ANWER KEY
FULL TEST-02

PHYSICS

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

CHEMISTRY

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

BIOLOGY

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

Hints & Solutions

Q.1 (2)

[Torque] = $[ML^2T^{-2}]$

[Energy density] $= \left[\frac{\text{Energy}}{\text{Volume}}\right] = \left[ML^{-1}T^{-2}\right]$

[Angular momentum] = $[ML^2T^{-1}]$

[Specific heat] = $[M^0L^2T^{-2}K^{-1}]$

Q.2 (3)

$$\text{Pitch} = \frac{4}{8} = 0.5\text{mm}$$

$$\text{Now, least count} = \frac{\text{Pitch}}{\text{CSD}} = \frac{0.5}{50}$$

$$= \frac{1}{100}\text{mm} = 0.01\text{mm}$$

$$= 0.001\text{ cm}$$

Q.3 (3)

Since the particle moves with constant speed hence the change in magnitude of velocity is zero.

Q.4 (4)

Initial velocity, $v_i = 2\cos\theta\hat{i} + 4\sin\theta\hat{j} = 5\sqrt{3}\hat{i} + 15\hat{j}$

Final velocity vector (after 2s),

$$v_f = u\cos\theta\hat{i} + (u\sin\theta - gt)\hat{j} = 5\sqrt{3}i - 5\hat{j}$$

Now, $v_i \cdot v_f = 25 \times 3 - 15 \times 5 = 0$

$\therefore v_i \perp v_f$

Q.5 (4)

$F_{s\,max} = \mu \times N = 0.3 \times 50 = 15$ N

Since, applied force (10 N) is less than the $F_{s\,max}$

Therefore $F_s = 10$ N

Q.6 (4)

According to the question,

In the first condition,

$$W_1 = \frac{1}{2}kx^2 \quad \text{.....(i)}$$

In the second condition,

$$W_2 = \frac{1}{2}k(x+y)^2 \quad \text{.....(ii)}$$

Work for x to y expansion

$$= \frac{1}{2}k(x+y)^2 - \frac{1}{2}kx^2$$

$$= \frac{1}{2}k\left[x^2 + y^2 + 2xy - x^2\right]$$

$$= \frac{1}{2}k\left[y^2 + 2xy\right]$$

$$= \frac{1}{2}ky\left[y + 2x\right]$$

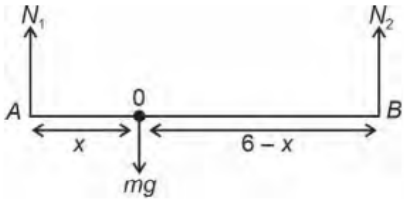
Q.7 (1)

From the conservation of energy,

$mgh = \mu mgd$

$$d = \frac{h}{\mu}$$

Q.8 (3)



From the FBD of plank,

Taking torques about *mg*:

$x(N_1) = (6 - x)N_2$

$x(3N) = (6 - x)N \quad [\because N_2 = 3N_1]$

$3x = 6 - x$

$4x = 6$

$\therefore x = 1.5$ m

Or, 4.5 m from knife 2

Q.9 (3)

Angular momentum of a particle about a point is given by

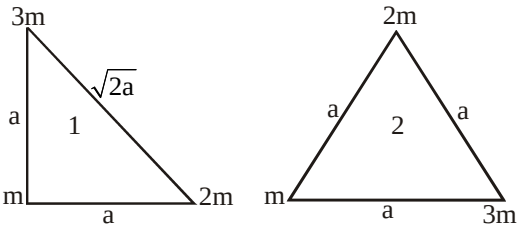
$L = mr \perp v$

Hence for a particle moving with constant velocity, angular momentum remains constant. Also, angular momentum depends on the point of observation.

Q.10 (4)

Work done to change configuration from 1 & 2 can be calculated by

$$W_{12} = -\left(U_f - U_i\right)$$



$$= -\left[-\frac{Gm^2}{a}\left(2+3+\frac{6}{\sqrt{2}}\right) - \left(-\frac{Gm^2}{a}(2+3+6)\right)\right]$$

$$= -\frac{Gm^2}{a}\left(6 - \frac{6}{\sqrt{2}}\right)$$

Q.11 (4)

Acceleration due to gravity on the surface of earth of

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

& At height 2R above earth surface

$$g' = \frac{GM}{R^2\left(1+\frac{h}{R}\right)^2} = \frac{GM}{R^2\left(1+\frac{2R}{R}\right)^2}$$

$$g' = \frac{GM}{R^2 9}$$

$$\Rightarrow \frac{g'}{g} = \frac{GM}{9R^2} \times \frac{R^2}{GM} = \frac{1}{9}$$

