ANSWER KEY
NEET (FINAL TRACK)
PART TEST-06 (XII)

PHYSICS

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

CHEMISTRY

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

BIOLOGY

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

SOLUTIONS

PHYSICS
SECTION-A

Q.1 (3)

|Incoming flux| = |Outgoing flux|

Incoming flux $= -\phi$

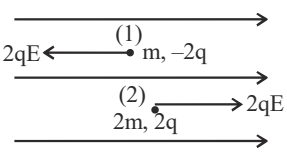
Outgoing flux $= +\phi$

$\therefore$ Net flux $= \phi_{in} + \phi_{out} = \phi - \phi = 0$

Q.2 (2)

Force between two charges is independent of presence and absence of third charge

Q.3 (1)



$a_1 = \frac{2qE}{m}$, $a_2 = \frac{2qE}{2m} = \frac{qE}{m}$

Velocity after time (t)

$V_1 = \frac{2qE}{m}t$, $V_2 = \frac{qE}{m}t$

$$\frac{K.E_1}{K.E_2} = \frac{\frac{1}{2}m_1V_1^2}{\frac{1}{2}m_2V_2^2} = \frac{m\left(\frac{2qE}{m}t\right)^2}{2m\left(\frac{qE}{m}t\right)^2} = \frac{2}{1}$$

Q.4 (1)

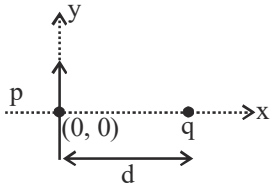
$\phi_{in} = -3\times10^5$ wb, $\phi_{out} = 4\times10^5$

$\phi_{net} = \phi_{in} + \phi_{out} = -3\times10^5 + 4\times10^5 = 10^5$

$\phi_{net} = \frac{Q_{in}}{\varepsilon_0}$

$Q_{in} = \varepsilon_0\phi_{net} = 8.85\times10^{-12}\times10^5 = 8.85\times10^{-7}$C

Q.5 (4)



At equitorial position electric field $= \frac{-kp}{r^3}$

direction of electric field is opposite to $\vec{p}$

$\therefore F = q\left(\frac{kp}{d^3}\right)(-\hat{j}) = \frac{kpq}{d^3}(-\hat{j})$

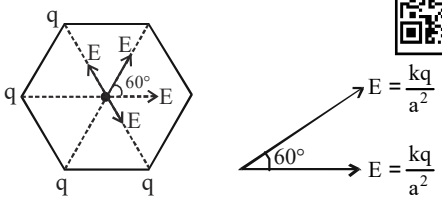
Q.6 (3)

$\phi = \vec{E}\cdot\vec{A}$

$= \left(2\hat{i}+3\hat{j}+\hat{k}\right)\cdot\pi R^2\hat{i}$

$= 2\pi R^2$

Q.7 (3)



$E_{net} = 2E\cos\left(\frac{60}{2}\right) = 2.\frac{kq}{a^2}\times\frac{\sqrt{3}}{2} = \frac{\sqrt{3}kq}{a^2}$

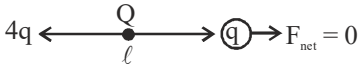
$E_{net} = \frac{\sqrt{3}q}{4\pi\varepsilon_0 a^2}$

Q.8 (1)

Surface charge density σ is more at sharp points

Also $E = \frac{\sigma}{\epsilon_0}$

Q.9 (2)



$\frac{KQq}{\ell^{2/4}} + \frac{K4q\,q}{\ell^2} = 0$

$q = -Q$

Q.10 (3)

Initial force, $F = \frac{KQ^2}{r^2}$ .....(1)

New force, $4F = \frac{K(Q+2)(Q)}{r^2}$ .....(2)

From (1) and (2)

$(Q+1)(q) = 4Q^2$

$\Rightarrow Q+2 = 4Q$

$2 = 3Q$

$\Rightarrow Q = \frac{2}{3}C$

Q.11 (3)

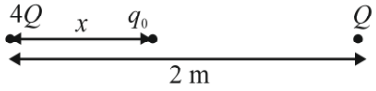
At r = 20 cm

$\Rightarrow E = \frac{kQ}{r^2} = 100\ V/m \Rightarrow kQ = 100\,r^2$

At r' 3 cm $\Rightarrow E = \frac{kQr}{R^3} = \frac{(100r^2)r'}{R^3}$

$= \frac{100\times(20\times10^{-2})\times3\times10^{-2}}{(10\times10^{-2})^3} = 120\,V/m$

Q.12 (4)



$F_Q = 0$

$k\frac{4q_0Q}{x^2} = k\frac{q_0Q}{(2-x)^2}$

$\frac{2}{x} = \frac{1}{(2-x)}$

$4-2x = x \Rightarrow x = \frac{4}{3}m$

Q.13 (2)

Electrostatic field is a conservative field so the electric line of forces can never form a closed loop.

Electric line of forces starts from the positive charge and terminate on negative charge.

No. of electric lines of forces $\propto |Q|$

Q.14 (4)

Electric lines of forces are closed at y so

$E_y > E_x = E_z$

Q.15 (4)

Conductors are equipotential surface so

$V_A = V_B = V_C$

Q.16 (2)

$V = \frac{Kq}{r}$

$V = \frac{q}{4\pi\varepsilon_0 a}$

Q.17 (2)

$E = -\frac{\partial V}{\partial x} = -$ (Slope of v-x curve)

$E_{x=23} = -\left(-\frac{10}{30-20}\right) = \frac{10}{10} = 1\ V/m$

Q.18 (4)

$$E = \frac{-dV}{dx} = \frac{-d}{dx}(4x) = -4\,V/m$$

$$\text{Net Flux} = \frac{\text{Charge enclosed}}{\varepsilon_0}$$

Charge enclosed = Net flux × ε_0

Since Net flux through the closed cube is zero due to constant uniform electric field .

