ANSWER KEY
AITS (NEET) Final Track (XI)
Part Test-03

PHYSICS
SECTION-A

Q.1 (1)	**Q.2** (3)	**Q.3** (3)	**Q.4** (2)	**Q.5** (1)	**Q.6** (4)	**Q.7** (4)	**Q.8** (3)	**Q.9** (4)	**Q.10** (4)
Q.11 (2)	**Q.12** (1)	**Q.13** (3)	**Q.14** (3)	**Q.15** (4)	**Q.16** (3)	**Q.17** (2)	**Q.18** (2)	**Q.19** (4)	**Q.20** (4)
Q.21 (2)	**Q.22** (1)	**Q.23** (1)	**Q.24** (3)	**Q.25** (4)	**Q.26** (3)	**Q.27** (3)	**Q.28** (1)	**Q.29** (1)	**Q.30** (3)
Q.31 (2)	**Q.32** (2)	**Q.33** (3)	**Q.34** (2)	**Q.35** (2)					

SECTION-B

Q.36 (2)	**Q.37** (4)	**Q.38** (3)	**Q.39** (2)	**Q.40** (3)	**Q.41** (4)	**Q.42** (1)	**Q.43** (3)	**Q.44** (3)	**Q.45** (3)
Q.46 (2)	**Q.47** (4)	**Q.48** (4)	**Q.49** (3)	**Q.50** (4)					

CHEMISTRY
SECTION-A

Q.51 (2)	**Q.52** (3)	**Q.53** (3)	**Q.54** (3)	**Q.55** (4)	**Q.56** (2)	**Q.57** (1)	**Q.58** (3)	**Q.59** (2)	**Q.60** (2)
Q.61 (2)	**Q.62** (3)	**Q.63** (2)	**Q.64** (1)	**Q.65** (2)	**Q.66** (4)	**Q.67** (4)	**Q.68** (2)	**Q.69** (2)	**Q.70** (4)
Q.71 (2)	**Q.72** (2)	**Q.73** (4)	**Q.74** (2)	**Q.75** (1)	**Q.76** (3)	**Q.77** (4)	**Q.78** (2)	**Q.79** (3)	**Q.80** (1)
Q.81 (1)	**Q.82** (3)	**Q.83** (2)	**Q.84** (2)	**Q.85** (2)					

SECTION-B

Q.86 (1)	**Q.87** (4)	**Q.88** (1)	**Q.89** (4)	**Q.90** (2)	**Q.91** (3)	**Q.92** (2)	**Q.93** (3)	**Q.94** (3)	**Q.95** (1)
Q.96 (1)	**Q.97** (4)	**Q.98** (3)	**Q.99** (3)	**Q.100** (4)					

BIOLOGY-I
SECTION-A

Q.101 (1)	**Q.102** (2)	**Q.103** (3)	**Q.104** (2)	**Q.105** (2)	**Q.106** (3)	**Q.107** (2)	**Q.108** (4)	**Q.109** (3)	**Q.110** (2)
Q.111 (2)	**Q.112** (3)	**Q.113** (4)	**Q.114** (3)	**Q.115** (4)	**Q.116** (4)	**Q.117** (1)	**Q.118** (3)	**Q.119** (3)	**Q.120** (3)
Q.121 (3)	**Q.122** (1)	**Q.123** (2)	**Q.124** (2)	**Q.125** (4)	**Q.126** (3)	**Q.127** (2)	**Q.128** (4)	**Q.129** (2)	**Q.130** (4)
Q.131 (4)	**Q.132** (4)	**Q.133** (2)	**Q.134** (4)	**Q.135** (2)					

SECTION-B

Q.136 (3)	**Q.137** (3)	**Q.138** (4)	**Q.139** (2)	**Q.140** (4)	**Q.141** (4)	**Q.142** (1)	**Q.143** (2)	**Q.144** (3)	**Q.145** (3)
Q.146 (1)	**Q.147** (1)	**Q.148** (3)	**Q.149** (3)	**Q.150** (4)					

BIOLOGY-II
SECTION-A

Q.151 (1)	**Q.152** (3)	**Q.153** (4)	**Q.154** (2)	**Q.155** (2)	**Q.156** (1)	**Q.157** (1)	**Q.158** (2)	**Q.159** (4)	**Q.160** (3)
Q.161 (2)	**Q.162** (3)	**Q.163** (3)	**Q.164** (2)	**Q.165** (2)	**Q.166** (1)	**Q.167** (3)	**Q.168** (1)	**Q.169** (4)	**Q.170** (1)
Q.171 (3)	**Q.172** (4)	**Q.173** (4)	**Q.174** (3)	**Q.175** (4)	**Q.176** (1)	**Q.177** (4)	**Q.178** (4)	**Q.179** (3)	**Q.180** (3)
Q.181 (3)	**Q.182** (3)	**Q.183** (1)	**Q.184** (3)	**Q.185** (1)					

SECTION-B

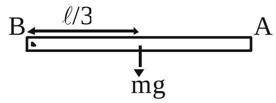
Q.186 (2)	**Q.187** (3)	**Q.188** (3)	**Q.189** (1)	**Q.190** (1)	**Q.191** (3)	**Q.192** (2)	**Q.193** (4)	**Q.194** (3)	**Q.195** (1)
Q.196 (3)	**Q.197** (1)	**Q.198** (2)	**Q.199** (3)	**Q.200** (3)					

Physics

Q.1 (1)

About point B,

$\tau = I\alpha$



$$mg\frac{\ell}{2} = \frac{m\ell^2}{3} \times \alpha$$

$$\alpha = \frac{3g}{2\ell}$$

Now, $a_{CM} = r\alpha$

$$= \frac{\ell}{2} \times \frac{3g}{2\ell}$$

$$a_{cm} = \frac{3g}{4}$$

Q.2 (3)

Factual

Q.3 (3)

$$m\left(3\hat{i} + 2\hat{j}\right) + m\left(-\hat{i} - 4\hat{j}\right) + m\vec{v} = 0$$

$$\therefore\ \vec{v} = -2\hat{i} + 2\hat{j}$$

Q.4 (2)

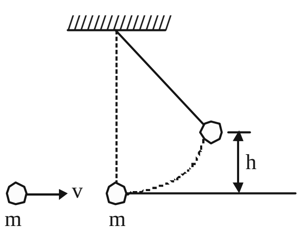
Impulse = change in momentum

= 2mu (in opposite direction)

$= 2 \times 5 \times 0.06$

= 0.6 kg m/s.