Q.12 (3)

$$Y = \frac{K\ell}{Ax}$$

$$Y = \frac{(1000)(40)}{2\times10^{-4}\times10\times10^{-2}}$$

$Y = 2 \times 10^9$ N/m^2 = 2 GPa

Q.13 (2)

Weight = Thrust (in floating condition)

$mg = \rho_\omega \times V_{in} \times g$

$= 1000 \times [5 \times 4 \times 0.003]$

$m = 60$ kg

Q.14 (2)

During adiabatic process, no heat transfer takes place,

So, $dQ = 0$

From first law of thermodynamics,

$dQ = dU + dW$

$\Rightarrow dU = -dW$

$\Rightarrow dU = -4.5$ J

As, the temperature falls so internal energy will decrease i.e. $dU = -4.5$ J

Q.15 (2)

$$n_1 C_{V_1} \Delta T_1 = n_2 C_{V_2} \Delta T_2$$

$$\frac{28}{28} \times \frac{5R}{2} \times (\theta - 27) = \frac{32}{312} \times \frac{5R}{2} \times (57 - \theta)$$

$2\theta = 57 + 27$

$$\theta = \frac{84}{2} = 42°C$$

Q.16 (3)

Mass of the particle = m

spring constant = k

The time period of o scillator, $T = 2\pi\sqrt{\frac{m}{k}}$

As $k \propto \frac{1}{l}$ (where *l* is the length of spring)

$\because k' = 2k$

$\therefore \quad T' = 2\pi\sqrt{\frac{m}{2k}} = \frac{1}{\sqrt{2}}T$

Q.17 (1)

Q.18 (2)

The transverse wave is given by

$y = 2\sin(30t - 40x)$

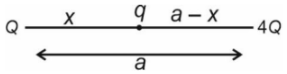
The standard transverse wave is

$y = A\sin(\omega t - kx)$

On comparing, we get,

$v = \frac{\omega}{k} = \frac{30}{40} = 0.75\,m/s$

Q.19 (1)



$\frac{KQ}{x^2} = \frac{K4Q}{(a-x)^2}$

$x = \frac{a}{3}$

for 4Q to be in equilibrium

$\frac{KQ}{a^2} = \frac{kq}{\left(\frac{2a}{3}\right)^2}$

$\Rightarrow q = \frac{4Q}{9}$

Hence $q = \frac{-4Q}{9}$

Q.20 (2)

$\vec{F} = q\vec{E}$

And, $a = \frac{F}{m}$

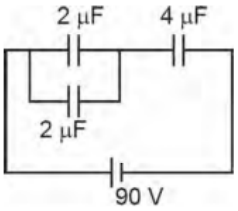
Q.21 (3)

$W = q\Delta V$

$\frac{4}{10} = \Delta V$

$\Delta V = 0.4$ volt

Q.22 (1)



$q = C_{eq} \times V$

$= 180\ \mu C$

$U = \frac{1}{2}\frac{q^2}{C}$

$= \frac{1}{2} \times \frac{180 \times 180}{4} = 45 \times 90$

$= 4050\ \mu J$

Q.23 (1)

For figure I,

Total resistance = 3R

I power = I^2 (3R)

For figure II,

Re sistance $= \frac{2R}{3}\Omega$

II power = $I^2\left(\frac{2R}{3}\right)$

For fig ure III,

Total resistance = $\frac{R}{3}\Omega$

III power = $I^2\left(\frac{R}{3}\right)$

For figure IV,

Total resistance $\frac{3}{2}\Omega$

IV power = $I^2\left(\frac{3}{2}R\right)$

Hence, option (a) is correct.

Q.24 (2)

According to balanced Wheatstone bridge :

$60\,\Omega \times 70\ cm = R \times 30\ cm$

$R = 140\,\Omega$

Q.25 (3)

According to maximum power transfer theorem internal resistance = load resistance

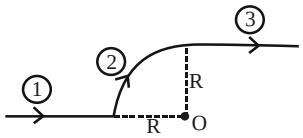
$\therefore \frac{\left(R + \frac{3}{2}\right) \times 5}{\left(R + \frac{3}{2}\right) + 5} = 4 \Rightarrow 5R + \frac{15}{2} = 4R + \frac{13}{2} \times 4$

$$R = 26 - \frac{15}{2} = \frac{37}{2}\Omega$$

Q.26 (3)

$$T \propto \frac{m}{q}$$

Q.27 (3)



$$B_1 = 0, B_2 = \frac{\mu_0 i}{2R} \times \frac{1}{4} \otimes,\ B_3 = \frac{\mu_0 i}{2\pi R} \times \frac{1}{2} \otimes$$

$$\therefore B_{net} = \frac{\mu_0 i}{8R} + \frac{\mu_0 i}{4\pi R} = \frac{\mu_0 i}{4R}\left(\frac{1}{2} + \frac{1}{\pi}\right)$$

