ANWER KEY
FULL TEST-03

PHYSICS

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

CHEMISTRY

Q.46 (4)	**Q.47** (2)	**Q.48** (1)	**Q.49** (2)	**Q.50** (3)	**Q.51** (3)	**Q.52** (1)	**Q.53** (3)	**Q.54** (4)	**Q.55** (2)
Q.56 (3)	**Q.57** (1)	**Q.58** (4)	**Q.59** (3)	**Q.60** (2)	**Q.61** (4)	**Q.62** (1)	**Q.63** (2)	**Q.64** (3)	**Q.65** (2)
Q.66 (2)	**Q.67** (2)	**Q.68** (3)	**Q.69** (1)	**Q.70** (3)	**Q.71** (2)	**Q.72** (3)	**Q.73** (3)	**Q.74** (3)	**Q.75** (2)
Q.76 (1)	**Q.77** (1)	**Q.78** (4)	**Q.79** (4)	**Q.80** (1)	**Q.81** (4)	**Q.82** (1)	**Q.83** (4)	**Q.84** (4)	**Q.85** (2)
Q.86 (3)	**Q.87** (2)	**Q.88** (3)	**Q.89** (4)	**Q.90** (1)					

BIOLOGY

Q.91 (2)	**Q.92** (2)	**Q.93** (1)	**Q.94** (1)	**Q.95** (3)	**Q.96** (2)	**Q.97** (4)	**Q.98** (4)	**Q.99** (2)	**Q.100** (3)
Q.101 (1)	**Q.102** (3)	**Q.103** (2)	**Q.104** (2)	**Q.105** (3)	**Q.106** (3)	**Q.107** (4)	**Q.108** (1)	**Q.109** (2)	**Q.110** (3)
Q.111 (2)	**Q.112** (1)	**Q.113** (2)	**Q.114** (4)	**Q.115** (1)	**Q.116** (3)	**Q.117** (1)	**Q.118** (1)	**Q.119** (4)	**Q.120** (4)
Q.121 (1)	**Q.122** (3)	**Q.123** (4)	**Q.124** (1)	**Q.125** (1)	**Q.126** (2)	**Q.127** (3)	**Q.128** (1)	**Q.129** (1)	**Q.130** (4)
Q.131 (4)	**Q.132** (4)	**Q.133** (3)	**Q.134** (4)	**Q.135** (1)	**Q.136** (3)	**Q.137** (2)	**Q.138** (4)	**Q.139** (4)	**Q.140** (1)
Q.141 (2)	**Q.142** (1)	**Q.143** (4)	**Q.144** (1)	**Q.145** (4)	**Q.146** (4)	**Q.147** (1)	**Q.148** (2)	**Q.149** (2)	**Q.150** (4)
Q.151 (1)	**Q.152** (4)	**Q.153** (1)	**Q.154** (2)	**Q.155** (4)	**Q.156** (2)	**Q.157** (1)	**Q.158** (4)	**Q.159** (3)	**Q.160** (4)
Q.161 (2)	**Q.162** (1)	**Q.163** (1)	**Q.164** (3)	**Q.165** (3)	**Q.166** (4)	**Q.167** (2)	**Q.168** (3)	**Q.169** (4)	**Q.170** (3)
Q.171 (3)	**Q.172** (3)	**Q.173** (1)	**Q.174** (3)	**Q.175** (4)	**Q.176** (3)	**Q.177** (1)	**Q.178** (1)	**Q.179** (1)	**Q.180** (1)

Hints & Solutions

Q.1 (3)

$1\text{MSD} = \frac{1}{20}\text{cm}$

$\because$ 10 VSD = 9 MSD

$1\text{VSD} = \frac{9}{10}\text{MSD} = \frac{9}{10}\times\frac{1}{20}\text{cm}$

$= 0.45\,\text{mm}$

Now, LC = 1 MSD – 1 VSD

$= (0.5 - 0.45)\,\text{mm}$

$= 0.05\,\text{mm}$

Q.2 **(2)**

$y = \frac{z}{r}e^{-zt}$

$[y] = \left[\frac{z}{r}\right]$

$[zt] = [M^0L^0T^0] \Rightarrow [Z] = [T^{-1}]$

$[r] = \left[\frac{z}{y}\right] = \left[\frac{T^{-1}}{L^1}\right]$

$[r] = [L^{-1}T^{-1}]$

Q.3 (3)

Distance travelled in 3 seconds = 36 m

Distance travelled in 2 seconds = 20 m

$\Rightarrow$ Distance travelled in third second = 16 m

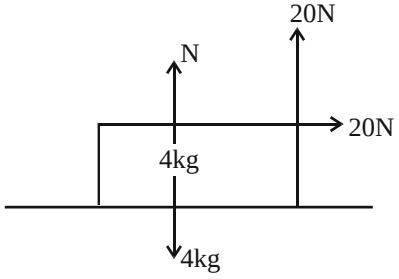
Q.4 (1)

$t = \frac{u}{g\sin\theta} = \frac{20\sqrt{3}}{10\times\sqrt{3}/2} = 4\text{s}$

Q.5 (2)

Since the particle moves with constant speed hence the direction of acceleration vector cannot be $\vec{a}_3$ and $\vec{a}_1$ it will be perpendicular to velocity which is $\vec{a}_2$.

Q.6 (3)



$N + 20 = 40 \Rightarrow N = 20\ N$

$f_{smax} = \mu_s N = 0.8(20) = 16\ N$

As $F_{ext}(20\ N) > f_{smax}$

body will move

$f_k = \mu_k N = 0.6(20) = 12N$

$a = \dfrac{20-12}{4} = 2\ m/s^2$

Q.7 (1)

$F_C = \sqrt{N^2 + f^2}$

Q.8 (3)

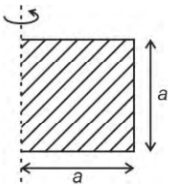
$\text{Force} = \dfrac{-dU}{dx}$

$\Rightarrow F = -(\text{Slope of } U - X \text{ graph})$

Q.9 (1)

By definition, COM of two particles lies on the line joining them and is located somewhere between them.

Q.10 (1)



$I = \dfrac{ma^2}{3}$

Q.11 (2)

$\Delta U = \dfrac{mgh}{1+\dfrac{h}{R}} = \dfrac{mg \times 3R}{1+\dfrac{3R}{R}} = \dfrac{3}{4}mgR$

Q.12 (1)

We know, the earth slows down at aphelion and moves faster at perihelion, this is due to the conservation of angular momentum as there is no net external torque on earth-sun system. Thus, areal velocity in elliptical path remains same.