$\Rightarrow$ Charge = 0

Q.19 (2)

$$U = -\frac{k2qQ}{a} + \frac{2kq^2}{a} - \frac{kQq}{a}$$

U=0

$-2Q + 2q - Q = 0$

$$Q = \frac{2q}{3}$$

Q.20 (2)

Potential at surface =

Potential at centre = 20 V

Q.21 (2)

$$\text{Net potential} = \frac{KQ_{net}}{r}$$

$$= \frac{9\times10^9\times5\times10^{-6}}{10\times10^{-2}} = 45\times10^4\,V$$

Q.22 (1)

$w = q\Delta V$

For equipotential surface ($\Delta V = 0$)

$\therefore w = 0$

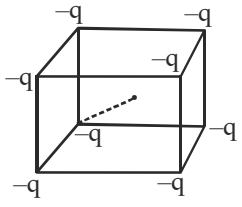
$$w = q\int \vec{E}.d\vec{s} = q\,\vec{E}ds\cos 90° = 0$$

Q.23 (4)

Potential energy of dipole in electric field U = –PE cos θ;

where θ is the angle between electric field and dipole.

Q.24 (3)



$$V_C = -\frac{8kq}{r} \quad \text{diagonal} = \sqrt{\left(\sqrt{2}b\right)^2 + b^2} = \sqrt{3}b$$

$$V_C = -\frac{8kq}{\left(\frac{\sqrt{3}b}{2}\right)} \qquad r = \frac{\sqrt{3}b}{2}$$

$$V_C = -\frac{1}{4\pi\varepsilon_0}\frac{8q}{\frac{\sqrt{3}b}{2}} = -\frac{4q}{\sqrt{3}\pi\varepsilon_0 b}$$

$$\text{Potential energy} = qV_C = -\frac{4q^2}{\sqrt{3}\pi\varepsilon_0 b}$$

Q.25 (2)

$$Q = \lambda(R\theta) = \frac{\lambda R\pi}{3} = \frac{(4)(4)\pi}{3} = \frac{16\pi}{3}$$

$$V = \frac{kQ}{r} = \frac{9\times10^9\times16\pi}{3\times4} = 12\pi\times10^9 = 3.8\times10^{10}V$$

Q.26 (2)

$V_B > V_A$, so, $V_B - V_A$ will be positive.

If d denotes effective displacement between two points along the field, then

$d_{AB} = 2\cos 60° = 1$ m

$\therefore V_B - V_A = Ed_{AB} = (10)(1) = 10V$

$V_B > V_C$ So $V_B - V_C$ will be positive

Now d_{BC} =2.0m

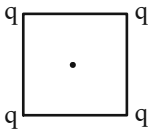
$V_B - V_C = 10(2) = 20$ V

Now, $\frac{V_B - V_A}{V_B - V_C} = \frac{10}{20} = 1:2$

Q.27 (1)

Charge remains the same

Q.28 (1)



$V_C \neq 0$

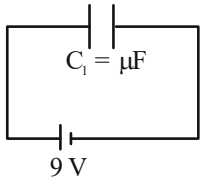
E = 0

Q.29 (3)

$$C = \frac{\varepsilon_0 A}{d}$$

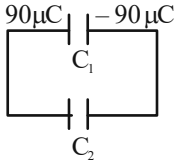
$$\Rightarrow \frac{C_1}{C_2} = \frac{A_1}{A_2}\frac{d_1}{d_2} = \frac{A_1}{2A_1}\times\left(\frac{1}{d_1}\right)\left(\frac{d_1}{3}\right) = \frac{1}{6} \Rightarrow C_2 = 6C_1$$

Q.30 (1)



Q = C_2V = 9 × 10 μF

= 90μC

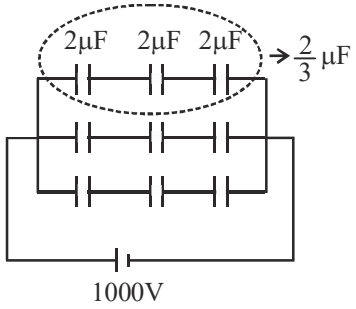


$$\text{Common potential} = \frac{C_1V_1 + C_2V_2}{C_1 + C_2}$$

$$= \frac{90 + 0}{10 + 20} = 3V$$

$$Q' = C_2V = 20 \times 10^{-6} \times 3 \quad = 6 \times 10^{-5} C$$

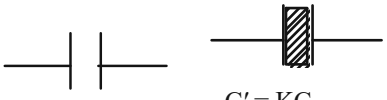
Q.31 (3)



$$C_{eq} = 2\mu F = \frac{2}{3}n, \; n = 3$$

No of capacitors = 9

Q.32 (2)

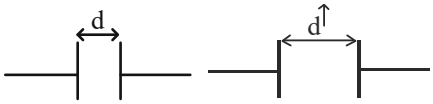


$C' = KC$

$$U_0 = \frac{1}{2}CV^2 = \frac{Q^2}{2C} \qquad U' = \frac{Q^2}{2C^1} = \frac{Q^2}{2KC} = \frac{U_0}{K}$$

$$\text{Decreased by} = \frac{U_0 - U_0}{K} = U_0\left(1 - \frac{1}{K}\right)$$

Q.33 (4)



Q = cos t

$$C = \frac{e_0A}{d} \Rightarrow d\uparrow \; c\downarrow$$

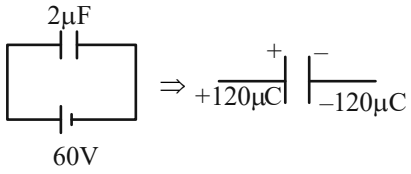
Q = constant

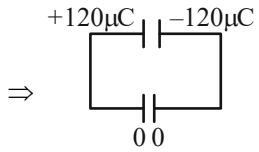
$$\therefore \; V\uparrow, \qquad U = \frac{Q^2}{2c} \; \therefore U\uparrow$$

$$E = \frac{Q}{A\varepsilon_0} \qquad Q = \text{constant}$$

$\therefore$ E = constant

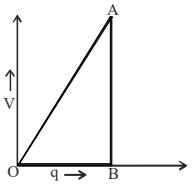
Q.34 (3)





$$V = \frac{Q_1 + Q_2}{C_1 + C_2} = \frac{120\mu C + 0}{2\mu F + 1\mu F} = \frac{120}{3} = 40\,V$$

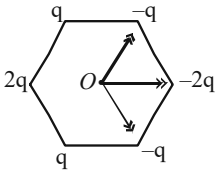
Q.35 (4)