Q.5 (1)



Let v' = velocity of (bob + ball) after collision then, mv

$$= 2mv' \Rightarrow v' = \frac{v}{2}$$

Also, $v' = \sqrt{2gh}$ $\therefore h = \frac{v'^2}{2g} = \frac{v^2}{8g}$

Q.6 (4)

The force exerted by machine gun on man's hand firing a bullet = change in momentum per second on a bullet or rate of change of momentum

$$= \left(\frac{40}{1000}\right) \times 1200 = 48N$$

The force exerted by man on machine gun = 144 N

Hence, number of bullets fired $= \frac{144}{48} = 3$

Q.7 **(4)**

Hint $x_{com} = \frac{\sum m_i x_i}{\sum m_i}; y_{com} = \frac{\sum m_i y_i}{\sum m_i}.$

Sol. $x_{com} = \frac{1(0) + 3(4) + 6(0)}{6+3+1} = \frac{24}{10} = 2.4$

$$y_{com} = \frac{1(0) + 3(4) + 6(0)}{6+3+1} = \frac{12}{10} = 1.2$$

Position of COM = (2.4, 1.2)

Q.8 (3)

$$\Delta K.E. = \frac{1}{2}\frac{m_1 m_2}{(m_1 + m_2)}(u_1 - u_2)^2 = \frac{1}{2} \times \frac{40 \times 60}{(40+60)}(4-2)^2$$

$\Delta K.E. = 48\ J$

Q.9 **(4)**

By conservation of angular momentum

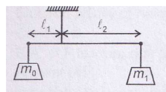
$$\left(\frac{1}{2}MR^2 + mR^2\right)\omega_0 = \frac{1}{2}MR^2\omega$$

Q.10 (4)

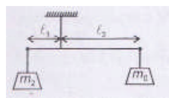
$\tau = rF\sin\theta$

For torque to be maximum, r should be more and = 90º

Q.11 (2)



$m_0\ell_1 = m_1\ell_2$ ...(i)



$m_2\ell_1 = m_0\ell_2$ ...(ii)

Dividing (i) by (ii)

$\Rightarrow m_0^2 = m_1 m_2$

$\Rightarrow m_0 = \sqrt{m_1 m_2} = \sqrt{4 \times 9} = 6$ Kg

Q.12 (1)

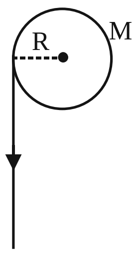
Total initial angular momentum

= Total final angular momentum

$2I[+3\omega] + I[-\omega] = [2I + I]\omega_c$

$\therefore$ Common angular velocity , $\omega_c = \frac{5\omega}{3}$

Q.13 (3)



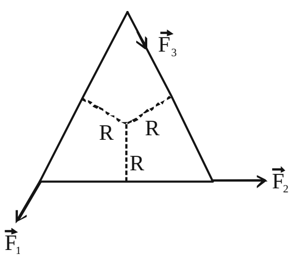
Torque exerted on the disc,

$\tau = TR$

Now $\tau = I\alpha$

$$\therefore \alpha = \frac{\tau}{I} = \frac{TR}{\frac{1}{2}MR^2} = \frac{2TR}{MR^2} = \frac{2T}{MR}$$

Q.14 (3)



Torque of $\vec{F_1}$ and $\vec{F_2}$ are in same direction but torque of $\vec{F_3}$ is in opposite direction

For net torque to be zero

$(F_1 + F_2) R = F_3R$

$(F_1 + F_2) = F_3$

Q.15 **(4)**

Conservation of angular momentum

$I_1 \omega_1 = I_2 \omega_2$

$$\frac{2}{5}MR^2\omega = \frac{2}{5}M\left(\frac{R}{n}\right)^2 \omega$$

$\omega' = n^2\omega$

Q.16 **(3)**

Hint: Conservation of mechanical energy

Sol. : $mg\frac{I}{2} = \frac{1}{2}I\omega^2$

$$mg\frac{I}{2} = \frac{1}{2}\left(\frac{mI\omega^2}{3}\right)^2$$

$$\sqrt{\frac{3g}{I}} = \omega$$

$$\omega = \sqrt{\frac{30}{0.3}} 10 \text{ rad / s}$$

Q.17 **(2)**

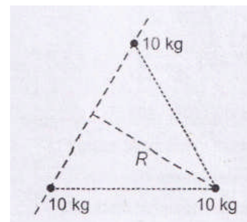
Moment of inertia is not a vector quanity. According to parallel axis theorem, $I = I_{com} + md^2$.

$\therefore$ Minimum moment of inertia (among parallel axis) is about an axis passing through centre of mass

Q.18 **(2)**

Hint : moment of inertia of point mass mR^2

Sol, :



$R = \sqrt{2^2 - 1}$

$= \sqrt{3}$

$I = 10(0)^2 + 10(0) + 10\left(\sqrt{3}\right)^2$

$= 30 \text{ kg m}^2$

Q.19 (4)

Newtons law of gravitation is valid for all types of bodies.