Q.13 (1)

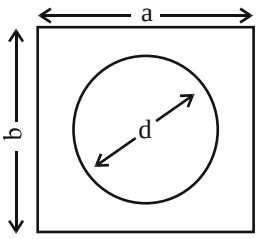
$\text{Energy per unit volume} = \dfrac{(\text{stress})^2}{2Y}$

$\dfrac{E_1}{E_2} = \dfrac{Y_2}{Y_1}(\text{Stress is constant}) \therefore \quad \dfrac{E_1}{E_2} = \dfrac{3}{2}$

Q.14 (1)

According to the principle of continuity, the velocity of fluid increases when the cross-sectional area decreases.

Q.15 (1)



During thermal expansion, all dimensions increases. So, a, b and d all will increase.

where d = diameter of hole

Q.16 (2)

$W = 200 \times 10^3 (100 - 300) \times 10^{-6} = -40\ J$

Q.17 (2)

$P_0 = \dfrac{1}{3} \times \dfrac{m'N}{V} \times (V_{rms})^2$

$P = \dfrac{1}{3} \times \dfrac{2m'N}{V} \times \dfrac{(V_{rms})^2}{4} = \dfrac{P_0}{2}$

Q.18 (1)

$KE + PE = \dfrac{1}{2}KA^2$

$\Rightarrow 8PE + PE = \dfrac{1}{2}KA^2$

$\Rightarrow 9PE = \dfrac{1}{2}KA^2$

$\Rightarrow \Rightarrow 9\left(\dfrac{1}{2}Kx^2\right) = \dfrac{1}{2}KA^2 \left(\because PE = \dfrac{1}{2}Kx^2\right)$

$\Rightarrow 9x^2 = A^2 \Rightarrow x = \dfrac{A}{3} = \dfrac{\sqrt{3\pi}}{3}$

$\Rightarrow x = \sqrt{\dfrac{\pi}{3}}$

Q.19 (2)

$\Delta n = n_1 - n_2 \Rightarrow 4$

$= \dfrac{v}{2l_1} - \dfrac{v}{2l_2} = \dfrac{v}{2}\left[\dfrac{1}{1.00} - \dfrac{1}{1.025}\right]$

$\Rightarrow v \simeq 328 m/s$

Q.20 (1)

From Gauss law,

$$\phi_{Net} = \frac{q_{inside}}{\epsilon_0} = \frac{q_1 + q_2 + q_3}{\epsilon_0}$$

$$\Rightarrow \phi_{Net} = \frac{(-14 + 78.85 - 56)\times 10^{-9}}{8.85 \times 10^{-12}}$$

$$= 10^{-9+12} = 10^3 \frac{N - m^2}{C}$$

Q.21 (3)

Torque, $\vec{\tau} = \vec{P} \times \vec{E}$

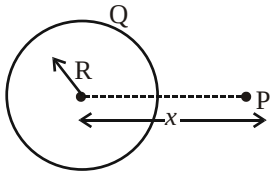
$\Rightarrow |\vec{\tau}| = PE \sin\theta$

$= 5 \times 10^{-7} \times 2 \times 10^4 \times \sin 60°$

$= 10^{-2} \times \frac{\sqrt{3}}{2} = 0.866 \times 10^{-2}$

$= 8.66 \times 10^{-3}\ N - m$

Q.22 (2)



Potential at centre $V_c = \frac{3}{2}\frac{KQ}{R}$

Poteintial at P ; $v_P = \left(\frac{KQ}{x}\right)$

$\frac{1}{6}.Vc = Vp$

$\frac{1}{6} \cdot \frac{3}{2}\frac{KQ}{R} = \frac{KQ}{x}$

$\boxed{X = 4R}$

$\therefore$ distance from surface = 4R – R = 3R

Q.23 (1)

$C = \frac{A\varepsilon_0 K}{d}$; $\frac{A\varepsilon_0}{d} = \frac{C}{K} = \frac{C}{3}$

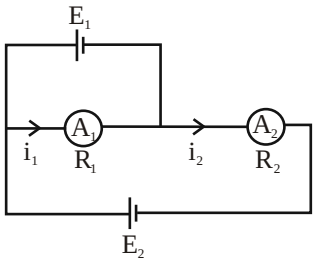
Q.24 (2)

Slope of i – v graph is

$\frac{di}{dv} = \tan 60°$

$\Rightarrow \frac{1}{\text{Resistance}} = \sqrt{3} \Rightarrow \text{Resistance} = \frac{1}{\sqrt{3}}$

Q.25 (2)

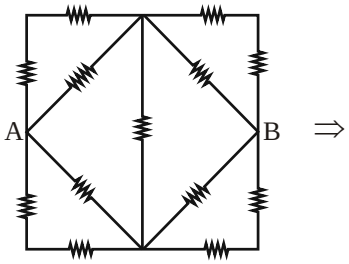


Applying KVL, we get

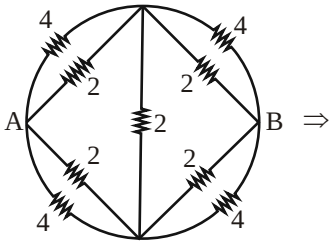
$i_1 = \frac{E_1}{R_1}$ and $i_2 = \frac{E_2 - E_1}{R_2}$

Now, i_1 and i_2 can be same if $E_2 > E_1$ and R_1 and R_2 have values which satisfy the above equations. Also, for $E_2 > E_1$, the current direction in both the ammeters will be same.

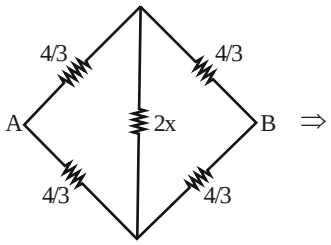
Q.26 (1)



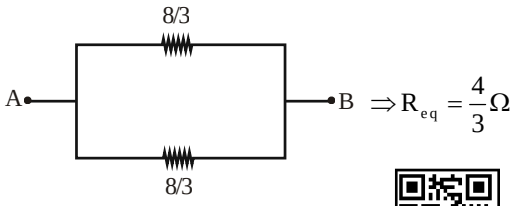
$\Rightarrow$



$\Rightarrow$



$\Rightarrow$



$\Rightarrow R_{eq} = \frac{4}{3}\Omega$

Q.27 (3)

A stationary charge can only produce electric field, that is why statement (B) is wrong.