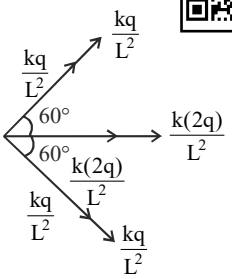


$$\text{Area} = \frac{1}{2}qV = \text{Energy stored in capacitor}$$

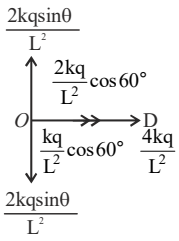
SECTION-B

Q.36 (2)





$\Rightarrow$



$$E_{net} = \frac{4kq}{L^2} + \frac{2kq}{L^2}\left(\frac{1}{2}\right) + \frac{2kq}{L^2}\left(\frac{1}{2}\right)$$

$$= \frac{6kq}{L^2} = \frac{1}{4\pi\varepsilon_0}\frac{6q}{L^2} \text{ along OD}$$

Q.37 (1)

$$\phi_{s_1} = \frac{\text{charge enclosed by } s_1}{\varepsilon_0} = \frac{3Q - Q}{\varepsilon_0} = \frac{2Q}{\varepsilon_0}$$

$$\phi_{s_2} = \frac{\text{charge enclosed by } s_2}{\varepsilon_0} = \frac{2Q - Q}{\varepsilon_0} = \frac{Q}{\varepsilon_0}$$

$$\phi_{s_3} = \frac{\text{charge enclosed by } s_3}{\varepsilon_0} = \frac{3Q}{\varepsilon_0}$$

Q.38 (1)

$F = qE$

$E = \frac{40}{4}$

$= 10\ N/C$

Force on negative charge will be opposite to electric field.

Q.39 (3)

$\therefore \alpha > \beta$

$\Rightarrow m_1 < m_2$

Nothing can't be said about charge.

Q.40 (3)

$x = \sqrt{3}R$

$$E = \frac{kQx}{(R^2 + x^2)^{3/2}}$$

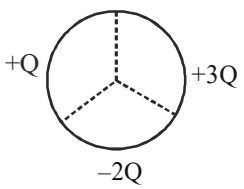
$$E = \frac{kQ}{(R^2 + 3R^2)^{3/2}}\sqrt{3}R$$

$$E = \frac{kQ}{8R^3}\sqrt{3}R = \frac{\sqrt{3}}{8}\frac{kQ}{R^2}$$

Q.41 (2)

Due to +ve charge E is away from charge & due to –ve towards.

Q.42 (1)



$$V = \frac{kQ}{R} + \frac{k(3Q)}{R} + \frac{k(-2Q)}{R}$$

$$= \frac{2kQ}{R} \quad = \frac{2Q}{4\pi\varepsilon_0 R} = \frac{Q}{2\pi\varepsilon_0 R}$$

Q.43 (3)

$$E = \frac{\sigma}{2\varepsilon_0}$$

$$\frac{dV}{dr} = \frac{\sigma}{2\varepsilon_0}$$

$$dr = \frac{\varepsilon_0 dV \times 2}{\sigma}$$

$$= \frac{8.8\times10^{-12}\times100\times2}{4\times10^{-7}}$$

$= 2.2\times10^{-3}\ m \times 2$

$= 4.4\ mm$

Q.44 (1)

$w = q(V_f - V_i) = -Q\,[V_D - V_C]$

$$= -Q\left[\left(\frac{K(2q}{3L} - \frac{kq}{L}\right) - \left(\frac{k(2q)}{L} - \frac{kq}{L}\right)\right] = \frac{1}{4\pi\varepsilon_0}\frac{4Qq}{3L}$$

Q.45 (3)

$$V_A - V_0 = -\int_O^A E_x dx$$

$$V_A - V_0 = \int_0^2 30x^2 dx$$

$$= -30\ \frac{2^3}{3} = -80V$$

Q.46 (4)

$$\frac{E_1}{E_2} = \frac{R_1}{R_2}$$

$$\frac{V_1}{V_2} = \frac{E_1R_1}{E_2R_2} = \frac{R_1}{R_2}\times\frac{R_1}{R_2} = \left(\frac{R_1}{R_2}\right)^2$$

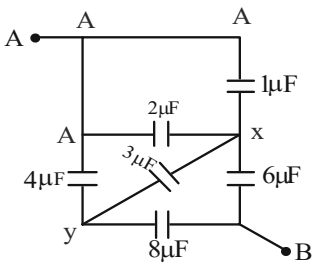
Q.47 (1)

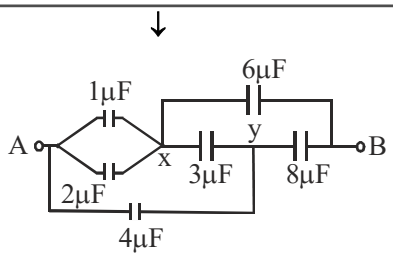
$$E = -\frac{dV}{dr} = -4ar \equiv \frac{\rho r}{3\varepsilon_0}\ \text{(compare)}$$

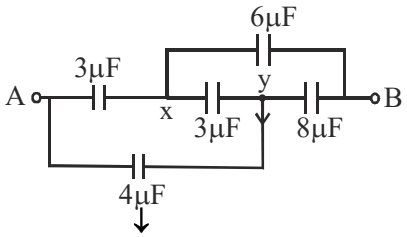
Result inside uniformly charged solid sphere.

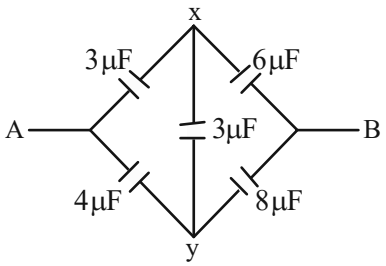
$\rho = -12a\varepsilon_0$

Q.48 (2)

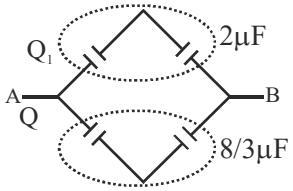








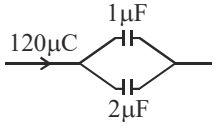
$\frac{3}{4}=\frac{6}{8}$ Balanced wheatstone bridge



$C_{eq}=2+\frac{8}{3}=\frac{14}{3}\mu F$

$Q=C_{eq}V=\frac{14}{3}\times 60=280\mu C$

$Q_1=\frac{2}{2+\frac{8}{3}}\times 280=\frac{6}{14}\times 280=120\mu C$



Charge on $2\mu F=\frac{2}{3}\times 120=80\mu C$

Q.49 (3)