Q.20 (4)

For physical balance,

$m_1 gl = m_2 gl$

$m_1 = m_2$ independent on the value of 'g'

For spring balance

Reading = mg

Q.21 (2)

$$V_p = \frac{G2m}{3R} - \frac{GM}{R} = -\frac{GM}{R}\left(+\frac{2}{3} + 1\right)$$

$$= -\frac{5}{3}\frac{GM}{R}$$

Q.22 (1)

KE = | –Total energy |

$\frac{1}{2}Mv^2 = E$ $\qquad \therefore v = \sqrt{\frac{2E}{m}}$

$\therefore$ Angular momentum

$L = mvr$

$$= m\sqrt{\frac{2E}{m}r^2}$$

$$= = \sqrt{2Emr^2}$$

Q.23 **(1)**

Using conservation of angular momentum

$\Rightarrow mv_{max}\, r_{min} = m\, v_{min}\, r_{max}$

$\Rightarrow v_{max}\, r_{min} = v_{min}\, r_{max}$

Q.24 (3)

$g' = g - \omega^2 R\cos^2\lambda$

$\lambda = 60^o$, $g' = 0$

$0 = g - \omega^2 R\cos^2 60$

$$g = \frac{\omega^2 R}{4} \Rightarrow \omega^2 = \frac{4g}{R}$$

$$\omega = \sqrt{\frac{4g}{R}} \Rightarrow \frac{2\pi}{T} = \sqrt{\frac{4g}{R}}$$

$$T = 2\pi\sqrt{\frac{R}{4g}} = \pi\sqrt{R/g}$$

Q.25 (4)

$$T = \frac{2\pi r}{V_0} \text{ and } V_0 = \sqrt{\frac{GM}{r}}$$

$$V_0^2 = \frac{GM}{r} \Rightarrow r = \frac{GM}{V_0^2}$$

$$T = \frac{2\pi}{V_0}\left(\frac{GM}{V_0^2}\right) = \frac{2\pi GM}{V_0^3}$$

Q.26 (3)

$m\omega^2 r =$

$$\frac{GmM}{r^2} \Rightarrow \frac{4\pi^2}{T^2} = \frac{GM}{r^3}$$

$$T^2 = \left(\frac{4\pi^2}{GM}\right) r^3 \Rightarrow K = \frac{4\pi^2}{GM}$$

$M \rightarrow$ mass of heavier body around which smaller body removes.

For option (i) and (ii)

$M \rightarrow$ mass of sun

For option (iv), $M \rightarrow$ mass of mars

Option (iii) for earth, $M \rightarrow$ mass of sun

for Moon, $M \rightarrow$ mass of earth

Q.27 (3)

$$g = \frac{GM}{R^2} \quad \therefore\ g \propto \frac{M}{R^2} \Rightarrow \frac{g_1}{g_2} = \frac{M_1}{M_2} \times \left(\frac{R_2}{R_1}\right)^2$$

$$= \frac{2}{3} \times \left(\frac{2}{3}\right)^2 = 8 : 27$$

Q.28 (1)

Beam type balance gives reading by balancing torque which is independent of the value of g.

Spring balance increases weight which is gravitational force.

Q.29 (1)

$V_0 = \sqrt{Rg}$

$V_e = \sqrt{2Rg}$

$$\frac{V_e - V_0}{V_0} \times 100 = 41.4\%$$

Q.30 (3)

$$-\frac{GM_E m}{R} + K.E. = 0 + 0$$

$$K.E. = \frac{GM_E m}{R} = \frac{GMe}{R^2} \cdot mR = mgR.$$

Q.31 (2)

$$g = \frac{GM}{R^2}$$

$$\frac{dg}{g} \times 100\% = \frac{dM}{M} \times 100\% - 2\frac{dR}{R} \times 100\%$$

$= -1 - 2(-1)$

$= -1 + 2 = 1\%$

Q.32 (2)

Planetary motion is elliptical, angular momentum (mvr or $m\omega r^2$) is conserved.

When r changes ω also changes, V also changes. So total energy remain same but kinetic energy changes.

Q.33 (3)

As setellite is moving in a circular motion due to change in the direction of velocity. Its angular momentum about centre is conserved as their is no extended force acting on the system.

Q.34 (2)

$g' = g - R\omega^2\cos^2\lambda$

at poles, $\lambda = 90°$

$g' = g$ (independent of angualr speed)

At equator, $\lambda = 0$

$g' = g - R\omega^2$

$\omega\uparrow \Rightarrow g\downarrow$

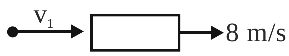
Q.35 (2)

$$g_A = \frac{GM}{(R + R/2)^2} = \frac{4GM}{9R^2} = \frac{4}{9}g$$

$$g_B = g\left[1 - \frac{d}{R}\right] \text{ here } d = \frac{R}{2}; g_B = \frac{g}{2} \qquad \therefore \frac{g_n}{g_a} = \frac{9}{8}$$

Q.36 (2)

After collision velocity of heavy block remains the same.



Now,

Relative velocity of separation = Relative velocity of approach

$\Rightarrow\ 8 - v_1 = (10–8)$

$v_1 = +6$ m/s (in positive × direction)

Q.37 (4)

$x_{cm_f} = x_{cm_i} + v_{cm} \times t$

Here $v_{cm} = \dfrac{4\times2-4\times2}{4+4} = 0$

$x_{cm} = \dfrac{4\times0+4\times4.5}{4+4} = 2.25\text{m}$

$y_{cm} = 0$

Q.38 (3)

$a_{cm} = \dfrac{F}{M} = \dfrac{6}{2+3} = \dfrac{6}{5}\ \text{m/s}^2$

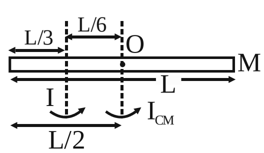
$V_{cm} = a_{cm} \times t$

$= \dfrac{6}{5}\times5$

$V_{cm} = 6$ m/s

Q.39 (2)

$I = I_{cm} + M\left(\dfrac{L}{6}\right)^2$



$= \dfrac{ML^2}{12} + \dfrac{ML^2}{36}$

$= \dfrac{(3+1)ML^2}{36}$

$I = \dfrac{ML^2}{9}$

Q.40 (3)

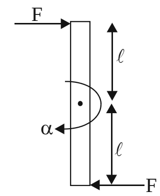
Given $\theta = 2t^3 - 3t^2 - 4t - 5$

$\omega = \dfrac{d\theta}{dt} = 6t^2 - 6t - 4$

$\alpha = \dfrac{d\theta}{dt} = 12t - 6$

Now, $\alpha|_{t=1s} = 12(1) - 6 = 6\ \text{rad/s}^2$

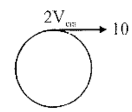
Q.41 **(4)**



F_{Net} = zero

Torque = $F\ell + F\ell = 2F\ell$

Q.42 (1)



