$$\Delta n = \frac{0.529 \times 10^{-34}}{9 \times 10^{-31} \times 3 \times 10^6}$$
$= 2.45 \times 10^{-10} m.$

Q.75 (3)
Visible line shown in Balmer region = (n) = 2
no. of lines in H spectrum = 5 – 2 = 3

Q.76 (3)
no. of orbitals = n^2
$= (4)^2 = 16$

Q.77 (3)

$$E = \frac{hc}{\lambda}$$

$$\lambda = \frac{hc}{E} = \frac{2 \times 10^{-25}}{8 \times 10^{-18}} = 0.250 \times 10^{-7} m$$
$= 250 \times 10^{-10} m$
$= 250$ Å

Q.78 (4)

Orbital angular momentum $= \frac{h}{2\pi}\sqrt{\ell(\ell+1)}$

3p subshell
$\ell = 1$

$$\frac{h}{2\pi}\sqrt{1(1+1)} = \sqrt{2}\frac{h}{2\pi}$$

Q.79 (1)

$$\lambda = \frac{h}{mv} [\text{Mass}(m) = 1 \text{ mg or } 10^{-6} \text{ kg}]$$

$$\lambda = \frac{6.63 \times 10^{-34}}{10^{-6} \times 20}$$
$\lambda = 3.3 \times 10^{-29}$ m

Q.80 (1)

$$\Delta E = -13.6 Z^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

The largest absorbtion of energy will be for the transition n = 1 to n = 2

$$\Delta E = -13.6\,Z^2\left[\frac{1}{(1)^2}-\frac{1}{(2)^2}\right]$$

ΔE for the transition $n = \infty$ to n = 1 is athough maximum but in this transition energy will be released.

Q.81 (4)

$$E = -13.6\,\frac{z^2}{n^2}$$

$$-13.6 \times \frac{(3)^2}{(3)^2} = -13.6\text{ eV.}$$

2nd excited state means [n = 3]

Q.82 (2)

$1s^2$	$2s^2$	$2p^6$	$3s^1$
⇅	⇅	⇅ ⇅ ⇅	↑
m=0	m=0	–1 0 +1	m=0

= 2 2 2

1 = 7 electrons.

Q.83 (2)

Mn(25) = $1s^2, 2s^2, 2p^6, 3s^2\,3p^6, 4s^2, 4s^2$

for 3d electrons (ℓ + m) value = 2

No. of $3d^5$ electrons = 5

Q.84 (1)

P_x orbital lies along the x axis. Hence the probability of finding an electron is zero in the yz plane.

Q.85 (3)

I. E. of the elelment is very low and IInd I.E. is very high i.e. the difference b/w Ist and IInd I.E. is large hence we can conclude that after removal of $1e^-$ the element must have acquired noble gas configuration. The 2nd, 3rd and 4th I.E. does not show much difference. On the basis of this observation electronic configuration of the element may be $1s^2\,2s^2\,2p^6\,3s^1$

SECTION-B

Q.86 (1)

$$2NH_3 + CO_2 \rightarrow NH_2COONH_4$$

2 mol 1 mol

Mass 2 × 17 1 × 44

34 g 44 g

$$\text{Ratio} = \frac{34}{44} = \frac{17}{22}$$

Q.87 (4)

	C	H
	80%	20%
Relative moles	$\frac{80}{12}$	$\frac{20}{1}$
Simplest ratio	1 : 3	

CH_3 empirical formula

molecular formula may be C_3H_9

Q.88 (1)

	4A	+ 2B	+ 3C ⟶ $A_4B_2C_3$
initial	1mol	0.6	0.76mol
L·R	$\frac{1}{4} = 0.25$,	$\frac{0.6}{2} = 0.3$,	$\frac{0.76}{3} = 0.253$

A is LR

4 mol of A gives 1 mole of $A_4B_2C_3$

1 mol of A gives $\frac{1}{4}$ mol of $A_4B_2C_3$

Q.89 (3)

$$n_{H_2O} = \frac{18}{18} = 1$$

$\therefore$ No. of electrons = 1 × N_A × 10 = 6.023 × 10^{24}

Q.90 (2)

20 × 80 = n × 32

n = 50 molecular of O_2

Q.91 (1)

no. of atoms In 1 mole = Atomicity × N_A

= 45 × 6.02 × 10^{23}

Q.92 (2)

	$2SO_2$	+ O_2 →	$2SO_3$
t = 0	10 mol	12 mol	0
t sec	10 – 8 = 2 mol	12 – 4 = 8 mol	8 mol

$$\therefore \text{ratio} = \frac{SO_2}{SO_3} = \frac{2}{8} = \frac{1}{4}$$

Q.93 (3)

Elements	%	At. mass	molar ratio	Simplest ratio
C	38.71	12	$\frac{38.71}{12} = 3.22$	1
H	9.67	1	$\frac{9.67}{1} = 9.67$	3
O	51.62	16	$\frac{51.67}{16} = 3.22$	1

Therefore, empirical formula of the compound is CH_3O.