Q.50 (4)

$C=\frac{\varepsilon_0 A}{d}$,

d : seperation between the plates

CHEMISTRY
SECTION-A

Q.51 (1)

$\pi_{glucose}=$ $\pi_{glucose}$

$(w_B=?)$ $(w_B=9.2)$

$v=0.5\ L$ $v=1\ L$

$\frac{w_B}{mm\times 0.5}=\frac{9.2}{mw\times 1}$

$w_B=0.5\times 9.2=4.6\ g$

Q.52 (3)

Given $w_b=0.5\ g$

$mm_3=100$

$w_A=25g=25\times 10^{-3}\ kg$

$\Delta T_b=1\ K$

$K_b=?$

$\Delta T_b=K_b\times\frac{w_B}{mm_B\times w_A(kg)}$

$K_b=\frac{1\times 100\times 25\times 10^{-3}}{0.5}$

$K_b=5$

Q.53 (2)

Molarity is the number of moles per litre

900 g of $H_2O=\frac{900}{18}$ moles $=50$ moles

900 g of $H_2O=900$ mL of H_2O ($\because$ density $=1$g/mL)

Vol. in L $=\frac{900}{1000}$ L

$M=\frac{50\times 1000}{900}=55.5\ M$

Q.54 (4)

$4A\rightarrow A_4$

$n=4;\quad \alpha=80\%=0.8$

$\alpha=\frac{i-1}{\frac{1}{n}-1}$ (for Association)

$i=1+\left(\frac{1}{n}-1\right)\alpha$

$i=1+\left(\frac{1}{4}-1\right)0.8$

$i=0.4$

$\Delta T_f=i\times k_f\times\frac{(w_B)_g\times 1000}{mm_B\times(w_A)_g}$

$mm_B=\frac{0.4\times 1.86\times 2.5\times 1000}{0.3\times 100}$

$=62$

Q.55 (3)

$nA \rightleftharpoons A_n$

$t = 0 \quad 1 \quad 0$

$t = eq \quad 1-\alpha \quad \frac{\alpha}{n}$

Total particles at eq $= 1 - \alpha + \frac{\alpha}{n}$

$i = \frac{\text{no of particles aqualibrium}}{\text{initial no of particles}}$

$i = 1 - \alpha + \frac{\alpha}{n}$

Q.56 (3)

$P_T = 0.195\, X_A + 0.315$ ....(i)

$P_T = P_A^\circ X_A + P_B^\circ X_B$

$P_T = P_A^\circ X_A + P_B^\circ (1 - X_A)$

$P_T = (P_A^\circ - P_B^\circ) X_A + P_B^\circ$ ....(ii)

On comparing above equation (ii) by equation (i) we get.

$P_B^\circ = 0.315$ atm

Q.57 (3)

$w_B = 20$ g; $w_A = 200$ g $= 0.2$ kg

$\Delta T_b = 1$, $K_b = 2.53$

$\Delta T_b = k_b \times \frac{(w_B)_g}{mm \times (w_A)_{kg}}$

$mm = \frac{2.53 \times 20}{1 \times 0.2} = 253$ g

Q.58 (2)

$\pi = 1$ atm, $T = 27°C = 300$ k

$i = 2.9$; $v = 4$ L

$\pi = \frac{i \times w_B \times R \times T}{mm_B \times v}$

$1 = \frac{2.9 \times w_B \times 0.082 \times 300}{(40 + 2 \times 35.5) \times 4}$

$w_B = 6.21$ g

Q.59 (1)

(i) of Na_2SO_4 > (i) of KCl so for same concentration: higher the valve of (i); higher will be boiling point of solution.

$\frac{7g}{L} MgCl_2 = \frac{7}{95} \frac{mol}{L} MgCl_2(aq)solution$

$i \times c = \frac{7}{95} \times 3 = 0.22$

$\frac{7g}{L} NaCl = \frac{7}{58.5} \frac{mol}{L} NaCl(aq)solution$

$i \times c = \frac{7}{58.5} \times 2 = 0.24$

Lower the (i × c) value higher will be freezing point.

Q.60 (3)

For same concentration lower the value of (i); higher is the freezing point of aq solution.

Q.61 (2)

⇒ Carbon disulphide and acetone mixture show positive deviation.

⇒ Ethanol and acetone mixture show positive deviation.

Q.62 (4)

at 373; $(P^0)_{water} = 760$ mmHg

$\frac{P^0 - P}{P^0} = X_{solute}$

$X_{solute} = \frac{760 - 750}{760} = \frac{1}{76}$

Q.63 (1)

Molality (m) $= \frac{30}{60 \times 1} = 0.5$

1 molal solution means

1 mol of solute is present in 1kg (1000g) of solvent.

Q.64 (1)

$M = \frac{(w_B)_g}{mm_B \times V(L)}$

$w_B = M \times V \times mm_B$

$= 0.2 \times 0.4 \times 63$

$= 5.04$ g

Q.65 (2)

$w_B = 3.42$ g

$V = 100$ mL $= 0.1$ L

$T = 27°C = 300$ K

$\pi = C\,R\,T$

$= \frac{(wg)_B \times R \times T}{mm_B \times V_{solution}}$

$= \frac{3.42 \times 0.0821 \times 300}{342 \times 0.1}$

$\pi = 2.463$ atm

Q.66 (3)

Molal depression constant (K_f) is a constant. Value of K_f does not depend on molality of solution.

Q.67 (4)

(a) Ethanoic acid in benzene gets dimerize so van't Hoff factor (i) < 1. so observed colligative property is less than calculated colligative property.

(b) Value of (i) for KCl, NaCl and $MgSO_4$ is = 2 (As solution is very dilute)

(c) Osmotic pressure can be determined at room temperature so it is used to determine molar mass of macromolecules like proteins polymers etc.

Q.68 (4)

Azeotropic mixture can not be separated by distillation so it is not possible to obtain either C_2H_5OH or water.

Q.69 (3)

Metals with negative electrode potential liberate hydrogen from acids.