Q.28 (3)

As, we know that

$\Rightarrow \mu = \mu_0 (1 + \chi_m)$

Now, the magnetic flux $\phi = BA = \mu HA$

$= \mu_0 (1 + \chi) HA$

$= 4\pi \times 10^{-7}(1 + 313) \times 1000 \times 0.25 \times 10^{-4}$

$= 9.87 \times 10^{-6}$ Wb

Q.29 (4)

$$T = 2\pi\sqrt{\frac{I}{MB_H}}$$

$$\therefore \frac{T_1}{T_2} = \sqrt{\frac{(B_H)_2}{(B_H)_1}}$$

$$T_2 = T_1\sqrt{\frac{(B_H)_1}{(B_H)_2}}$$

$n_1 = 30$ oscillation/min

$$n_1 = \frac{1}{2} \text{ oscillation/s}$$

$T_1 = 2$ s

$$T_2 = 2\sqrt{\frac{B_H}{2B_H}} = 2 \times \frac{1}{2} = \sqrt{2}\,\text{s}$$

Q.30 (1)

According to figure

Given, $\frac{dI}{dt} = 10^3$ A/s

$L = 9$ mH $= 9 \times 10^{-3}$ H

$V_R = I \cdot R = 2 \times 7 = 14$ V

Voltage of source, $V = 4$V

$$V_L = L.\frac{dI}{dt}$$

$$= 9 \times 10^{-3} \times 10^3 \text{V} = 9\text{V}$$

Now, $V_{AB} - V_R + V + V_L = 0$

or, $V_{AB} - 14 + 4 + 9 = 0$

$V_{AB} - 1 = 0$

or, $V_{AB} = 1$V

Q.31 (2)

For 0 to t_1

$$E_0 = -A\sqrt{3}$$

For t_2 to t_3

$$E_0' = \frac{A}{\sqrt{3}} = \frac{E_0}{3}$$

Q.32 (2)

$$\cos\phi = \frac{R}{Z}$$

$$4R = \sqrt{R^2 + X_c^2}$$

$16R^2 - R^2 = X_c^2$

$R\sqrt{15} = X_c$

$100\sqrt{15}\,\Omega = X_c$

Q.33 (2)

$$f = \frac{1}{2\pi}\sqrt{\frac{1}{LC}} = \frac{1}{2\pi}\sqrt{\frac{1}{\frac{L}{4} \times 16^4 C}} = \frac{f_0}{2}$$

Q.34 **(3)**

Energy density due to electric field is

$$U = \frac{1}{2}\varepsilon_0 E^2$$

Here, $E = \frac{E_0}{\sqrt{2}} = \frac{40}{\sqrt{2}}$

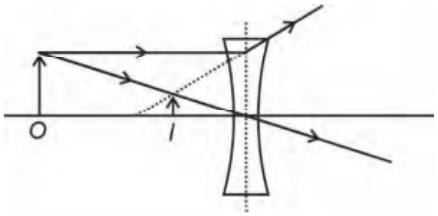
$$\therefore U = \frac{1}{2} \times 8.85 \times 10^{-12} \times \frac{40 \times 40}{2} = 3.54 \times 10^{-9}\,\text{J/m}^2$$

Q.35 (3)

In simple microscope, image fromed is Erect, magnified and virtual.

Q.36 (4)

The condition mentioned in the question is only possible for concave lens as shown below



Q.37 (2)

$$\Delta\phi_1 = \frac{2\pi}{\lambda}\times\lambda \Rightarrow \Delta\phi_1 = 2\pi$$

$$\Delta\phi_2 = \frac{2\pi}{\lambda}\times\frac{\lambda}{4} \Rightarrow \Delta\phi_2 = \pi/2$$

$$I = 4I_0\cos^2\left(\frac{\Delta\phi}{2}\right)$$

$$\frac{I_1}{I_2} = \frac{\cos^2\pi}{\cos^2\frac{\pi}{4}} = \frac{1}{\lambda_2} = 2$$

Q.38 (4)

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

$$\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{E_2}{E_1}} \Rightarrow \frac{\lambda_2}{\lambda_1} = \sqrt{\frac{E_1}{E_2}} = \frac{60}{100}$$

$$\sqrt{\frac{E_1}{E_2}} = \frac{3}{5} \Rightarrow \frac{E_1}{E_2} = \frac{9}{25}$$

$$E_2 = \frac{25}{9}E$$

Extra energy given $\frac{25}{9}E - E = \frac{16E}{9}$

Q.39 (3)

$KEmax = hf - \phi_1$

hence KE_{max} varies linearly with frequency. Also, intensity of radiation doesn't affect the KE of photoelectrons.