$2V_{cm} = 10$

$V_{cm} = 5$

Q.43 (3)

$\alpha = \dfrac{\omega}{t} = \dfrac{10}{2} = 5$

$t = I\alpha \Rightarrow MR^2\alpha$

$= 0.5\times(0.2)^2\times5 = 0.10$

Q.44 (3)

$Mv_1 - Mv_2 = 0 \quad \therefore v_1 = v_2 = v$

When saparation becumes r by using energy conse rvation

$-\dfrac{GMM}{r} + \dfrac{1}{2}Mv^2 + \dfrac{1}{2}Mv^2 = 0$

$Mv^2 = \dfrac{GMM}{r}$

$v = \sqrt{\dfrac{GM}{r}}$

Q.45 (3)

Time period of revolution of moon around the earth = 1 lunar month.

$\dfrac{T_s}{T_m} = \left(\dfrac{r_s}{r_m}\right)^{3/2} = \left(\dfrac{1}{2}\right)^{3/2} \Rightarrow T_s = 2^{-3/2}$

lunar month

Q.46 (2)

$\because$ As we move away potential increases due to its negative value.

Gravitational field at A can not be compared with B as masses and distance are not given.

$V_C = V_D$

As points D and A gravitational field is due to inner shell only.

Q.47 (4)

$$\frac{dA}{dt} = \frac{L}{2M}$$

$$A = \frac{L}{2M}$$

$L = 2MA$

Q.48 (4)

Centripetal force acts perpendicular to the displacement. hence work done is zero.

Q.49 (3)

Inside the earth

$g \, \alpha r$

Also, outside the earth

$$g \propto \frac{1}{r^2}$$

Q.50 (4)

$$v_e = \sqrt{\frac{2GM}{R}} \quad \therefore \; v_e \propto \sqrt{\frac{M}{R}}$$

$$\Rightarrow \frac{(v_e)_2}{(v_e)_1} = \sqrt{\frac{M_2}{M_1} \times \frac{R_1}{R_2}} = \sqrt{4 \times \frac{1}{2}} = \sqrt{2}$$

$$\therefore \; (v_e)_2 = \sqrt{2}\,(v_e)_1 = 1.4 \; v_e$$

PART TEST-03 CHEMISTRY

Q.51 (2)

$$K_P = \frac{(P_{NOCl})^2}{(P_{NO})^2 \times (P_{Cl_2})} = \frac{1.2^2}{(5\times10^{-2})^2 \times 3\times10^{-1}}$$

$K_P = 1920 = 1.92 \times 10^3$

Q.52 (3)

K_c =3.6 (given)

$$CH_{4(g)} + 2H_2S \rightleftharpoons CS_{2(g)} + 4H_{2(g)}$$

$$Q_c = \frac{[H_2]^4[CS_2]}{[H_2S]^2[CH_4]}$$

$$Q_c = \frac{(1.8)^4}{(1.2)^2} \times 2 = 14.5g$$

$Q_c > k_c$

Reaction will shift to back ward direction to form more H_2S

Q.53 (3)

$$K_1 = \frac{[NO_2]}{[NO][O_2]^{1/2}} \quad ....(1)$$

$$K_2 = \frac{[NO]^2[O_2]^2}{[NO_2]^2} \quad ....(2)$$

$$\therefore K_2 = \frac{1}{K_1^2}$$

Q.54 (3)

$$2HI(g) \rightleftharpoons H_2(g) + I_2(g)$$

$t = 0$	1	0	0
t_{eq}	$1-x$	$\frac{x}{2}$	$\frac{x}{2}$

$$x = \frac{4}{9} \times 1 = \frac{4}{9}$$

So, mol of HI $= 1 - \frac{4}{9} = \frac{5}{9}$

mol of $H_2 = \frac{x}{2} = \frac{4}{9\times2} = \frac{2}{9}$

mol of $I_2 = \frac{x}{2} = \frac{2}{9}$

$$K_{eq} = \frac{[H_2]\times[I_2]}{[HI]^2} = \frac{\frac{2}{9}\times\frac{2}{9}}{\frac{5}{9}\times\frac{5}{9}} = \frac{4}{25}$$

Q.55 (4)

For the reaction $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$

$\Delta n_g = 0$

$K_p = K_c = 0.1$.

Q.56 (2)

For the reaction $pA + qB \rightleftharpoons qC + pD$

$\Delta n_g = (q + p) - (q + p) = 0$

So $K_p = K_C$.

Q.57 (1)

For the reaction $A(g) + 3B(g) \rightleftharpoons 2C(g)$

$K = 1.2$

and $$Q = \frac{[C]^2}{[A][B]^3} = \frac{\left(\frac{6}{2}\right)^2}{\left(\frac{2}{2}\right)\times\left(\frac{4}{2}\right)^3}$$

$$Q = \frac{3\times3}{1\times2\times2\times2} = \frac{9}{8} = 1.125$$

Q < K; So reacton process is forward direction.

Q.58 (3)

For the reaction

$$SO_2Cl_2(g) \rightleftharpoons SO_2(g) + Cl_2(g)$$

$$\Delta n_g = 1$$

$K_p = K_c (RT)\Delta n_g$

$K_p = K_c \times RT$

$$T = \frac{K_p}{K_c \times R} = \frac{3}{0.0821} = 36.54K$$

Q.59 (2)

A reversible reaction will be at equilibrium if rate of forward direction will be equal to rate of backweard direction.

Q.60 (2)

$$H_3PO_4 \rightleftharpoons H^+ + H_2PO_4^-\,;\,K_1$$

$$H_2PO_4^- \rightleftharpoons H^+ + HPO_4^{-2}\,;\,K_2$$

$$HPO_4^{2-} \rightleftharpoons H^+ + PO_4^{3-}\,;\,K_3$$

On adding above equations with each other, we get

$$H_3PO_4 \rightleftharpoons 3H^+ + PO_4^{3-}$$

$K = K_1 \times K_2 \times K_3$.