Q.70 (3)

$$\text{Conductivity} = \frac{\text{cell constant}}{\text{Resistance}}$$

$$k = \frac{\sigma}{R}$$

$$\sigma = k \times R$$

$$\sigma = \frac{1}{\rho} \times \frac{1}{G} = (G\rho)^{-1}$$

Q.71 (1)

$Fe^{3+} + 3e^- \rightarrow Fe$; $E_1^\circ = -0.036$,

$\Delta G_1^\circ = -3FE_1^\circ$ ....(i)

$Fe^{2+} + 2e^- \rightarrow Fe$; $E_2^\circ = -0.44$,

$\Delta G_2^\circ = -2FE_2^\circ$ ....(ii)

Calculation of E^0 for

$Fe^{3+} + e^- \rightarrow Fe^{2+}$ ....(iii)

applying (i) – (ii); we get eq (iii) so;

$\Delta G_1^\circ - \Delta G_2^\circ = \Delta G_3^\circ$

$-3FE_1^\circ - (-2FE_2^\circ) = -1FE_3^\circ$

$-F(3E_1^\circ - 2E_2^\circ = -FE_3^\circ$

$$E_3^\circ = \frac{E_1^\circ \times 3 - E_2^\circ \times 2}{1}$$

$E_3^\circ = -0.036 \times 3 - (-0.44) \times 2 = 0.772$

Q.72 (4)

Standard hydrogen electrode (S.H.E) has been universally accepted as a reference electrode and has been assigned a value of zero.

Q.73 (2)

$E_{rp} = -0.059 \times pH$

$E_{rp} = -0.059 \times 0.1$

$E_{rp} = -0.0059\ V$

Q.74 (2)

$$\Lambda^\circ_{m(Al(OH)_3} = \frac{1}{2}\Lambda^\circ_{mAl_2(SO_4)_3} + 3\ \Lambda^\circ_{mNH_4OH} - \frac{3}{2}\Lambda^\circ_{m(NH_4)_2SO_4}$$

$$= \left[\frac{1}{2} \times 858\right] + [3 \times 238.3] - \left[\frac{3}{2} \times 238.4\right]$$

$= 429 + 684.9 - 357.6 = 786.3\ S\ cm^2\ mol^{-1}$

Q.75 (3)

$Pt(s) \mid Br_2\ aq. \mid Br^-(aq.)$

half reaction is represented as

$$\frac{1}{2}\ Br_2\ aq + e^- \rightarrow Br^-(aq.)$$

Q.76 (3)

At equilibrium; $Q = k_{eq}$ and $E_{cell} = 0$

Q.77 (3)

In galvanic cell; anode is negative and cathode is positive terminal.

In electrolytic cell; anode is positive and cathode is negative terminal.

Q.78 (4)

$$Zn^{+2}_{(aq)} + \underset{2F}{2e^-} \rightarrow \underset{1mole}{Zn(s)}$$

Q.79 (4)

$\lambda^0_{NaCl} = 126$

$\lambda^0_{KBr} = 152$, $\lambda^0_{KCl} = 150$

$\lambda^0_{NaBr} = \lambda^0_{NaCl} + \lambda^0_{KBr} - \lambda^0_{KCl}$

$\lambda^0_{NaBr} = 126 + 152 - 150$

$= 128$

Q.80 (4)

Anode reaction of fuel cell is given as below:

$2H_2(g) + 4OH^-_{(aq)} \rightarrow 4H_2O + 4e^-$

Q.81 (4)

Given information is about PbO_2.

Q.82 (3)

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

$EMF = E^0_{cathode} - E^0_{anode}$

$= [0.80 - (-2.36)]$

$EMF = 3.16\ V$

Q.83 (4)

$Cu(s)\,|\,Cu^{2+}(0.01m)\,||\,Cu^{2+}(0.001m)\,|\,Cu(s)$

Standard cell potential i.e., $E^0 = 0$ for concentration cell.

Q.84 (1)

Lower the value of E^0, more is the reducing power; so order of reducing power C > A > B

Q.85 (3)

According to Faraday's first law.

$$\frac{W_{H_2}}{W_{O_2}} = \frac{Z_{H_2}}{Z_{O_2}}$$

$$\frac{W_{H_2}}{W_{O_2}} = \frac{E_{H_2}}{E_{O_2}}$$

$$\frac{0.500}{W_{O_2}} = \frac{1}{8}$$

$$W_{O_2} = 4.00g$$

SECTION-B

Q.86 (4)

Solution of two liquids showing positive deviation from Raoult's law so this is minimum boiling azeotrope. Thus boiling point of the mixture is less than either of their individual boiling point.

Q.87 (1)

On mixing n-heptane with ethanol; hydrogen bonds between ethanol rupturs and new bond between heptane and ethanol molecule is formed which is weaker so mixture will form non-ideal solution showing positive deviation.

Q.88 (1)

$$ppm = \frac{(w_g)_{solute}}{(w_g)_{water}} \times 10^6$$

$$= \frac{4\times10^{-3}}{1000} \times 10^6 = 4\,ppm$$

Q.89 (3)

Experimental molar mass of solute can be less or more than true value, it depend whether the solute get dissociate or associate in solvent.

$\Rightarrow$ Due to dissociation of solute molecule into ions molar mass is found to be lesser than true value.

Q.90 (2)

$$\pi_A = \pi_{sucrose}$$

$$C_A RT = C_{sucrose} RT$$

$$\frac{n_A}{v} = \frac{n_{sucrose}}{v}$$

$$\frac{(w_g)_A}{mm_A} = \frac{(w_g)_{sucrose}}{mm_{sucrose}}$$

$$\frac{1}{mm_A} = \frac{5}{342}$$

$$mm_A = 68.4$$

Q.91 (2)

Given $P_A^\circ = 100$, $P_B^\circ = 200$

Total v.p $(P_T) = 175$

$$P_T = P_A^\circ X_A + P_B^\circ (1 - X_A)$$

$$P_T = P_B^\circ + X_A (P_A^\circ - P_B^\circ)$$

$$175 = 200 + X_A (100 - 200)$$

$$X_A = 0.25$$

$$Y_A = \frac{P_A^\circ X_A}{P_T} = \frac{100\times0.25}{175} = 0.142$$

Q.92 (1)

4.9% w/w H_2SO_4 aq solution represent 4.9 g H_2SO_4 in 100 gram solution.