Q.40 (4)

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

$$\frac{E_1}{E_2} = \left(\frac{n_2}{n_1}\right)^2 = \left(\frac{4}{3}\right)^2 \Rightarrow \frac{E_1}{E_2} = \frac{16}{9}$$

Q.41 (2)

In nucleus ${}_zX^A$

Number of proton =Z

Number of neutron = A-Z

Q.42 **(2)**

$Y = \overline{A+B}$

i.e. NOR gate

Q.43 (1)

$\sigma = e(n_e\mu_e + n_h\mu_n)$

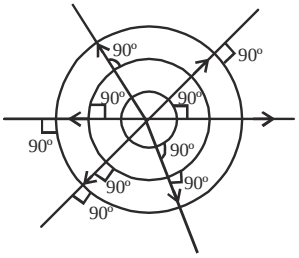
$= en_i(\mu_e + \mu_n)$

$= 1.6\times10^{-19}\times5.4\times10^{19}\times(0.72+0.24)$

$= 8.3\ S\ m^{-1}$

Q.44 (1)

Q.45 (2)



wavefront is perpendicular to ray of light

Q.46 (2)

$C_6H_{12}O_6$ and CH_3COOH have same empirical formula, so both have same mass% of C.

Q.47 (3)

Given, Δx = uncertainty in position

Δv = uncertainty in velocity we know, $\Delta p = m\Delta v$; where Δp is the uncertainty in momentum and m is the mass of particle.

Using Hersenberg's uncertainty principle,

$$\Delta x \cdot m\Delta v = \frac{h}{4\pi}$$

As $\Delta x = \Delta v$,

So, $$\Delta v \cdot m\Delta v = \frac{h}{4\pi}$$

On multiplying both sides with m, we get

$$m\Delta v \cdot m\Delta v = \frac{mh}{4\pi}$$

Thus, $$\Delta p^2 = \frac{mh}{4\pi} \Rightarrow \Delta p = \sqrt{\frac{mh}{4\pi}}$$

Hence, $$\Delta p = \frac{1}{2}\sqrt{\frac{mh}{\pi}}$$

Q.48 (1)

Electron affinity order →

F > S > O > N

Q.49 (3)

	G . N.	P.N.
108	VIII	7th

Q.50 (3)

$ICl_4^+ \rightarrow sp^3d$

$NO_3^- \rightarrow sp^2$

$PCl_4^+ \rightarrow sp^3$

$SiF_6^{2-} \rightarrow sp^3d^2$

Q.51 (1)

(I) For adiabatic process, q = 0

So from first law of thermodynamics

$\Delta U = q + W$

$\Delta U = W$

(II) Work is path function.
(III) Volume is an example of extensive property.

Q.52 **(3)**

$\Delta_r H = \Sigma(BE)_R - \Sigma(BE)_P$
$= (430 + 200) - (2 \times 350)$
$= 630 - 700 = -70$ kJ/mol

Q.53 (3)

$A(g) \rightleftharpoons 2B(g)$; $K_C = 1.4$

$$Q = \frac{[B]^2}{[A]} = \frac{\left(\frac{2}{2}\right)^2}{\left(\frac{3}{2}\right)} = \frac{2}{3} = 0.66$$

Since $Q < K_C$; so reaction proceed in forward direction.

Q.54 (2)

$$2X(g) + Y(g) \rightleftharpoons 3Z(g)$$

$$k = \frac{[Z]^3}{[X]^2[Y]}$$

Q.55 (3)

Lime water is $Ca(OH)_2$. Acidity of lime water is 2.
So, Normality = Acidity × Molarity

$$\Rightarrow \text{Molarity} = \frac{0.01}{2} \text{ M}$$

Concentration of $[OH^-]$ ions,

$$[OH^-] = 2 \times \frac{0.01}{2} = 0.01 \text{ M}$$

Now, $pOH = -\log [OH^-]$
$pOH = -\log 10^{-2}$
$\Rightarrow pOH = 2\log 10 = 2$
$pH + pOH = 14$
$\Rightarrow pH = 14 - pOH$
$= 14 - 2$
Thus, pH = 12

Q.56 (4)

$KMnO_4 + FeC_2O_4 \xrightarrow{H^+} Mn^{2+} + Fe^{3+} + CO_2$

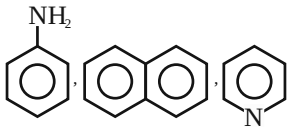
n_f of $KMnO_4 = 5$
n_f of $FeC_2O_4 = 3$
no. of equivalent of $KMnO_4$ = no. of equivalent of FeC_2O_4
$(\text{mol} \times n_f)_{KMnO4} = (\text{mol} \times n_f)_{FeC2O4}$
$1 \times 5 = x \times 3$

$$x = \frac{5}{3}$$

Q.57 (2)

Alcohols are isomeric with ether. Both have same general molecular formula.