Q.94 (4)

Aufbau & then is Rule as ns subshell is not completely filled & unpaired e^- has opposite spin.

Q.95 (1)

no. of e^- in the orbited for $(n + \ell) \le 3$

$1s^2$	$2s^2$	$2p^6$	$3s^2$
$n = 1$	$n = 2$	$n = 2$	$n = 3$
$\ell = 0$	$\ell = 0$	$\ell = 1$	$\ell = 0$

These will contain 12 e^-

Q.96 (4)

3p subshell

$n = 3, \ell = 1, m = -1, 0, +1, s = \pm 1/2$ (any)

Q.97 (3)

$\underline{\lambda} = \frac{h}{P}$ (debroglie) lyman $\rightarrow$ uv region

$\Delta n \cdot \Delta p \ge \frac{h}{4\pi}$ (Heisen berg) paschen $\rightarrow$ IR region

Q.98 (3)

$$E = -320\left(\frac{z}{n}\right)^2$$

$$-20 = -320 \times \frac{1^2}{n^2}$$

$n^2 = 16$, $n = 4$

Q.99 (3)

For 'g' subshell, $\ell = 4$

no. of $e^- = 2(4\ell + 1)$

$= 18\ e^-$

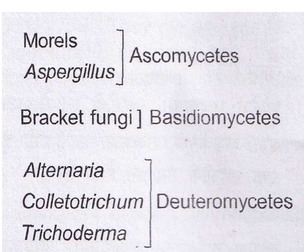
Q.100 (3)

$$\Delta x = \frac{h}{4\pi.\Delta P} = \frac{6.62\times10^{-34}}{4\times3.14\times10^{-5}} = 5.27\times10^{-30}\,m$$

BIOLOGY-I
SECTION-A

Q.101 (3)

Deuteromycetes are called imperfect fungi.



Q.102 (2)

A virus is larger than sub viral agents/particles.

Viroids are infectious RNA particles. They lack protein.

They cause diseases in plants only.

Viruses have proteinaceous capsid.

Q.103 (4)

All viruses have capsid.

Bacterial viruses are known as bacteriophages, they have capsid (protein coat) & genetic material, usually dsDNA.

Q.104 (4)

Paramoecium has two nuclei.

Paramoecium is a ciliated protozoan

Q.105 (2)

Euglenoids lack cell wall.

Slime moulds are heterotrophic (Saprophytic). Protozoans are predators & parasites. Chrysophytes include diatoms and desmids which are mostly photosynthetic.

Q.106 (3)

Mycoplasma are smallest living organisms.

They lack cell wall and can survive without oxygen.

Methanogens are responsible for production of biogas.

Q.107 (1)

Q.108 (4)

Malaria is caused by *Plasmodium* which is a sporozoan protozoa.

Q.109 (3)

Q.110 (3)

Q.111 (1)

Q.112 (2)

Q.113 (1)

Q.114 (1)

Q.115 (2)

Q.116 (3)

Q.117 (1)

Q.118 (3)

Q.119 (4)

Heterosporous pteridophytes show event precursor to the seed habit.

Q.120 (2)

Q.121 (1)

Q.122 (4)
In gymnosperms, the transfer of pollen grains occur by air current.

Q.123 (2)
Chemotaxonomy includes DNA sequencing ' to identify or classify organisms.

Q.124 (1)
Stems are usually unbranched in *Cycas*.
Stems are branched in *Cedrus* and *Pinus*.

Q.125 (4)
Polysiphonia is a red alga.
: It lacks motile stages. It reproduces by non-motile gametes and spores.

Q.126 (1)

Q.127 (1)

Q.128 **(3)**

Q.129 **(3)**

Q.130 (3)

Q.131 (1)

Q.132 (1)

Q.133 (4)

Q.134 (3)
In Pteridophyte, the female gametophyte is retained on the parent sporophyte for variable periods. The development of the zygotes into young embryos take place within the female gametophytes. This event is a precursor to the seed habit considered an important step in evolution.

SECTION-B

Q.135 (2)

Q.136 (2)

Q.137 (1)

Q.138 (2)

Q.139 (3)

Q.140 (4)
Dinoflagellates are flagellated, mostly marine photosynthetic protist.
Dinoflagellates have two flagella, one is transverse and another is longitudinal

Q.141 (2)

Q.142 (1)

Q.143 (4)
Long, cylindrical unbranched stem in Cycas.

Q.144 (2)

Q.145 (4)
Marchantia is a liverwort.
Liverworts have completely dependent sporophyte on gametophyte.