d = 1.98 g/mL

$$\text{vol. of solution} = \frac{\text{mass of solution}}{d_{solution}}$$

$$v = \frac{100g}{1.98g} \times mL = \frac{100}{1.98} mL$$

$$m = \frac{n}{v} = \frac{4.9/98}{100/1.98} \times 1000 = 0.99$$

Q.93 (2)

When lead storage battery is charging sulphuric acid is regenerated.

$$2PbSO_4(s) + 2H_2O(\ell) \rightarrow Pb(s) + PbO_2(s) + 2H_2SO_4(aq)$$

Q.94 (2)

$Zn(s)\,|\,Zn^{2+}(0.01)\,||\,Fe^{2+}(0.001)\,|\,Fe(s)$

$$E_{cell} = E_{cell}^\circ - \frac{0.059}{2} \log \frac{[Zn^{2+}]}{[Fe^{2+}]}$$

$$0.2965 = E_{cell}^\circ - \frac{0.059}{2} \log \frac{10^{-2}}{10^{-3}}$$

$$E_{cell}^\circ = 0.2905 + \frac{0.059}{2} \log 10$$

Q.132 (3)
New NCERT Pg. No. 45
Tubectomy is a surgical method, also called sterilisation, in which a small part of the fallopian tube is removed, tied up.

Q.133 (4)
New NCERT Pg. No. 45
In vasectomy, a small part of the vas deferens is removed or tied up, thereby blocking gamete transport and thereby prevents conception.

Q.134 (4)
New NCERT Pg. No. 46
Female foeticide is not a ground for MTP in India.

Q.135 (1)
New NCERT Pg. No. 48
Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce one, but can provide suitable environment for fertilisation and further development is GIFT.
It stands for gamete intra-fallopian transfer.

SECTION-B

Q.136 (4)
New NCERT Pg. No. 23
Producing hybrid seeds is costly and requires significant effort due to manual hybridization, making it expensive for farmers. However, hybrid seeds are widely used because they offer better yields. The other statements are correct.

Q.137 (3)
New NCERT Pg. No. 18
The secondary nucleus is diploid (2n) because it forms from the fusion of two polar nuclei in the central cell of the embryo sac. The other structures, like antipodals, synergids, and gametes, are haploid (n).

Q.138 (3)
New NCERT Pg. No. 22
This statement is false. Orchids and some parasitic plants like Orobanche and Striga produce a large number of tiny seeds in each fruit, not just one.

Q.139 (1)
New NCERT Pg. No. 11
The filiform apparatus is present in the synergids at the micropylar end of the embryo sac. It guides the pollen tube toward the egg for fertilization.
Synergids having special cellular thickenings at the micropylar tip called filiform apparatus, which play an important role in guiding the pollen tubes into the synergid. Antipodal cells are present at the chalazal end in the mature embryo sac.

Q.140 (4)
New NCERT Pg. No. 20
The remnant of nucellus is persistent in seeds of plants like castor and sunflower and is known as perisperm.

Q.141 (3)
New NCERT Pg. No. 28
The secretions from accessory glands of male composes seminal plasma which is rich in fructose, calcium and certain enzymes but not s perms.
Seminal plasma + sperms = Semen

Q.142 (3)
New NCERT Pg. No. 28
The ovarian stroma is divided into two zones – a peripheral cortex and an inner medulla.

Q.143 (1)
New NCERT Pg. No. 37
The chorionic villi and maternal uterine tissue become interdigitated to form structural and functional unit between developing embryo (foetus) and maternal body called placenta.

Q.144 (4)
NCERT Pg. No. 30
The endometrium undergoes cyclical changes during menstrual cycle while myometrium exhibits strong contractions during delivery of the baby. The external thin membranous layer of wall of uterus is perimetrium.

Q.145 (2)
New NCERT Pg. No. 33
Secondary spermatocytes → Haploid, n, 23 chromsomes
Ootid → Haploid, n, 23 chromosomes
Secondary oocyte → Haploid, n, 23 chromosomes
Spermatogonium → Diploid, 2n, 46 chromosomes

Q.146 (4)
New NCERT Pg. No. 43
Saheli is non-steroidal preparation.
It is selective estrogen receptor modulator.

Q.147 (3)
New NCERT Pg. No. 44
Intra-uterine devices are inserted by doctors or expert nurses in the uterus through vagina.

Q.148 (3)
New NCERT Pg. No. 46
MTPs are considered relatively safe during the first trimester, i.e., up to 12 weeks of pregnancy.
Second trimester abortions are much more riskier.

Q.149 (3)
New NCERT Pg. No. 43
An ideal contraceptive should be user friendly, easily available, effective and reversible with no or least side-effects. It also should in no way interfere with the sexual drive, desire and/or the sexual act of the user.

Q.150 (1)
New NCERT Pg. No. 46
MTPs were being used for illegal female foeticide, therefore, GOI legalised MTP in 1971.

BIOLOGY-II
SECTION-A

Q.151 (2)
New NCERT Pg. No. 13
Zostera is strictly water-pollinated (hydrophily), In Zostera, pollen grains are long and thread-like, allowing them to easily float and reach the female flower for fertilization. The other options are incorrect:
- Corn cob (1) is wind-pollinated.
- Yucca (3) involves pollination by moths.
- Water lily (4) is primarily insect-pollinated.

Q.152 (4)
New NCERT Pg. No. 18
In angiosperms, the zygote is diploid (2n) as it forms from the fusion of haploid (n) male and female gametes. The primary endosperm nucleus is triploid (3n) because it forms from the fusion of one sperm nucleus with two polar nuclei in the central cell of the embryo sac.

Q.153 (3)
New NCERT Pg. No. 7
In the given figure, part A likely represents a vegetative cell, which typically has an irregularly shaped nucleus. Part B is the generative cell, which is spindle-shaped and facilitates the transport of sperm cells to the ovule for fertilization.

Q.154 (2)
New NCERT Pg. No. 20
Mango is a true fruit (drupe), developing from a monocarpellary superior ovary. Cashew nut, Strawberry and apple develop from parts of the flower other than the ovary therefore are false fruits.