Q.58 (2)

Aromatic compound → 

Anti aromatic compound → 

Non-aromatic compound → 

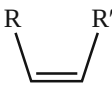
Q.59 **(4)**

Boiling point ∝ Molecular weight ∝ Surface area
Boiling point → n-pentane > 2 - methyl butane > 2, 2-dimethyl propane > n-butane

Q.60 (2)

$R\text{–}Br \xrightarrow{Na} R\text{–}R$ (Wurtz reaction)

$RCOO^{\ominus}Na^{\oplus} \xrightarrow[\Delta]{NaOH+CaO} P\text{–}H$ (Decarboxylation)

$R\text{–}C\equiv C\text{–}R' \xrightarrow[\text{Catalyst}]{\text{Lindlar}}$  (Partial reduction)

$CH_2=CH_2 \xrightarrow{Br_2/CCl_4} CH_2(Br)\text{–}CH_2(Br)$ (Electrophilic addition)

Q.61 (4)

$P_T = P_A^o X_A + P_B^o X_B$
$P_T = 200 \times 0.7 + 400 \times 0.3$
$P_T = 260$

mole fraction of B in vapour phase $(Y_B) = \frac{P_B^o X_B}{P_T}$

$$Y_B = \frac{400 \times 0.3}{260}$$

$Y_B = 0.4615 \sim 0.462$

Q.62 (1)

$$w_g = \frac{GAM \times i \times t}{v.f. \times F}$$

$$v.f. = \frac{GAM \times i \times t}{w_g \times F}$$

$$v.f. = \frac{63.5 \times 5 \times 193}{0.32 \times 96500} = \frac{612775}{30880} = 1.98 \sim 2$$

v.f. = 2

Q.63 (3)

	A	→	3B
t = 0	0.1		0
t = 20	0.1 – x		3x

for zero order reaction,
rate = k

$$\frac{-\Delta(A)}{\Delta t} = \frac{-(0.05-0.1)}{15} = 0.0033$$

$k = 3.3 \times 10^{-3}\ mol\ L^{-1}\ sec^{-1}$

$A_t = A_0 - kt$

$0.1 - x = 0.1 - 3.3 \times 10^{-3} \times 20$

$x = 0.066$

conc. of product after 20 sec. = 3x

$= 3 \times 0.066 = 1.98 \times 10^{-1}$ m

Q.64 (1)

$$K = \frac{1}{t_2 - t_1} 1n \frac{[R]_1}{[R]_2}$$

$$K = \frac{1}{(20-10)\times 60} \ln \frac{0.06}{0.02} = 1.83 \times 10^{-3}\ sec^{-1}$$

Q.65 (3)

When we move top to bottom in a group acidic character of hydrides decreases.

$H_2Te > H_2Se > H_2S > H_2O$

Q.66 (2)

$F_2 \rightarrow$ Yellow

$Cl_2 \rightarrow$ Greenish Yellow

$Br_2 \rightarrow$ Red

$I_2 \rightarrow$ Violet

Q.67 **(4)**

Sc & Zn shows +3 and +2 oxidation state only.

Q.68 (3)

Complex which contains same kind of ligands is known as homoleptic complex.

Q.69 (3)

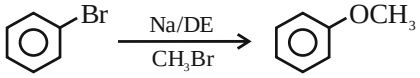
Magnetic moment = $\sqrt{n(n+2)} = 5.92$

$\Rightarrow \boxed{n = 5}$

Complex is high spin complex means it has weak field ligand.

Electronic configuration is $\rightarrow t_{2g}^3 e_g^2$

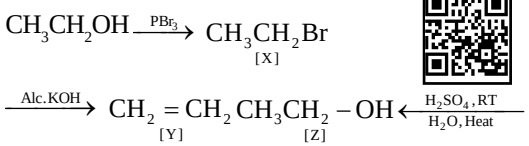
Q.70 (2)



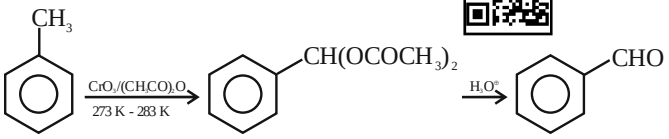
[Wurtz fittig reaction]

Q.71 (1)

Q.72 (2)



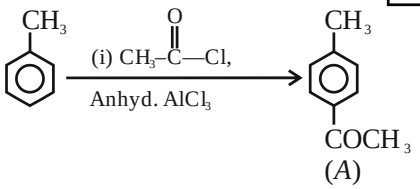
Q.73 (3)



[X] [Y]

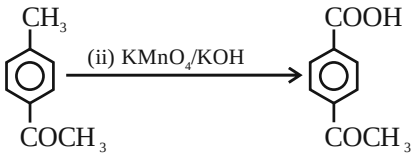
Q.74 (4)

Friedel-Crafts acylation of toluene gives *p*-acylated product.