Q.146 (2)
Fucus is a brown algae and shows diplontic life cycle pattern.

Q.147 (4)
Highly reduced male gametophytes are also present in angiosperms living in different habitats.

Q.148 (1)

Q.149 (3)
Brown algae possess the photosynthetic pigments chl-a and chl-c and fucoxanthin.

Q.150 (2)

BIOLOGY-II
SECTION-B

Q.151 (2)
Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion. All living organisms have the ability to sense their surroundings or environment and respond to these environmental stimuli which could be physical, chemical or biological. All organisms, therefore are aware of their surroundings. Human beings also show self-consciousness. Consciousness therefore becomes the defining property of living organisms.

Q.152 (2)

Q.153 (1)
Division -Angiospermae

Q.154 (1)

Q.155 (1)

Q.156 (1)
Biological names are generally in latin and written in italics. They are latinised or derived from latin irrespective of their origin. When hand written, generic and specific epithet both the words in a biological name are separately underlined or printed in italics showing their latin origin.

Q.157 (2)

Q.158 (4)

Q.159 (4)

Q.160 (3)

Q.161 (3)
The given statement is true for Aschelminthes, for e.g. *Wuchereria*.

Q.162 (3)

Q.163 (3)
Union of gametes occurs in water.
Sponges reproduce asexually by fragmentation and sexually by formation of gametes. Fertilisation is internal.

Q.164 (3)
Identify a bird
Crocodilus belongs to class Reptilia while *pavo* belongs to class Aves.

Q.165 (4)
Development in mammals is direct with few exceptions Viviparity is seen in many taxa of animals. Monotremes are a group of mammals that lay eggs .e.g. : Platypus and Echidna.

Q.166 (3)
The term cyclostome refers to "round mouth".
Cyclostomes have mouth without jaws, so they are grouped under agnatha. Mouth is ventral, suctorial and is circular.

Q.167 (3)
Gizzard is also called gastric mill.
Gizzard, in many birds is the hind part of the stomach, which is especially modified for grinding food. It is located between the saclike crop and the intestine. It has a thick muscular wall and may contain small stones, or gastroliths, that help in the mechanical breakdown of seeds and other foods.

Q.168 (2)
Pneumatic bones have air cavities to reduce weight of flying birds.
Neophron i.e. vulture is a flying bird that has both pneumatic bones and- preen/oil gland. Air sacs in birds are avascular and meant for storage of air but not exchange of gases.

Q.169 (2)
Heart and blood vessels are present in open and dosed circulatory system.
Heart is dorsal in position in non-chordates usually while it is ventral in chordates. Nerve cord is ventral in non-chordates but dorsal in position in chordates. Post anal tail is a feature of chordates. Gill slits are lateral in position in chordates.

Q.170 (4)
Clarias is a bony fish.

Q.171 (3)

Q.172 (4)

Q.173 (3)

Q.174 (3)

Q.175 (2)

Q.176 (3)

Q.177 (3)

Q.178 (1)

Q.179 (1)

Q.180 (2)

Q.181 (2)

Q.182 (3)

Q.183 (3)

Q.184 (2)

Q.185 (1)

SECTION-B

Q.186 (2)

Q.187 (3)

Q.188 (1)
Systematics, study of diversity amongst groups of organisms.

Q.189 (2)

Q.190 (3)
Author or discoverer's name is not Latinised in biological nomenclature.
In binomial epithet, author name is not printed in italics. Only genus and species names are printed in italics to show their Latin origin.

Q.191 (2)

Q.192 (3)

Q.193 (4)
Ancylostoma is commonly known as hookworm and belongs to the phylum Aschelminthes, while *Saccoglossus* is commonly known as tongueworm and belongs to phylum Hemichordata.

Q.194 (2)
In cartilaginous (chondrichthyes) fishes placoid scales are present which backwardly directed. Cycloid, ctenoid and ganoid scales are observed in bony (ostrichthyes) fishes.

Q.195 (1)
In echinoderms, nervous system is not very well developed.

Q.196 (1)

Q.197 (1)
Select a cartilaginous fish.
Air/swim bladder helps to maintain buoyancy in bony fish. Dog fish has to swim continuously to avoid sinking.

Q.198 (3)
These organisms occur in exclusively marine conditions.
Saccoglossus a hemichordate, has proboscis gland as its excretory organ. Gills are meant for respiration in hemichordates. In molluscs, gills serve both the function of respiration and excretion!

Q.199 (1)
Metamerism refers to presence of segments and probable repeat of organs.
Wuchereria is a filarial worm, where excretory pore eliminates nitrogenous waste. Wastes present in alimentary canal are eliminated through anus. Pseudocoelom, absence of segmentation and presence of bilateral symmetry are features of Aschelminthes.

Q.200 (2)