Q.61 (2)

$$\left.\begin{matrix} T = \uparrow \\ K_c = \uparrow \end{matrix}\right] \therefore \text{Endothermic}$$

Q.62 (3)

If $\Delta n_g < 0$ then $K_p < K_c$.

Q.63 (2)

On increasing temp. extent of ionisation of H_2O increase & pKw decreases

Q.64 (1)

$BaCO_3$ is the salt of strong base and weak acid so it aqueous solution is basic so pH is greater t han 7.

Q.65 (2)

Strongest acid have weakest conjugate base.

So, Br^- is weakest base which is the conjugate base of HBr i.e., strong acid.

Q.66 (4)

AgOH is weak electrolyte and KOH is strong electrolyte with common ion OH^-.

Q.67 (4)

pH of 10^{-9} M HNO_3 solution lies between 6 and 7 so its pOH will lie between 7 and 8.

Q.68 (2)

Acidic strength of CH_3COOH in the presence of CH_3COONa decreases due to common ion effect H^+ concentration of CH_3COOH decreases.

Q.69 (2)

$[H^+] = \sqrt{K_a \times c} = \sqrt{3.5 \times 10^{-8} \times 0.4}$

$[H^+] = 1.19 \times 10^{-4} M$

$[H^+] \approx 1.2 \times 10^{-4} M$.

Q.70 (4)

After dilution total concentration of OH^- of solution

$= 10^{-7} + 10^{-8} = 11 \times 10^{-7}$

So, $p^{OH} = -\log(11 \times 10^{-7}) = 6.96$

$p^H = 14 - 6.96 = 7.04$

Q.71 (2)

$pH = [H^+]$

for millimolar $[H^+] = 1 \times 10^{-3} \therefore pH = 3$

Q.72 (2)

Acidic salt's $pH = \frac{1}{2}(pK_w - pK_b - \log c)$

Basic salt's $pH = \frac{1}{2}(pK_w + pK_a + \log c)$

Acidic buffer $pH = pK_a + \log \frac{Salt}{Acid}$

Basic buffer $pOH = pK_b + \log\left(\frac{Salt}{Base}\right)$.

Q.73 (4)

$[H^+]_{Total} = [H^+]_{Acid} + [H^+]_{Water}$

$= 10^{-8} + 10^{-7} = 1.1 \times 10^{-7}$ M

$pH = -\log[1.1 \times 10^{-7}] = 6.96 < 7$

Q.74 (2)

$[H^+] = 1M$

$pH = -\log 1 = 0$.

Q.75 (1)

$OH^- \longrightarrow O^{2-} + H^+$

Acid — Conjugate Base

Q.76 (3)

$$\text{Reducing power} \propto \frac{1}{\text{oxidation number of central atom}}$$

Q.77 (4)

$$KMnO_4 + I_2 \xrightarrow[\text{alkaline}]{\text{weak}} IO_3^- + MnO_2$$

Q.78 (2)

$\overset{+5}{HNO_3}$, $\overset{+2}{NO}$, $\overset{-3}{NH_4Cl}$, $\overset{0}{N_2}$

Q.79 (3)

$Cr_2O_7^{2-} + 14\overset{+}{H} + \underline{6e^-} \rightarrow 2Cr^{3+} + 7H_2O$

Q.80 (1)
Oxidation state of Cr in $Cr(CO)_6$ is zero as CO is neutral ligand.

Q.81 (1)
Over all balanced Eq. :-

$Cr_2O_7^{2-} + 14H^+ + 3Ni \rightarrow 2Cr^{3+} + 3Ni^{2+} + 7H_2O$

So cofficient are 1, 3, 14

Q.82 (3)

$(M \times V \times Vf)_{\text{oxalic acid}} = (M \times V \times Vf)_{KMnO_4}$

$(0.1 \times V \times 2) = (0.025 \times 20 \times 5)$

$V = 12.5\,mL.$

Q.83 (2)

$\overset{+3}{NO_2^-} + H_2O \longrightarrow \overset{+5}{NO_3^-} + 2H^+ + 2e^-$

$n = 2.$

Q.84 (2)

$2Cr(OH)_3 + 4OH^- + IO_3^- \longrightarrow 2CrO_4^{2-} + 5H_2O + I^-$

$x = 5, y = 2$

So, $x + y = 5 + 2 = 7.$

Q.85 (2)

NH_4NO_3

$\overset{-3}{NH_4^{\oplus}}$ $\overset{+5}{NO_3^{\ominus}}$

-3 and $+5$.

Q.86 (1)

$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ is an example of homogeneous equilibrium.

Q.87 (4)

	N_2	+ $3H_2$	$\rightleftharpoons 2NH_3$
t = 0	1 mol	3 mol	0
t = eq	1 – 0.5	3 – 1.5	1

$P_{N_2} = X_{N_2} \times P_T = \frac{0.5}{3} \times P = \frac{P}{6}$

Q.88 (1)
From figure shown,
$[A]_e = 0.1$ and $[B]_e = 0.4$

So, for the reaction $A(g) \rightleftharpoons 2B(g)$

$K_c = \frac{[B]^2}{[A]} = \frac{0.4^2}{0.1} = 1.6$

$K_c > 1.$

Q.89 (4)

$2CO(g) + 2H_2O(g) \xrightleftharpoons{K_1} 2CO_2(g) + 2H_2(g)$ ... (i)

$CH_4(g) + H_2O(g) \xrightleftharpoons{K_2} CO(g) + 3H_2(g)$ ... (ii)

On dividing equation (i) by 2 and then add (ii) we get following equation (iii)

$CH_4(g) + 2H_2O(g) \xrightleftharpoons{K_3} CO_2(g) + 4H_2(g)$ ... (iii)

$K_3 = \sqrt{K_1} \times K_2.$

Q.90 (2)
For the reaction

$2XY \rightleftharpoons X_2 + Y_2$; $K = 81$

On dividing above equation by 2, we get

$XY \rightleftharpoons \frac{1}{2}X_2 + \frac{1}{2}Y_2$; $K' = \sqrt{K}$

$K' = \sqrt{81} = 9.$

Q.91 (3)

$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$

At constant volume addition of inert gas do not affect the state of equilibrium.