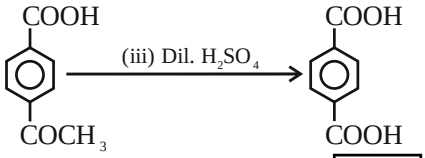
(*A*)

Product *A* in presence of $KMnO_4$/KOH gives benzoic acid derivative. Here, methyl group is oxidised to —COOH group.



(*B*)

Product B in presence of H_2SO_4 get hydrolysed to form —COOH group at *para*-position as well.



Q.75 (4)

Fact

Q.76 **(3)**

In case nitrogen and sulphur both are present in an organic compound, sodium thiocyanate is formed, it give blood red colour and no prussian blue since there are no free cyanide Ions

$Na + C + N + S \rightarrow NaSCN$

$Fe^{+3} + SCN^{\Theta} \rightarrow [Fe(SCN)]^{2+}$

Blood red

Q.77 (3)

Average atomic mass = $\frac{10 \times 54 + 85 \times 56 + 5 \times 57}{100}$

$= 55.85$

Q.78 (2)

energy $\propto (n + l)$

(I) $n + l = 3 + 2 = 5$

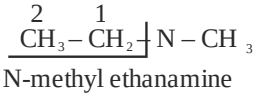
(II) $n + l = 4 + 0 = 4$
(III) $n + l = 4 + 1 = 5$
(IV) $n + l = 5 + 0 = 5$

Q.79 (1)
Theory based

Q.80 (3)
Order of electronic repulsions →
lp – lp > lp – bp > bp – bp

Q.81 (2)
For endothermic reaction as temp. increases, equilibrium constant increases.

Q.82 (3)



N-methyl ethanamine

Q.83 **(4)**
On adding non-volatile solute in water its vapour pressure decreases, so melting point also decreases.

Q.84 (2)
1 g atom of Mg = 1 mole Mg

$Mg^{+2} + 2e \rightarrow Mg$

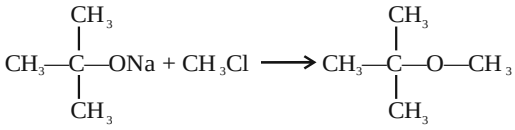
For 1 mol Mg, 2F is required.

Q.85 (4)
For first order reaction rate constant is independent of time and also half life period is constant.

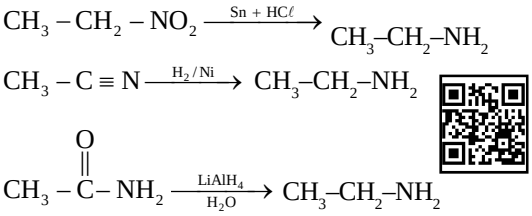
Q.86 (2)
Lanthanoid + Fe + some traces of S, C, Ca, Al etc.

Q.87 (1)
$[Cr(H_2O)_4Cl_2]^+$ show geometrical isomer, two forms like cis and trans.

Q.88 (1)



Q.89 (4)



Q.90 **(3)**

Q.91 (3)
New NCERT Pg. No. 4, Class XI
In biological nomenclature, the genus name starts with a capital letter, while the species name starts with a small letter. Both names are either italicized or underlined separately when handwritten. The second word denotes the species, not the family.

Q.92 (3)
New NCERT Pg. No. 17, Class XI
Claviceps and Ustilago are fungi suitable for studying the dikaryon stage. The dikaryotic phase is a stage in the fungal life cycle where cells have two genetically distinct nuclei.

Q.93 (1)
Old NCERT Pg. No. 87, Class XI
Xylem fibers have highly thickened walls and obliterated central lumen not peripheral, contributing to their mechanical strength. The radial conduction of water is facilitated by ray parenchymatous cells, which transport water and nutrients laterally within the xylem.

Q.94 (4)
New NCERT Pg. No. 73, Class XII
Phenylketonuria (PKU) is actually an autosomal recessive disorder, not dominant. It is caused by a mutation in the gene coding for the enzyme phenylalanine hydroxylase.