Q.28 (2)

Force on a current wire $\vec{F} = \int i\vec{dl} \times \vec{B}$

Since, magnetic field is uniform

$\therefore \vec{F} = i(\Delta\vec{l} \times \vec{B})$

$\Delta\vec{l} = 3\hat{i} + 4\hat{j}$

$\therefore \vec{F} = 0.3\left[(3\hat{i} + 4\hat{j}) \times 2(-\hat{k})\right]$

$\vec{F} = 0.3(6\hat{j} - 8\hat{i})$

$|\vec{F}| = 0.3\sqrt{6^2 + 8^2} = 3N$

Q.29 (2)

Potential energy, $U = -\bar{M}.\bar{B}$

$= -MB\cos\theta$

Work done, $WD = \Delta U = U_f - U_i$

$WD = (-MB\cos 90°) - (-MB\cos 0°)$

$= 0 + MB$

$= MB = 2 \times 0.1 = 0.2$ J

Q.30 (3)

Magnetic field at an equatorial point is $\frac{-\mu_0 \bar{M}}{4\pi r^3}$

Magnetic field at an axial point is $2\left(\frac{\mu_0}{4\pi}\right)\frac{\bar{M}}{r^3}$

$\Rightarrow \frac{B_{axial}}{B_{equatorial}} = \frac{2(20)^3}{(40)^3}$

$= 2 \times \frac{1}{8} = \frac{1}{4}$

$\Rightarrow B_{axial} = \frac{6.4 \times 10^{-5}}{4} = 1.6 \times 10^{-5}$ T

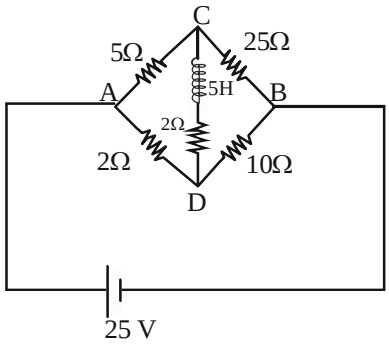
Q.31 (3)

$\phi = BA\cos\theta$

$= BA\cos 60°$

$\text{emf} = \frac{\Delta\phi}{\Delta t} = \frac{A}{2}\left[\frac{3B_0 - B_0}{t}\right] = \frac{AB_0}{t}$

Q.32 (3)



$\frac{R_{AC}}{R_{AD}} = \frac{5}{2} = \frac{R_{CB}}{R_{DB}}$

$\Rightarrow$ Balance wheatstone bridge

$\Rightarrow$ There is no current in inductor

$\Rightarrow$ Energy stored $= \frac{1}{2}Li^2 = 0$

Q.33 (3)

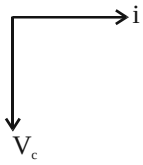
$P = V \cdot I\cos\phi$

$100 = 200 \times 4\cos\phi$

$\cos\phi = \frac{1}{8}$

Q.34 (2)

Phasor diagram for pure capacitive circuit is



i leads V_c by 90°

Q.35 (1)

Using Maxwell's equations mathematicals prediction of EMW was emerged.

Q.36 (2)

Critical angle $\sin\theta_c = 0.75 = \frac{3}{4}$

$\sin\theta_c = \frac{3}{4} = \frac{1}{\mu} \Rightarrow \mu = \frac{4}{3}$ and

Polarising angle $\theta_p = \tan^{-1}(\mu)$

$\theta_p = \tan^{-1}\left(\frac{4}{3}\right)$

$\theta_p = 53°$

Q.37 (4)

$M_T = M_o \times M_e \Rightarrow 96 = 8 \times m_e$

$\Rightarrow m_e = \frac{96}{8}\ m_e = 12$

Q.38 (2)

Here, $d = 5\lambda$, $D = 10d$, $y = \frac{d}{2}$.

resultant Intensity at $y = \frac{d}{2}, I_y = ?$

The path difference between two waves at $y = \frac{d}{2}$

$$\Delta x = d\tan\theta = d \times \frac{y}{D} = \frac{d \times \frac{d}{2}}{10d} = \frac{d}{20} = \frac{5\lambda}{20} = \frac{\lambda}{4}$$

Corresponding phase difference, $\phi = \frac{2\pi}{\lambda}\Delta x = \frac{\pi}{2}$.

Now, maximum intensity in Young's double slit experiment,

$I_{max} = I_1 + I_2 + 2I_1I_2$

$I_0 = 4I \qquad (\because I_1 = I_1 = I)$

$\therefore \quad I = \frac{I_0}{4}$

Required intensity $I_y = I_1 + I_2 + 2I_1I_2\cos\frac{\pi}{2} = 2I = \frac{I_0}{2}$

Q.39 (3)

$P = \frac{E}{c}$

$P = \frac{9\times10^6}{3\times10^8}\text{eV s m}^{-1}$

$P = 0.03\text{ eV s m}^{-1}$

Q.40 (2)

$\lambda = \frac{h}{\sqrt{2mE}}$

$\lambda_2 = \frac{hc}{E}$

$\frac{\lambda_1}{\lambda_2} = \frac{1}{c}\left(\frac{E}{2m}\right)^{1/2}$

Q.41 (3)

Angular momentum, $L = \frac{nh}{2\pi}$

For $n = 1$, $L_1 = \frac{h}{2\pi}$

$\Delta L = \frac{h}{2\pi}$

$\Rightarrow L_{final} = L_1 + \Delta L = \frac{2h}{2\pi}$

$\Rightarrow n = 2$

Energy of e^- in ground state = –13.6 eV

$\Rightarrow \Delta E$ is energy required to excite e^- to n = 2

$\Rightarrow \Delta E = 13.6\left(\frac{1}{1} - \frac{1}{4}\right)$

$= 13.6 \times \frac{3}{4} = 10.2\text{ eV}$

Q.42 (1)

$\frac{1}{\lambda} = Rz^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

$f = \frac{c}{\lambda} = Rcz^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

Given, $\frac{7}{3}f_{H-atom} = f_{Li-atom}$

$\Rightarrow \frac{7}{3}RC(1)^2\left(\frac{1}{4} - \frac{1}{16}\right) = Rc(3)^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

$\Rightarrow \frac{7}{3}\times\frac{1}{4}\times\frac{3}{4} = 9\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

$\Rightarrow \frac{7}{16}\times\frac{1}{9} = \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

$\Rightarrow n_1 = 3$ and $n_2 = 4$

Q.43 (2)

Alpha particle is basically helium nucleus (^4_2He)

Q.44 (4)

For forward biased p-side should be connected to higher potential and n-side should be connected to lower potential.