Q.155 (1)
New NCERT Pg. No. 11, 12
Autogamy, or self-pollination, can occur in plants that have bisexual flowers (flowers with both male and female reproductive organs) or cleistogamous flowers (flowers that do not open, ensuring self-pollination). Dioecious plants and self-incompatible plants cannot undergo autogamy.

Q.156 (3)
New NCERT Pg. No. 20
In pea seeds, the endosperm is completely consumed during embryo development, leaving no residual endosperm. In contrast, seeds like maize, barley, and castor retain some endosperm after seed maturation, providing nutrition during germination.

Q.157 (1)
New NCERT Pg. No. 15
- Assertion: A papaya plant prevents both autogamy and geitonogamy - This is true because papaya plants are dioecious.
- Reason: Papaya plants have either male or female flowers but not both, thus preventing both self-pollination (autogamy) and pollination between flowers on the same plant (geitonogamy).

Q.158 (4)
New NCERT Pg. No. 6
Microsporogenesis refers to the formation of microspores (pollen grains) by the meiotic division of a pollen mother cell.

Q.159 (1)
New NCERT Pg. No. 17
In artificial hybridization, emasculation (removal of stamens) is done to prevent self-pollination in bisexual flowers (flowers containing both male and female reproductive organs). This ensures that only the desired pollen from another plant fertilizes the female plant.

Q.160 (1)
New NCERT Pg. No. 7
Pollen grains are about 25-50 μm in diameter and are well-preserved due to the presence of sporopollenin, a tough, resistant substance in their outer wall. The other statements are incorrect:
- Pollen grains have a double-layered wall (not single).
- Intine does not lack cellulose, and germ pores are present for pollen tube formation.

Q.161 (2)
New NCERT Pg. No. 9
The hilum represents the junction where the ovule attaches to the funicle, the stalk that connects the ovule to the ovary wall.

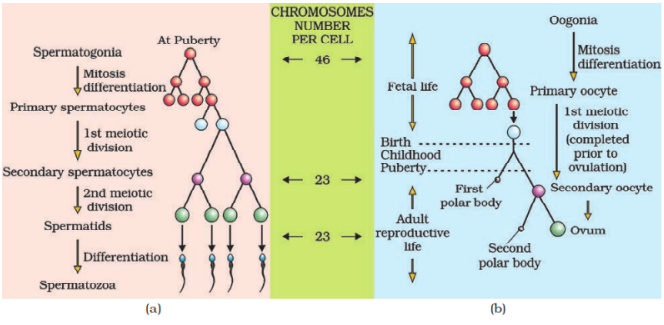
Q.162 (4)
New NCERT Pg. No. 18
In angiosperms, the pollen tube releases two male gametes into the cytoplasm of the synergids, which are cells located near the egg cell in the embryo sac. One male gamete fertilizes the egg cell (forming the zygote), and the other fuses with the central cell (forming the primary endosperm nucleus).

Q.163 (4)
New NCERT Pg. No. 13, 14
This statement is incorrect. Insects, especially bees, are among the most effective pollinating agents, facilitating the transfer of pollen between flowers.

Q.164 (3)
New NCERT Pg. No. 19
In the given figure, A represents the coleorhiza, a protective sheath covering the root, and B represents the Epiblast.

Q.165 (3)
New NCERT Pg. No. 37
Placenta facilitates the supply of oxygen and nutrients to the embryo and also removal of carbon dioxide and excretory waste materials produced by the embryo.
Placenta is structural and functional unit between developing embryo and maternal body.

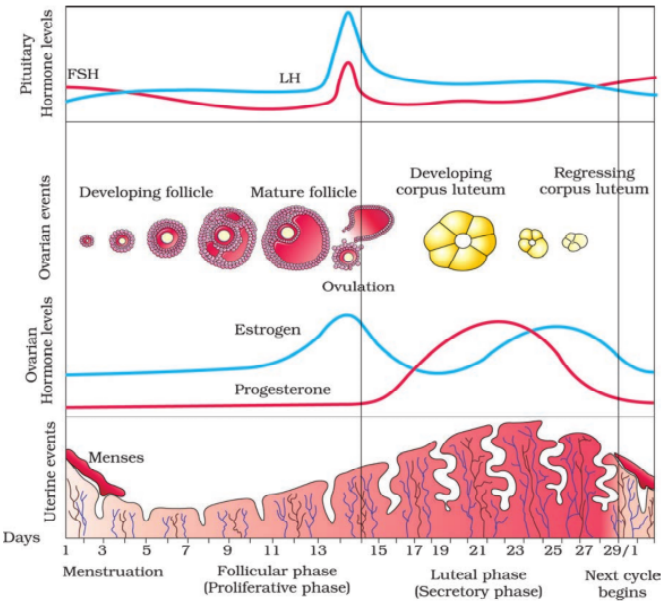
Q.166 (4)
New NCERT Pg. No. 33
1 Primary oocyte gives one ova.
So, 50 primary oocyte gives 50 ova.
1 Primary spermatocyte gives 4 sperms
So, 50 primary spermatocyte gives $50 \times 4 = 200$ sperms



Q.167 (1)
New NCERT Pg. No. 38
Embryo's heart is formed → First month after pregnancy
foetus develops limbs and digits → By end of 2nd month
Limbs and external genital developed → By end of 3rd month
Eyelids separate, eye lashes are formed → by end of 2nd trimester

Q.168 (4)
New NCERT Pg. No. 27
Correct pathway of transport of sperms
Seminiferous tubule → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus

Q.169 (4)
New NCERT Pg. No. 34
In secretory (luteal) phase of menstrual cycle, peak of progesterone is seen.



Q.170 (3)
NCERT Pg. No. 34, 35
Changes in ovary and uterus are induced by changes in levels of ovarian as well as pituitary hormones.
In fertilisation occurs, corpus luteum is rescued beyond its life span of 14 days.

Q.171 (4)
New NCERT Pg. No. 30
Menopause is permanent cessation of menstrual cycle.
The first menstruation begins at puberty and is called menarche.

Q.172 (2)
New NCERT Pg. No. 34
During follicular phase (day 6 to Day 13 in 28 days menstrual cycle), primary follicles become fully mature Graafian follicle and simultaneously the proliferative phase in uterus regenerates the endometrium.