Q.92 (2)

	$PCl_5(g)$	$\rightleftharpoons PCl_3(g)$	+ $Cl_2(g)$
t = 0	5	0	0
t = eq	5 – x	x	x

$x = 60\%$ of $5 = 0.6 \times 5 = 3$

moles of $PCl_5 = 5 - x = 5 - 3 = 2$

moles of PCl_3 = moles of $Cl_2 = x = 3$

Total moles = 2 + 3 + 3 = 8.

Q.93 (3)

$AlCl_3 = Al^{+3} + 3Cl^-$

s s 3s

$CaCl_2 \rightarrow Ca^{+2} + 2Cl^-$

C C 2C

$K_{sp} = [Al^{+3}][Cl^-]^3$

$K_{sp} = (S)(2C)^3$

$S = \frac{K_{sp}}{8C^3}$

Q.94 (3)
WB and salt of WB with SA form Buffer solution.

Q.95 (1)

$[H^+] = \sqrt{K_a \times c} = \sqrt{1.74 \times 10^{-5} \times 10^{-2}}$

$[H^+] = 4.17 \times 10^{-4}$
$pH = -\log(4.17 \times 10^{-4}) = 3.4.$

Q.96 (1)

$Sb_2S_3 \rightleftharpoons 2Sb^{3+} + 3S^{2-}$

$K_{sp} = 108\ s^5$
$K_{sp} = 108 \times (10^{-5})^5 = 108 \times 10^{-25}$

Q.97 (4)

Hint : $A_3B_2(s) + H_2O \rightleftharpoons 3A^{2+}(aq) + 2B^{3-}(aq)$

$K = [A^{2+}]^3[B^{3-}]^2$

$K = (3s)^3(2s)^2 = 27s^3 \times 4s^2 = 108\ s^5$

$s = \left(\frac{K}{108}\right)^{1/5}$

Q.98 (3)
H_2O_2 and HNO_2 and SO_2 can act as oxidizing as well as reducing agent.

Q.99 (3)
Both A and R are correct but R is not correct explanation of A.

Q.100 (4)
None of these can oxidize F^- into F_2 because oxidation of F^- is not possible by any substance as Fluorine is most electronegative.

BIOLOGY - I

Q.101 (1)
Four to six ribosomes attached to single mRNA is called polysome.
Q.102 (2)
Q.103 (3)
Pilli are not involved in locomotion. Actually, pilli are longer, fewer and thicker tubular outgrowths, which develop in response to F^+ or fertility factor in gram negative bacteria
Q.104 (2)
Q.105 (2)
Core or axoneme of eukaryotic flagellum is made up of 9 peripheral doublet and 2 central singlet microtubules.
Q.106 (3)
In acrocentric chromosomes, centromere is present very close to one end.
Q.107 (2)
Those chromosomes which have small fragments are known as SAT chromosomes.
Chromosome fragment separated by secondary constriction is called satellite.
Q.108 (4)
Extrachromosomal DNA is known as plasmid.
Plasmid is not considered as inclusion body of prokaryotes.
it has some specific genes.
Q.109 (3)
Q.110 (2)
Q.111 (2)
Q.112 (3)
Q.113 (4)
Q.114 (3)

> Schwann (1839), a British Zoologist, studied different types of animal cells and reported that cells had thin outer layer which is today known as the 'plasma membrane'. He also concluded, based on his studies on plant tissues, that the presence of cell wall is a unique character of the plant cells. On the basis of this, Schwann proposed the hypothesis that the bodies of animals and plants are composed of cells and products of cells.

All the statements given are correct. According to Schwann -
- Cells have a thin outer layer which is called plasma mebrane.
-Cell wall is a unique character of plant cell only
- Body of plants & animals are composed of cells & products of cells.

Q.115 (4)
NCERT Page No. 88/89

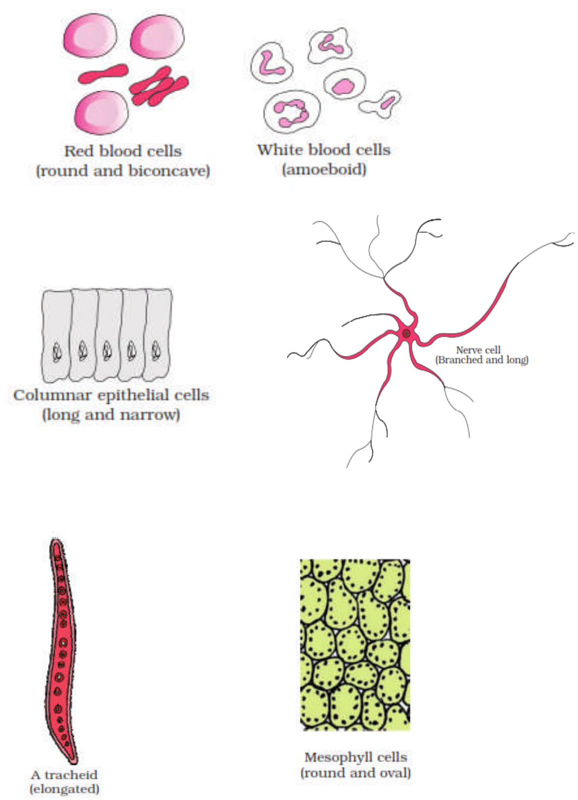


Figure 8.1 Diagram showing different shapes of the cells

Correct option of the descending order of the sizes of given cell is - Ostrich egg > Human RBC > Bacteria > *Mycoplasma*
Ostrich egg is largest & Mycoplasma is smallest.

Q.116 (4)
NCERT Page No. 88/89

The largest single cell is the egg of an ostrich. Among multicellular organisms, human red blood cells are about 7.0 mm in diameter. Nerve cells are some of the longest cells.
The cytoplasm is the main arena of cellular activities in both the plant and animal cells.
Thread like, or even irregular, the shape of the cell may vary with the function they perform.
Main arena of cellular activities in both the plant and animal cells. Various chemical reactions occur in it to keep the cell in the 'living state.'