Q.45 (3)

Zener diode are heavily doped p-n junction diodes which are used in reverse bias and can be used as voltage regulators

Q.46 (4)

$$\%\,C = \frac{57\times12}{57\times12+110\times1+6\times16}\times100$$

$\%\,C = 76.85\,\%$

Q.47 (2)

The shortest wavelength in hydrogen spectrum occurs in last line of lyman series for which $n_1 = 1$ and $n_2 = \infty$

$$\frac{1}{\lambda} = 1.09\times10^{7}\,m^{-1}\left(\frac{1}{n_1^2}-\frac{1}{n_2^2}\right)$$

$$\frac{1}{\lambda} = 1.09\times10^{7}\times\left(\frac{1}{1^2}-\frac{1}{\infty^2}\right)$$

$$\lambda = \frac{1}{1.09\times10^{7}}\,m = \frac{10^9}{1.09\times10^{7}}\,nm$$

$\lambda = 91.2\,nm$

Q.48 (1)

This ionisation energy order fits for boron.

Q.49 (2)

Dipole moment order

$NH_3 > CHCl_3 > H_2S > HBr$

Q.50 (3)

Bond order of CO (x) = 3

Bond order of $O_2^{2-} = 1$ or $\frac{x}{3}$

Q.51 (3)

$\Delta G° = -2.303\,RT\log K_C$

$\Delta G° = -2.303\times8.314\times10^{-3}\times298\times\log10^{12}$

$\Delta G° = -68.47\,kJ$

Q.52 (1)

$H_2CO_3 + 2NaOH \rightarrow Na_2CO_3 + H_2O$

$\Delta H = -108\,kJ\,mol^{-1}$

For two moles of NaOH with any strong acids, $\Delta_n H$ should be $2\times(-57.2) = -114.6\,kJ$

Now ΔH for dissociation of H_2CO_3

$\Delta H = 114.6 - 108 = 6.6\,kJ$

Q.53 (3)

$NaCl \rightarrow Na^+ + Cl^-$

0.1 M 0.1 M

$MCl \rightarrow M^+ + Cl^-$

s s s + 0.1

$K_{SP} = [M^+][Cl^-]$

$K_{SP} = s\times(s+0.1)$

$1\times10^{-10} = s\times0.1 \qquad \{s+0.1 \approx 0.1\}$

$s = 10^{-9}$

Q.54 (4)

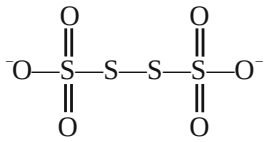
(P) $\Delta_n g = 0$; $K_P = K_C$

(Q) $\Delta_n g = -2$; $K_P = K_C(RT)^{-2}$

(R) $\Delta_n g = 1$; $K_P = K_C(RT)$

(S) $\Delta_n g = 2$; $K_P = K_C(RT)^2$

Q.55 (2)



When an atom is bonded to similar atoms, has zero oxidation state.

$\therefore$ Two middle sulphur atoms have zero oxidation state.

For other two sulphur atoms.

$2x + 6\times(-2) = -2$

$2x - 12 = -2$

$2x = -2 + 12$

$2x = +10$

$x = +5$

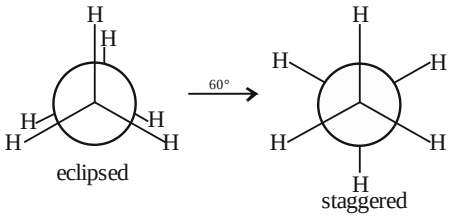
$\therefore$ The oxidation number on S-atoms in $S_4O_6^{2-}$ is +5, 0, 0 + 5.

Q.56 (3)

$\underset{sp^2}{CH_2} = \underset{sp}{C} = \underset{sp^2}{CH_2}$

Q.57 (1)

Eclipsed conformer of ethane is least stable and staggered is most stable.



Q.58 (4)

Homologues contains same functional group.

In HCOOH functional group is carboxylic acid but in $H-\underset{\underset{O}{\|}}{C}-O-CH_3$ functional group is ester. Homologues can differ by number of $>CH_2$ units.

Q.59 (3)

$C_2H_5Cl \xrightarrow{Zn/H^+} CH_3CH_3$

Q.60 (2)

Compounds having same family and very less difference in molecular mass can form ideal solutions, So (I), (II) and (III) pairs of liquids

can form ideal solution.

Q.61 (4)

$G^* = K \times R$

$K_2R_2 = K_1R_1$

$K_2 = \dfrac{K_1 \times R_1}{R_2}$

$K_2 = \dfrac{1.29 \times 100}{258}$

$K_2 = 0.5$

Q.62 (1)

Net cell reaction

$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

$$E_{cell} = E^o_{cell} - \frac{2.303RT}{nF}\log\frac{[Zn^{2+}]}{[Ag^+]^2}$$

So, EMF of cell depend on molarity of Zn^{2+}, moles of Ag^+ and temperature.

Q.63 (2)

$$\log\frac{K_2}{K_1} = \frac{E_a}{2.3R} \times \left(\frac{T_2 - T_1}{T_1T_2}\right)$$

$$\log\frac{0.2}{0.02} = \frac{E_a}{2.3 \times 8.3} \times \left(\frac{700 - 500}{700 \times 500}\right)$$

$E_a = 33.45\ kJ\ mol^{-1}$

Q.64 (3)

$$\text{Rate} = -\frac{1}{2}\frac{d[A]}{dt} = \frac{-d[B]}{dt}$$

$$\frac{-d[A]}{dt} = \frac{-2d[B]}{dt}$$

Q.65 (2)

$AlCl_3$ forms dimer to achieve stability.

Q.66 (2)

Cr(VI) in the form of dichromate in acidic medium is, strong oxidising agent but MoO_3 and WO_3 are not.

Q.67 (2)

Conceptual

Q.68 (3)

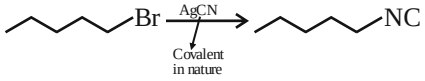
$CoCl_3.5NH_3$ can be represented as : $[Co(NH_3)_5Cl]Cl_2$

Two Cl ionise and one Cl make PV as well as SV.