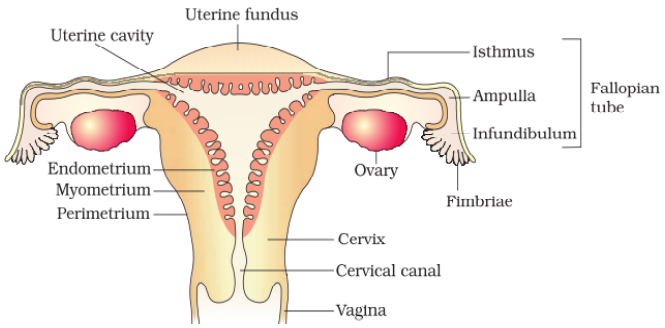
Q.173 (2)
New NCERT Pg. No. 29
Mons pubis → Cushion of fatty tissue covered by skin and pubic hair
Clitoris → Tiny-finger like structure lying above the urethral opening
Vas deferens → Ascends to the abdomen and loop over the urinary bladder
Seminal vesicles → Male accessory gland secretes seminal plasma

Q.174 (3)
New NCERT Pg. No. 28
Besides secreting steroid hormones, estrogen and progesterone, ovaries also produces ova/egg.

Q.175 (4)
New NCERT Pg. No. 31
the spermatides are transformed into spermatozoa (sperms) by the process called spermiogenesis after spermiogenesis, sperm head become embedded in the sertoli cells and are finally released from the seminiferus tubules by the process called spermiation.

Q.176 (2)
New NCERT Pg. No. 31
Antrum is a crescent shaped fluid filled cavity present in tertiary follicle.

Q.177 (2)
New NCERT Pg. No. 29
Ampulla is wider part of oviduct.



Q.178 (1)
New NCERT Pg. No. 35
At the mid of menstrual cycle, LH surge takes place which leads to rupturing of graafian follicle.

Q.179 (4)
New NCERT Pg. No. 44
Cervical caps, diaphragms and vaults cannot prevent spreading of STIs.

Q.180 (1)
New NCERT Pg. No. 42
Encouraging sex-education in schools can help in maintaining reproductive healthy society.

Q.181 (3)
New NCERT Pg. No. 45
LNG-20 is a hormone – releasing IUD and implants have much longer effective period.

Q.182 (4)
New NCERT Pg. No. 45
Multiload-375 is a copper releasing Intra-uterine device.

Q.183 (3)
New NCERT Pg. No. 44
Periodic abstinence is a method in which couples avoid or abstain from coitus from day 10 to 17 of the menstrual cycle when ovulation could be expected.

Q.184 (4)
New NCERT Pg. No. 43
Population growth occurs when there is increase in number of people in reproducible age group.

Q.185 (1)
New NCERT Pg. No. 42
Amniocentesis is a pre-natal diagnostic technique for checking genetic and chromosomal abnormalities in developing foetus. It is being misused to determine sex of unborn foetus and for female foeticide.

SECTION-B

Q.186 (4)
New NCERT Pg. No. 7
In about 60% of angiosperms, pollination takes place when the pollen grain is in the 2-celled stage: a vegetative cell and a generative cell. The generative cell divides later to form two male gametes.

Q.187 (1)
New NCERT Pg. No. 22
- Statement-I: Apomixis mimics sexual reproduction because it results in seed formation without fertilization.
- Statement-II: In some species, a diploid egg cell is formed without meiosis (reduction division) and develops into an embryo without fertilization.

Q.188 (2)
New NCERT Pg. No. 8
• Statement-I: Pollen grain viability is affected by temperature and humidity.
• Statement-II: Pollen grains in Rosaceae and Leguminoseae families lose viability in few months.

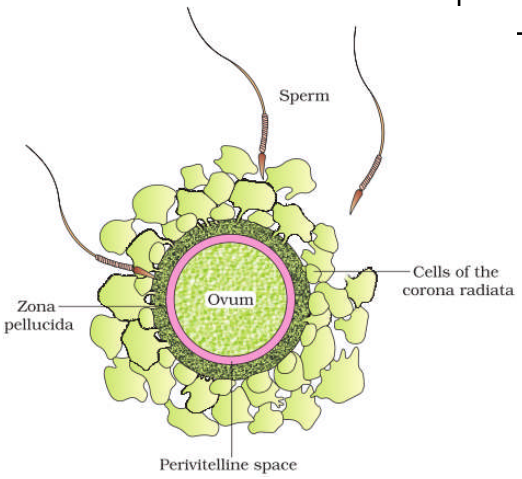
Q.189 (4)
New NCERT Pg. No. 18
The ovules develop into seeds after fertilization, not into embryo sacs.
The embryo sac is formed before fertilization and contains the female gametophyte. The other statements are correct:
• The ovary develops into a fruit.
• The zygote develops into an embryo.
• The central cell develops into the endosperm.

Q.190 (4)
New NCERT Pg. No. 9
In angiosperms, the nucellus is the mass of cells inside the ovule that surrounds the embryo sac. It provides nourishment to the developing embryo and is enclosed by the integuments.

Q.191 (4)
New NCERT Pg. No. 28
The secretions of bulbourethral (cowper's) glands helps in the lubrication of the penis.

Q.192 (2)
New NCERT Pg. No. 30
In uterus,
Outer layer → Perimetrium
Middle layer → Myometrium
Inner layer → Endometrium

Q.193 (1)
New NCERT Pg. No. 35



Ovum surrounded by few sperms

Q.194 (2)
New NCERT Pg. No. 35
During fertilisation, a sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane that blocks the entry of additional sperms.

Q.195 (3)
New NCERT Pg. No. 35
The corpus luteum secretes large amounts of progesterone which is essential for maintenance of the endometrium.

Q.196 (3)
New NCERT Pg. No. 44
Condoms are used as barrier methods and prevents physical meeting of ovum and sperm.

Q.197 (4)
New NCERT Pg. No. 43
Grave's disease is a hormonal disorder due to hyper-thyroidism. It is not a genetic or chromosomal disorder.

Q.198 (3)
New NCERT Pg. No. 44
Lactational amenorrhea is absence of menstruation during lactation.

Q.199 (4)
New NCERT Pg. No. 48
In ICSI, intra cytoplasmic sperm injection, sperm is directly injected into the ovum.

Q.200 (2)
New NCERT Pg. No. 44
Lippes loop → Nn-medicated IUD
LNG-20 → Hormone releasing IUD