All the statements I, II, III & IV are correct.

Q.117 (1)
NCERT Page No. 90

> The cell envelope consists of a tightly bound three layered structure i.e., the outermost glycocalyx followed by the cell wall and then the plasma membrane.

In bacterial cell the envelope consists of a tightly bound 3 layered structure i.e. outermost glycocalyx followed by cell wall & then the plasma membrane.

Q.118 (3)
NCERT Page No. 93

> Also the lipids are arranged within the membrane with the polar head towards the outer sides and the hydrophobic tails towards the inner part. This ensures that the nonpolar tail of saturated hydrocarbons is protected from the aqueous environment.

The nonpolar or hydrophobic hydrocarbon tails of lipid are arranged at the inner side within the membrane to ensure that its saturated hydrocarbons are protected from the aqueous environment.

Q.119 (3)
NCERT Page No. 93

> The ratio or protein and lipid varies considerably in different cell types. In human beings, the membrane of the erythrocyte has approximately 52 per cent protein and 40 per cent lipids.

Cell membrane poses 40% lipids and 52% protein in human erythrocytes. It also possess carbohydrates in some amount.

Q.120 (3)
NCERT Page No. 94

> The cell wall of a young plant cell, the primary wall is capable of growth, which gradually diminishes as the cell matures and the secondary wall is formed on the inner (towards membrane) side of the cell.

The primary wall of a young plant cell is capable of growth which gradually diminishes as the cell matures & the secondary wall is formed on the inner (towards membrane) side of cell.

Q.121 (3)
NCERT Page No. 94

> The middle lamella is a layer mainly of calcium pectate which holds or glues the different neighbouring cells together. The cell wall and middle lamellae may traversed by Plasmodesmata which connect the cytoplasm of neighbouring cells.

Plasmodesmata connect the cytoplasm of neighbouring cell, they are cell wall channels which allow the movement of molecules.
Middle lamella holds/glues the different neighboring cells together it is made up of calcium pectate.

Q.122 (1)
NCERT Page No. 96

> In plants, the tonoplast facilitates the transport of a number of ions and other materials against concentration gradients into the vacuole. Hence their concentration is significantly higher in the vacuole than in the cytoplasm.

In plants the tonoplast facilitates the transport of a number of ions & other material against concentration gradient into vacuole.

Q.123 (2)
NCERT Page No. 98

> Like mitochondria, the choloroplasts are also double membrane bound. Of the two the inner chloroplast membrane is relatively less permeable.

The outer membrane in chloroplast is more permeable & inner membrane is less permeable.

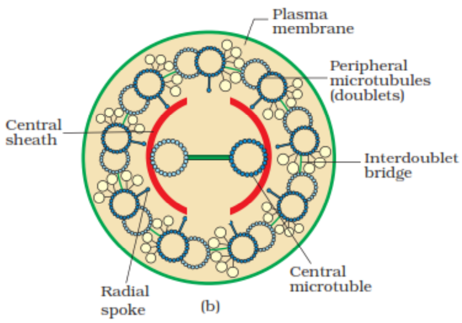
Q.124 (2)
Q.125 (4)
NCERT Page No. 97/98

> Yellow, orange or red colour. The leucoplast are the colourless plastids of varied shapes and sizes with stored nutrients. Amyloplasts store carbohydrates (starch) e.g. potato, elaioplasts store oils and fats whereas the aleuroplasts store proteins.

Plastids like -
Amyloplasts store - carbohydrate (starch)
Elaioplasts store - oils & fats
Aleuroplasts store - proteins
Chromoplasts - contains colured pigments
Chloroplasts - contain chlorophyll

Q.126 (3)

NCERT Page No. 99



In the given diagram 'C' is central microtubule. The central microtubules are connected by bridges & is also enclosed by a central sheath which is connected to one of the tubules of each peripheral doublets by a radial spoke.

Q.127 (2)

NCERT Page No. 99/100

Centrosome is an organelle usually containing two cylindrical structures called centrioles. They are surrounded by amorphous pericentriolar materials. Both the centrioles in a centrosome lie perpendicular to each other in which each has an organization like the cartwheel. They are
made up of nine evenly spaced peripheral fibrils of tubulin protein. Each of the peripheral fibril is a triplet. The adjacent triplets are also linked. The central part of the proximal region of the centriole is also proteinaceous and called the hub which is connected with tubules of the peripheral triplets by radial spokes made of protein. The centrioles form the basal body of cilia or flagella and spindle fibres that give rise to spindle apparatus during cell division in animal cells.

Central part of the centriole is also proteinaceous called as hub.

Q.128 (4)

NCERT Page No. 101

The metacentric chromosome has middle centromere forming two equal arms of the chromosome. The sub-metacentric chromosome has centromere slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm. In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm, whereas the telocentric chromosome has a terminal centromere.

- Metacentric chromosome - has middle centromere forming two equal arms of the chromosomes.
- Sub-metacentric chromosome - has centromere slightly away from the middle
- Acrocentric chromosome - centromere is present close to its end forming one long & one short arm.
- Telocentric chromosome - Terminal chromosome.

Q.129 (2)

NECRT Page No. 100

The nuclear matrix or the nucleoplasm contains nucleolus and chromatin. The nucleoli are spherical structures present in the nucleoplasm. The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis. Larger and more numerous nucleoli are present in cells actively carrying out protein synthesis.

Content of the nucleolus is continuous with rest of the nucleoplasm as it is not a membrane bound structure.

Q.130 (4)

Glycine is a simplest amino acid in which R-group is replaced by hydrogen.

Q.131 (4)

Q.132 (4)

Hydrolases require water for catalysis

Histidine decarboxylase is a lyase that removes CO_2 from histidine without involving water molecule.