Q.69 (1)

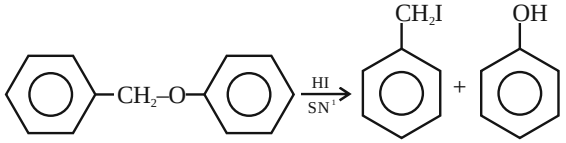
π^* molecular orbital of ligand is used in the synergic bond of metal carbonyls.

Q.70 (3)



Q.71 (2)

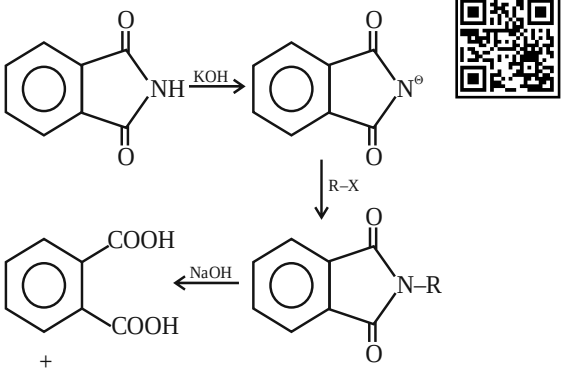
Reaction will proceeds through S_N1 Mechanism.



Q.72 (3)

The position of equilibrium lies largely to the right hand side for most aldehydes and to the left for most ketones due to steric reasons.

Q.73 (3)



This method is used only for formation of aliphatic primary amine.

Aromatic amines can't formed by this method.

Q.74 (3)

Fibrous protein contains H-bonding and disulphide linkages.

Globular protein is water soluble and contains spherical shape.

Q.75 (2)

Cu^{+2} and Co^{+2} shows colour in Borax Bead Test, so it can be identified by this test.

Q.76 (1)

(I) mass = 0.5 × 48 = 24 g

(II) mass = 0.5 × 16 = 8 g

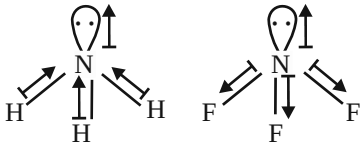
$$\text{(III) mass} = \frac{3.011 \times 10^{23}}{6.02 \times 10^{23}} \times 32 = 16g$$

(IV) mass = $\frac{5.6}{22.4} \times 44 = 11g$

So increasing order of mass will be
II < IV < III < I

Q.77 (1)
dxy, dyz, dxz are non axial orbital

Q.78 (4)



Q.79 (4)

$w = -2.303\, nRT \log_{10} \frac{V_2}{V_1}$

$-1381.8 = -2.303 \times 1 \times 2 \times 300 \log x$
$1381.8 = 1381 \log x$
$\log x = 1$
$x = 10$

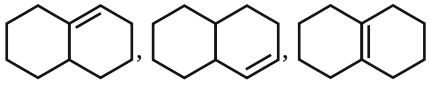
Q.80 (1)

$K_a = \frac{[CH_3COO^-] \times [H^+]}{[CH_3COOH]}$

$[H^+] = \frac{K_a \times [CH_3COOH]}{[CH_3COO^-]}$

$[H^+] = \frac{1.8 \times 10^{-5} \times 0.1}{0.2} = 9 \times 10^{-6} M$

Q.81 (4)
Stability of alkene $\propto$ no. of α-H



(I) (II) (III)
(5 α-H) (3 α-H) (8 α-H)

Q.82 (1)

$\frac{5}{342} \times 10 = \frac{1}{M_w} \times 10$

$M_w = 68.4$

Q.83 (4)

$t_{\frac{1}{2}} = \frac{0.693}{K}$ for Ist order reaction, so half life of Ist order reaction do not depend on initial concentration of reactant.
But K depend on temperature, so $t_{1/2}$ also depend on temperature.

Q.84 (4)
Oxidising power of halogens
$F_2 > Cl_2 > Br_2 > I_2$.

Q.85 (2)
In acidic medium

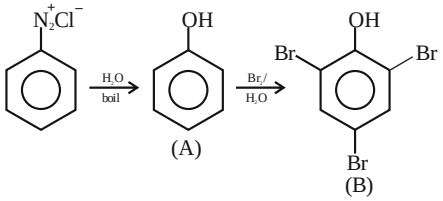
$MnO_4^- \xrightarrow{H^+} Mn^{+2}$

In alkaline medium

$MnO_4^- \xrightarrow{OH^\ominus} MnO_2$

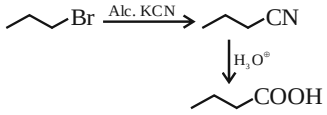
Q.86 (3)
$[Ni(CN)_4]^{2-} \rightarrow dsp^2 \rightarrow$ Square planar $\rightarrow$ Diamagnetic
$[Ni(CO)_4] \rightarrow sp^3 \rightarrow$ Tetrahedral $\rightarrow$ Diamagnetic
$[NiCl_4]^{2-} \rightarrow sp^3 \rightarrow$ Tetrahedral $\rightarrow$ Paramagnetic

Q.87 (2)



(A) (B)
White ppt.

Q.88 (3)



Q.89 (4)

Q.90 (1)
(i) $(N \times V)_{NaOH} = 80 \times 5 = 400$
$(N \times V)_{H_2SO_4} = 500 \times 1 = 500$

So amount of heat liberated depend on amount of NaOH.
(ii) $(N \times V)_{NaOH} = 80 \times 5 = 400$
$(N \times V)_{H_2SO_4} = 0.05 \times 1000 = 50$

So, amount of heat release depend on amount of H_2SO_4.
Therefore heat liberated in case (i) will be more.

Q.91 (2)
Old NCERT Pg. No. 4, Class XI
Planaria exhibits true regeneration (iv), Fungi produce asexual spores (ii), Yeast reproduces by budding (iii), and Amoeba undergoes binary fission (i).

Q.92 (2)
New NCERT Pg. No. 17, 18, Class XI
Claviceps is actually a member of Ascomycetes, not Basidiomycetes.

Q.93 (1)
New NCERT Pg. No. 74, Class XI
The endodermis with Casparian strips (suberin deposition) is a characteristic feature of dicot roots.

Q.94 (1)
New NCERT Pg. No. 11, Class XII
The embryo sac of angiosperms contains a 3-celled egg apparatus (1 egg cell and 2 synergids), 3 antipodal cells, and 2 polar nuclei.

Q.95 (3)
New NCERT Pg. No. 218, Class XII
Fishes represent the largest group of vertebrates, followed by birds and then amphibians.