Q.95 (1)
New NCERT Pg. No. 217, Class XII
Biodiversity can be categorized into three levels: genetic diversity (variation of genes within species), species diversity (variety of species within a habitat), and ecological diversity (variety of ecosystems in a region).

Q.96 (2)
New NCERT Pg. No. 157, Class XII
Baculoviruses are used as biological control agents against insects and arthropods, and they belong to the genus Nucleopolyhedrovirus. Trichoderma species are free-living fungi in root ecosystems and act as biocontrol agents against plant pathogens.

Q.97 (1)
New NCERT Pg. No. 76, Class XII
Down's syndrome (B): Short-statured with a small round head, furrowed tongue, and partially open mouth.
Turner's syndrome (C): Ovaries are rudimentary.
Klinefelter's syndrome (A): Gynaecomastia.

Q.98 (1)
New NCERT Pg. No. 170, Class XII

Agrobacterium tumefaciens infects dicot plants and transforms normal plant cells into tumor cells. Retroviruses in animals can transform normal cells into cancerous cells by integrating their DNA into the host genome.

Q.99 (1)

New NCERT Pg. No. 63

In mustard gynoecium occupies the highest position and other floral parts are situated below the gynoecium. Ovary is superior.

Q.100 (4)

New NCERT Pg. No. 60, Class XI

- The leaf is attached to the stem by the leaf base (a) is correct.
- Pedicel helps hold the leaf blade to light and allow it to flutter in wind (b) is incorrect; this is the function of the petiole.
- Veins provide rigidity to the leaf blade and act as channels of transport for water, minerals, and food materials (c) is correct.
- The lamina is a lateral small leaf-like structure which may be present at the leaf base (d) is incorrect; lamina is the leaf blade.
- In palmately compound leaves, the leaflets are attached at a common point as in silk cotton (e) is correct.

Q.101 (3)

New NCERT Pg. No. 61, Class XII

AB blood group shows co-dominance where both IA and IB alleles are expressed. The ABO blood groups are controlled by the gene I, with three alleles (IA, IB, i). The IA and IB alleles produce different sugars than the i allele. There are six possible genotypes (IAIA, IAi, IBIB, IBi, IAIB, ii).

Q.102 (4)

New NCERT Pg. No. 109, Class XI

Enzyme: Trypsin (ii)
Hormone: Insulin (iii)
Fight infectious agents: Antibody (iv)
Intercellular ground substance: Collagen (i)

Q.103 (1)

New NCERT Pg. No. 196, Class XII

Interspecific interactions arise from the interaction of populations of two different species. Commensalism is a type of interaction where one species benefits, and the other is neither harmed nor benefited.

Q.104 (4)

New NCERT Pg. No. 98, Class XI

The cytoskeleton provides mechanical support, helps in cell motility, and maintains the shape of the cell. It does not provide a barrier to undesirable macromolecules.

Q.105 (1)

New NCERT Pg. No. 29, Class XI

Bryophytes play a significant role in ecological succession and soil formation. The zygote in bryophytes does not undergo reduction division. Their sporophyte is less differentiated than in ferns, and mosses help decompose rocks making the substrate suitable for higher plants.

Q.106 (1)

New NCERT Pg. No. 92, Class XII

The promoter and terminator flank the sturctural gene in a transcription unit. The promoter is said to be located towerds 5' -end (upstream) of the structural gene (the reference is made with respect to the polarity of conding strand).

The terminator is located towards 3' -end (downstream) of the coding strand and it usually defines the end of the process of transcription.

Q.107 (2)

New NCERT Pg. No. 223, Class XII

More than 25% of the drugs currently sold in the market worldwide are derived from plants, and around 25,000 species contribute to traditional medicine. However, the Amazon forest does not produce 50% of the total oxygen in the Earth's atmosphere; it contributes significantly but not to that extent.

Q.108 (1)

New NCERT Pg. No. 104, Class XII

About 1.4 million locations have been identified in the human genome where single base differences occur.

Q.109 (2)

New NCERT Pg. No. 169, 170, Class XI

In arithmetic growth, following mitotic cell division, one daughter cell continues to divide while the other differentiates. The simplest expression of arithmetic growth is seen in root elongation at a constant rate. In the log phase of geometric growth, both progeny cells retain the ability to divide.

Q.110 (2)

New NCERT Pg. No. 109, Class XI

The chemical composition of living tissues in terms of percentage of total cellular mass is H_2O > Proteins > Nucleic acids > Carbohydrates > Lipids > Ions.