Q.133 (2)

Q.134 (4)

Q.135 (2)

After burning the dry tissue, all the organic compounds are oxidised to gaseous form (CO_2 and water vapour) and are removed. The material left which contains inorganic elements (e.g. calcium, magnesium, etc) is termed ash

Q.136 (3)

Q.137 (3)

NCERT Page No. 97/98

Microscope as dense particles by George Palade (1953). They are composed of ribonucleic acid (RNA) and proteins and are not surrounded by any membrane.
They produce cellular energy in the form of ATP, hence they are called 'power houses' of the cell. The matrix also possesses single circular DNA molecule, a few RNA molecules, ribosomes (70S) and the components required for the synthesis of proteins.
The stroma of the chloroplast contains enzymes required for the synthesis of carbohydrates and proteins. It also contains small double stranded circular DNA molecules and ribosomes.

Ribosomes are non-membrane bound present in cytoplasm and rough ER.

They take part in protein synthesis. They are present in both chloroplast & mitochondria.

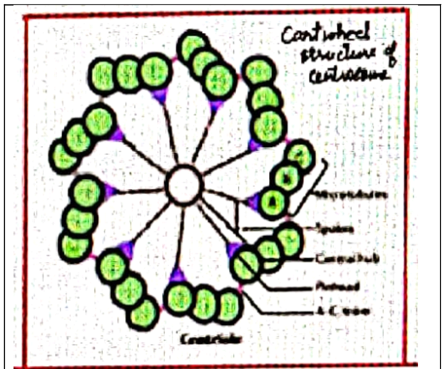
Q.138 (4)

Q.139 (2)

Q.140 (4)

Q.141 (4)

NCERT Page No. 100



Microtubules, and a pair of centrany located microtubules. Such an arrangement of axonemal microtubules is referred to as the 9+2 array. The central tubutes are connected by bridges and is also enclosed by a central sheath, which is connected to one of the tubules of each peripheral doublets by a radial spoke. Thus, there are nine radial

Each centriole has a cartwheel organisation arranged in a whorl or ring composed of 27 microtubules.

Q.142 (1)
Q.143 (2)
Q.144 (3)
Glycoproteins and glycolipids are fomed by Golgi apparatus.
Q.145 (3)
Q.146 (1)
NECRT Page No. 102

Many membrane bound minute vesicles called microbodies that contain various enzymes are present in both plant and animal cells.

Microbodies are membrane bound organelles which are only present in enkaryotes i.e. plant & animal cells.
Q.147 (1)
Q.148 (3)
A proteins is imagined as a line, the left end is represented by first amino acid (N-terminal amino acid) and the right end is represented by the last amino acid (C-terminal amino acid).
Q.149 (3)
Proteins are heteropolymer of α-amino acids. All compounds found in acid soluble pool has a molecular weight of 18-800 Da approximately. Molecular weight of proteins is much higher than this range. So, they belong to acid insoluble fraction.
Q.150 (4)
(b) Statement is wrong, because thermophillic enzymes don't get denatured at high temperature, they work efficiently at high temperature (750ºC).
(c) Statement is wrong, because enzyme don't break chemical bonds of product but of substrate.
Q.151 **(1)**
Q.152 (3)
Q.153 (4)
In telophase, chromosomes get decondensed and lose their identity.
Q.154 **(2)**
Q.155 (2)
Q.156 (1)
Q.157 (1)
Q.158 (2)
Q.159 (4)
Q.160 (3)
Q.161 **(2)**
Q.162 (3)
Q.163 **(3)**
NCERT-XI, Pg.# 169
Q.164 (2)
There are two main ways of cell division i.e., mitosis and meiosis. In each case, division of the nucleus, called karyokinesis, occurs before the division of the cytoplasm, termed as cytokinesis

Q.165 (2)
Q.166 (1)
Q.167 **(3)**
Q.168 **(1)**
Q.169 (4)
Q.170 (1)
Q.171 (3)
In plant cell wall formation starts in the centre of the cell and grows outwards to meet existing lateral walls.
Q.172 (4)
Q.173 (4)
Q.174 (3)
Stage of crossing over $\rightarrow$ Pachytene stage
Q.175 (4)
Q.176 (1)
Q.177 (4)
Q.178 (4)
Assertion is false, but Reason is true and Assertion can be corrected as
In metaphase-U, the chromosomes align at the smgle equatorial plate.
Q.179 (3)
Q.180 (3)
Q.181 (3)
Q.182 (3)
Glycosidic bond : Formed between the two monosaccharides (sugar molecule).
Phosphodiester bond : This bond is formed in nucleic acid i.e. DNA or RNA, between the phosphate and hydroxyl group of sugar.
Q.183 (1)
Q.184 **(3)**
Q.185 (1)
Toxins- Abrin, Ricin
Drugs- Vinblastin, curcumin
Lecithin- Concanavalin A
Q.186 (2)

Q.187 (3)

Q.188 (3)

Amount of DNA doubles after S phase but number of chromosomes remains same.

Q.189 (1)

In mitosis, the number of chromosomes in daughter cell is same as in parent cell, therefore, it is called equational division. It takes place in all somatic cells.

Q.190 (1)

Bivalent become clearly visible as tetrad in pachytene stage.

Q.191 (3)

Inteiphase is divided into three phases, namely first gap or G_1-phase, synthetic or S-phase and second gap or G_2-phase.

It involves scries of changes which occur in a newly formed cell and its nucleus, before it becomes capable of dividing again-

Q.192 (2)

Q.193 (4)

Given stage shows late prophase.

At late prophase cells do not show golgi, ER, intact nuclear membrane & nucleolus.

Q.194 **(3)**

Q.195 (1)

Q.196 (3)

Q.197 (1)

The four substituent groups occupying the four valency positions in an amino acids are hydrogen, carboxyl group, amino group and a variable group designated as /{-group.

Q.198 (2)

Q.199 (3)

The statement in option (3) is incorrect and can be corrected as

The percentage weight of nitrogen in the eailh's crust very low as compared to that ixx the human body.

Rest of the options are correct-

Q.200 (3)

Inorganic catalysts work efficiently at high temperatures and high pressures, while enzymes get damaged at high temperatures (say above 40°C).