Q.96 (2)
New NCERT Pg. No. 151, 153, Class XII
Saccharomyces cerevisiae is used for the commercial production of ethanol, *Monascus purpureus* for the production of blood cholesterol-lowering agents, *Trichoderma polysporum* for the production of immunosuppressive agents, and *Propionibacterium sharmanii* for the ripening of Swiss cheese.

Q.97 (4)
New NCERT Pg. No. 135, Class XI
Van Niel's studies on purple and green sulphur bacteria helped in understanding the light-dependent reactions of photosynthesis.

Q.98 (4)
New NCERT Pg. No. 70, Class XII
In grasshoppers, males have one X chromosome (XO) while females have two X chromosomes (XX).

Q.99 (2)
New NCERT Pg. No. 122, 123, 124, Class XI
The steps with correct sequence are
Condensation → Nuclear membrane disassembly → Arrangement at equator → centromere division → Segregation → telophase

Q.100 (3)
New NCERT Pg. No. 171, Class XII
The heat shock method creates transient pores in the bacterial cell membrane, facilitating the uptake of DNA.

Q.101 (1)
New NCERT Pg. No. 63, Class XI
In guava, cucumber, and ray florets of sunflower, the ovary is inferior because the thalamus encloses it completely and fuses with it.

Q.102 (3)
New NCERT Pg. No. 65, Class XII
Chromosomes and genes occur in pairs in diploid cells, not in haploid cells.

Q.103 (2)
New NCERT Pg. No. 117, Class XI
Enzymes that catalyse removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.

Q.104 (2)
New NCERT Pg. No. 197, 198, 199, 200, 201, Class XII
Brood parasitism in birds is a fascinating example of parasitism in which the parasitic bird lays its eggs in the nest of its host and lets the host incubate them. E.g. Cuckoo bird and Crow.

Q.105 (3)
New NCERT Pg. No. 89, Class XI
The largest isolated single cell is the egg of an ostrich, and nerve cells are branched and long.

Q.106 (3)
New NCERT Pg. No. 26, 27, Class XI
Brown algae reproduce asexually by motile spores, and common members include *Laminaria* and *Fucus*, not *Spirogyra* and *Porphyra*.

Q.107 (4)
New NCERT Pg. No. 92, Class XII
The terminator is located at the 3' end (downstream) of the coding strand and defines the end of the transcription process.

Q.108 (1)
New NCERT Pg. No. 95, Class XII
RNA polymerase III in eukaryotes synthesizes 5 S rRNA, tRNA, and some small nuclear RNAs (SnRNA).

Q.109 (2)
New NCERT Pg. No. 169, 170, Class XI
Growth is not only expressed as an increase in cell number but also as an increase in cell size and weight.

Q.110 (3)
New NCERT Pg. No. 73, Class XI
Assertion (A) is correct as conjoint vascular bundles are common in stems and leaves. However, Reason (R) is incorrect because xylem and phloem within a vascular bundle are not arranged alternately but side by side.

Q.111 (2)

New NCERT Pg. No. 125, Class XI

Cell growth results in disturbing the ratio between the nucleus and the cytoplasm.

Q.112 (1)

New NCERT Pg. No. 134, Class XI

Using a similar setup as the one used by Priestley, but by placing it once in the dark and once in the sunlight, Jan Ingenhousz (1730-1799) showed that sunlight is essential to the plant process that somehow purifies the air fouled by burning candles or breathing animals. Ingenhousz in an elegant experiment with an aquatic plant showed that in bright sunlight, small bubbles were formed around the green parts while in the dark they did not.

Q.113 (2)

New NCERT Pg. No. 71, 72, Class XI

The epidermis is not the innermost layer, cuticle is present in stems, and stomata are present in leaves, not roots.

Q.114 (4)

New NCERT Pg. No. 64, Class XI

• Stamens of a flower may be united with other members like petals or among themselves.

(i) When attached to petals, they are called epipetalous (e.g., brinjal).

(ii) United into one bundle (monoadelphous) as in china rose.

(iii) United into two bundles (diadelphous) as in pea.

(iv) United into more than two bundles (polyadelphous) as in citrus.

Q.115 (1)

New NCERT Pg. No. 177, Class XI

Ethylene promotes rapid internode/petiole elongation in deep water rice plants.

Q.116 (3)

New NCERT Pg. No. 179, Class XII

Bt cotton is a genetically modified plant that is resistant to bollworms, which are lepidopteran insects.

Q.117 (1)

New NCERT Pg. No. 222, Class XII

Habitat loss and fragmentation are the major causes of biodiversity loss according to the "Evil Quartet."

Q.118 (1)

New NCERT Pg. No. 67, 68, Class XII

Morgan and his group also found that even when genes were grouped on the same chromosome, some genes were very tightly linked (showed very low recombination) (Cross A) while others were loosely linked (showed higher recombination) (Cross B).

Q.119 (4)

New NCERT Pg. No. 168, Class XII

Ethidium bromide intercalates with DNA and fluoresces under UV light, making DNA fragments visible.

Q.120 (4)

New NCERT Pg. No. 182, Class XII

Introducing the ADA gene into cells at early embryonic stages can potentially provide a permanent cure for ADA deficiency.

Q.121 (1)

New NCERT Pg. No. 30, Class XI

The protonema stage develops from a spore, not directly from a gamete.

Q.122 (3)

New NCERT Pg. No. 210, Class XII

This categorization correctly places primary, secondary, and tertiary consumers.

Q.123 (4)

New NCERT Pg. No. 159, Class XI

The Krebs cycle starts with the condensation of acetyl CoA with oxaloacetic acid, not pyruvic acid, to yield citric acid.

Q.124 (1)

New NCERT Pg. No. 118, Class XI

Cofactors are essential for the catalytic activity of enzymes, and their removal results in the loss of catalytic activity.

Q.125 (1)

New NCERT Pg. No. 175, Class XI

Apical dominance refers to the inhibition of lateral bud growth by the apical bud.

Q.126 (2)

New NCERT Pg. No. 65, Class XI

The China rose exhibits axile placentation, not parietal.

Q.127 (3)

New NCERT Pg. No. 95, Class XII

The hnRNA in humans has exons and introns, but the primary transcript undergoes modification before translation.

Q.128 (1)

New NCERT Pg. No. 81, Class XII

The mRNA sequence transcribed from the coding strand AGGTATCGCAT is AGGUAUCGCAU.

Q.129 (1)
New NCERT Pg. No. 146, Class XI

In C_4 plants, phosphoenolpyruvate is the primary CO_2 acceptor found in mesophyll cells, and these cells lack RuBisCo enzyme.

Q.130 (4)
New NCERT Pg. No. 18, Class XII

Double fertilization involves the fusion of one male gamete with the egg and the other male gamete with the secondary nucleus.

Q.131 (4)
New NCERT Pg. No. 67, Class XI

Smooth Endoplasmic Reticulum (SER) is involved in lipid synthesis, not protein synthesis, and steroidal hormones are synthesized in the SER, not RER.

Q.132 (4)
New NCERT Pg. No. 181, Class XII

As of the latest edition, there are 12 recombinant therapeutics being marketed in India.

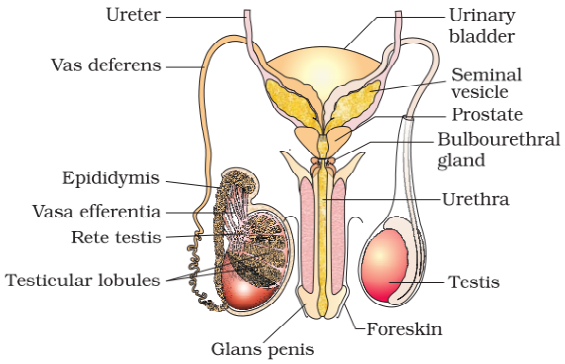
Q.133 (3)
New NCERT Pg. No. 223, Class XII

The introduction of the Nile perch led to the extinction of more than 200 species of cichlid fish in Lake Victoria.

Q.134 (4)
New NCERT Pg. No. 164, Class XI

Carbohydrates are generally preferred as respiratory substrates over pure proteins or fats.

Q.135 (1)
New NCERT Pg. No. 27, Class XII



Q.136 (3)
New NCERT Pg. No. 190, Class XI

The role of O_2 in regulating the respiratory rhythm centre is quite insignificant.

Q.137 (2)
New NCERT Pg. No. 226, Class XI

Each coxal bone is formed by fusion of three bones ilium, ischium and pubis. At the fusion of these bones, a deep cup shaped cavity called acetabulum is present at which head of femur articulates.

Q.138 (4)
Old NCERT Pg. No. 102, 103, Class XI

Bronchioles → Ciliated epithelium
Goblet cells → Glandular tissue
Tendons → Dense regular connective tissue
Adipose tissue → Loose connective tissue

Q.139 (4)
New NCERT Pg. No. 113, 117, Class XII

All of the given statements are correct.

Q.140 (1)
New NCERT Pg. No. 48, Class XII

Intra cytoplasmic sperm injection (ICSI) is another specialised procedure to form an embryo in the laboratory in which a sperm is directly injected into the ovum. Infertility cases either due to inability of the male partner to inseminate the female or due to very low sperm counts in the ejaculates, could be corrected by artificial insemination (AI) technique.

Q.141 (2)
New NCERT Pg. No. 226, Class XI

Ulna → 1 bone
Carpals → 8 bones
Metacarpals → 5 bones
Phalanges → 14 bones

Q.142 (1)
New NCERT Pg. No. 183, Class XII

ELISA is based on the principle of antigen-antibody interaction. Infection by pathogen can be detected by the presence of antigens (proteins, glycoproteins, etc.) or by detecting the antibodies synthesised against the pathogen.

Q.143 (4)
New NCERT Pg. No. 246, Class XI

Androgens is a male sex-hormone group and it has no role in supporting the pregnancy.

Q.144 (1)
New NCERT Pg. No. 236, Class XI

The cerebral cortex controls the voluntary movements and is the main site for processing of smell, vision, memory, intelligence, speech, thought etc.

Q.145 (4)
New NCERT Pg. No. 45, 46, Class XI

Animals belonging to phylum Chordata are fundamentally characterised by the presence of a notochord, a dorsal hollow nerve cord and paired pharyngeal gill slits. These are bilaterally symmetrical, triploblastic, coelomate with organ-system level of organisation.

Q.146 (4)
New NCERT Pg. No. 81, Class XI
According to chargaff's rule :
A + T + G + C = 100%
A = T = x
G = C = 30% given
$\therefore$ x + x + 30 + 30 = 100
2x + 60 = 100
x = A = T = 20%

Q.147 (1)
New NCERT Pg. No. 35, Class XII
The ovum released by the ovary is also transported to the ampullary region where fertilisation takes place. Fertilisation can only occur if the ovum and sperms are transported simultaneously to the ampullary region. This is the reason why not all copulations lead to fertilisation and pregnancy.

Q.148 (2)
New NCERT Pg. No. 108, Class XI
Not all the substances obtained from retentate have molecular weight more than 10,000 Dalton and above. Lipid is an exception whose molecular weight does not exceed 800 Dalton.

Q.149 (2)
New NCERT Pg. No. 119, Class XI
According to Darwin, variations are small and directional.

Q.150 (4)
New NCERT Pg. No. 134, Class XII
PMNLs – Cellular barriers
Interferons – Cytokine barriers
Tears – Physiological barriers

Q.151 (1)
New NCERT Pg. No. 133, Class XII
Typhoid – Widal test
Malignant malaria – *Plasmodium falciparum*
Common cold – Rhinovirus
Trichophyton – Ringworm

Q.152 (4)
New NCERT Pg. No. 61, 69, Class XII
In codominance, both alleles are expressed equally in the phenotype, not an intermediate phenotype. An example is the AB blood group in humans.

Q.153 (1)
New NCERT Pg. No. 142, Class XII
Smack also called as Heroin, is obtained from latex of plant *Papaver somniferum*.

Q.154 (2)
New NCERT Pg. No. 199, Class XI
Conducting pathway of heart
S.A. node → A.V. node → Bundle of his → Right and left A-V bundles → Purkinje fibres.

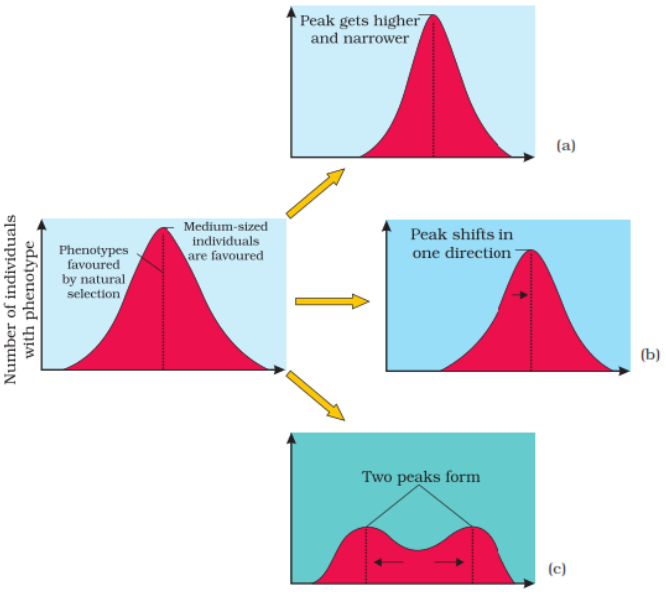
Q.155 (4)
New NCERT Pg. No. 126, Class XI
During zygotene, synapsis begins and homologous chromosomes start pairing. Chiasmata appear during diplotene, not zygotene.

Q.156 (2)
New NCERT Pg. No. 45, Class XI
In Echinodermata,
(1) Development is indirect
(2) Fertilisation is external
(3) Adult Echinodermata are radially symmetrical but larvae is bilaterally symmetrical.

Q.157 (1)
New NCERT Pg. No. 243, 244, Class XI
In Addison's disease, there is under production of hormones by adrenal cortex.

Q.158 (4)
New NCERT Pg. No. 164, Class XII
Bioprocess engineering is maintenance of sterile ambience in chemical engineering processes to enable growth of only desired microbes.

Q.159 (3)
New NCERT Pg. No. 120, Class XII



When more individuals acquire one extreme value than mean value in a distribution curve.

Q.160 (4)

New NCERT Pg. No. 40, 41, 42, 43, Class XI

Choanocytes – Porifera
Cnidoblasts – Coelenterata
Flame cells – Platyhelminthes
Nephridia – Annelida
Comb plates – Ctenophora

Q.161 (2)

New NCERT Pg. No. 164, 165, Class XII

Genetic modification of an organism involves 3 basic steps :
(1) Identification of DNA with desirable genes.
(2) Introduction of identified DNA into the host.
(3) Maintenance of introduced DNA in the host and transfer of DNA to its progeny.

Q.162 (1)

New NCERT Pg. No. 30, Class XII

Hymen partially covers vagina and often get ruptures after first coitus. It may also get broken down due to sudden fall, jolt or in active participation in sports like cycling and horse riding etc. Therefore, presence or absence of hymen is not a reliable indicator of virginity or sexual experience.

Q.163 (1)

New NCERT Pg. No. 167, Class XII

Restriction enzymes cut the strands of DNA a little away from the centre of the palindrome sites, between the same two bases, on opposite strands.

Q.164 (3)

Old NCERT Pg. No. 102, Class XI

Tight junctions prevent leaking of substances across a tissue. Gap junctions provide cytoplasmic channels between cells for passage of ions, small molecules and sometimes big molecules.

Q.165 (3)

New NCERT Pg. No. 212, Class XI

Renin is released from JGA in response to :
(1) Low GFR
(2) Increase osmolarity
(3) Low glomerular blood pressure
(4) Fall in glomerular blood flow.

Q.166 (4)

New NCERT Pg. No. 134, Class XII

Mucus coating of epithelium lining of major tracts in body → Physical barriers
Interferons → Cytokine barriers
Macrophages → Cellular barriers

Q.167 (2)

New NCERT Pg. No. 100, Class XI

The nucleolus is not a membrane-bound structure. It is a dense region within the nucleus where ribosomal RNA synthesis occurs.

Q.168 (3)

New NCERT Pg. No. 124, Class XII

The cranial capacity of homo erectus was 900 cc.

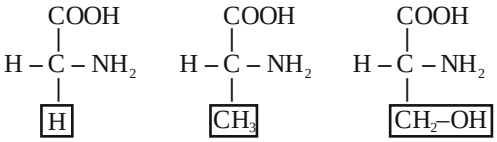
Q.169 (4)

New NCERT Pg. No. 196, Class XI

The logistic growth model is more realistic because it considers the carrying capacity of the environment, showing an S-shaped curve.

Q.170 (3)

New NCERT Pg. No. 107, Class XI



Amino acids

Q.171 (3)

New NCERT Pg. No. 199, Class XI

At A-V node, impulses from SA node gets delayed by 0.1 sec which ensure that atria must be fully relaxed before the ventricles start contracting.

Q.172 (3)

New NCERT Pg. No. 103, Class XII

The commonly used hosts were bacteria and yeast, and the vectors were called as BAC (bacterial artificial chromosomes), and YAC (yeast artificial chromosomes).

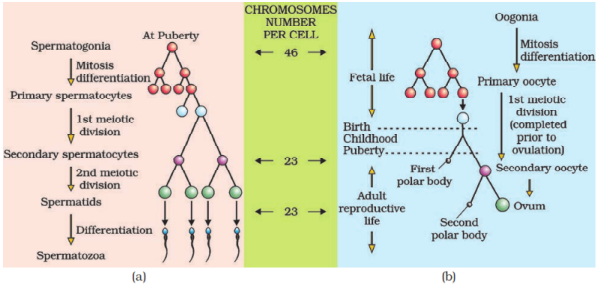
Q.173 (1)

New NCERT Pg. No. 38, Class XII

Prolactin does not induces uterine contractions. They are induced by oxytocin.

Q.174 (3)

New NCERT Pg. No. 33, Class XII



1 primary spermatocyte give rise to 4 spermatozoa.
1 primary oocyte give rise to 1 egg.

Q.175 (4)
New NCERT Pg. No. 207, 208, Class XI
Loop of Henle and collecting duct are present in medullary region of kidney.

Q.176 (3)
New NCERT Pg. No. 236, Class XI
Cerebral aqueduct is present in mid-brain.

Q.177 (1)
New NCERT Pg. No. 114, Class XI
The characteristic of mosaic vision is more sensitivity but less resolution.

Q.178 (1)
Old NCERT Pg. No. 101, Class XI
- Squamous epithelium → flattened cells with irregular boundaries
- Cuboidal epithelium → cube-like cells
- Columnar epithelium → tall and slender cells
- Ciliated epithelium → cilia present on apical surface

Q.179 (1)
New NCERT Pg. No. 247, Class XI
Gastric inhibitory → inhibit the secretion of gastric peptide juice
Gastrin → secretion of pepsinogen
Cholecystokinin → contraction of gall bladder
Secretin → stimulate the exocrine cells of pancreas

Q.180 (1)
New NCERT Pg. No. 67, Class XII
Linkage refers to the physical association of genes on the same chromosome. Recombination is the generation of new combinations of genes.