Component	% of the total cellular mass
Water	70-90
Proteins	10-15
Carbohydrates	3
Lipids	2
Nucleic acids	5-7
Ions	1

Q.111 (3)

New NCERT Pg. No. 76, Class XI

The ground tissue in monocot stems is not differentiated into cortex, pericycle, pith, etc. This feature is characteristic of dicot stems.

Q.112 (3)

New NCERT Pg. No. 125, Class XI

If there are 16 bivalents in metaphase-1, each daughter cell after Meiosis-I will have 16 chromosomes. After Meiosis-II, the number of chromosomes will remain 16 in each daughter cell.

Q.113 (3)

New NCERT Pg. No. 1, 144, 146, Class XI

Carboxylation (I): Most crucial step of C_3 cycle (B)
Reduction (II): Use of photochemically made ATP and NADPH for reduction per molecule of CO_2 fixed (D)
Calvin cycle (III): Primary CO_2 acceptor is a 5-carbon molecule (C)
C_4 pathway (IV): Primary CO_2 acceptor is a 3-carbon molecule (A)

Q.114 (1)

New NCERT Pg. No. 223, Class XII

Passenger Pigeons became extinct due to overexploitation by humans for food and sport.

Q.115 (2)

New NCERT Pg. No. 74, Class XI

The layers of a monocot root from outside to inside are: Epidermis, Cortex, Endodermis, Pericycle, Vascular Bundle, Pith.

Q.116 (2)

New NCERT Pg. No. 176, 177, Class XI

Auxin (A) - Forms weed-free lawns (iv)
Cytokinin (B) - Found in coconut milk (iii)
Ethylene (C) - Apical hook formation (ii)
Abscisic acid (D) - Stress hormone (i)
Gibberellin (E) - Delays senescence (v)

Q.117 (3)

New NCERT Pg. No. 184, 185, Class XII

Transgenic mice are developed for testing vaccine safety before human use. Traditional knowledge related to bio-resources can be exploited to develop modern applications. There are risks associated with recombinant DNA technology, which is why the GEAC was established.

Q.118 (4)

New NCERT Pg. No. 221, 222, Class XII

Alexander von Humboldt described the species-area relationship. The Rivet Popper hypothesis was proposed by Paul Ehrlich. Prickly pear cactus is not an extinct species. The Evil Quartet includes factors like habitat loss, overexploitation, alien species invasion, and co-extinction, not coexistence.

Q.119 (2)

New NCERT Pg. No. 69, Class XII

Henking discovered the X body in insects. In many insects, the mechanism of sex determination is of the XO type.

Q.120 (2)

New NCERT Pg. No. 165, 168, Class XII

Plasmids are extrachromosomal DNA molecules that replicate independently inside the bacterial cell. They cannot replicate outside the bacterial cell.

Q.121 (3)

New NCERT Pg. No. 180, Class XII

RNA interference (RNAi) is a strategy to produce pest-resistant plants and takes place in prokaryotic organisms only as a method of cellular defense. It involves silencing specific mRNA, not dsDNA.

Q.122 (1)

New NCERT Pg. No. 27, Class XI

Pear-shaped gametes are found in Brown algae e.g. Ectocarpus, Fucus.

Q.123 (3)

New NCERT Pg. No. 207, Class XII

Primary productivity varies in different ecosystems depending on plant species, environmental factors, and nutrient availability.

Q.124 (3)

New NCERT Pg. No. 157, Class XI

In fermentation, the reducing agent $NADH+H^+$ is oxidized to NAD^+, not reoxidized to $NADH+H^+$.

Q.125 (4)

New NCERT Pg. No. 115, Class XI

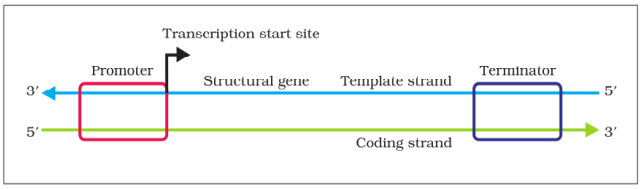
The correct sequence for the catalytic action of an enzyme is:
A. Substrate fits into the active site of enzyme.
D. The substrate binding induces the enzyme to alter its shape and fits more tightly with the substrate.

B. The active site of the enzyme breaks the chemical bonds of the substrate.
C. The enzyme is released from the enzyme-product complex.

Q.126 (3)
New NCERT Pg. No. 176, Class XI
Spraying sugarcane with gibberellins increases yield by promoting internodal elongation, resulting in taller plants with more sugar content.

Q.127 (2)
New NCERT Pg. No. 59, Class XI
The region of elongation is a few millimeters above the root cap. The root cap protects the tender apex of the root, the region of meristematic activity has thin-walled cells with dense protoplasm, and the region of maturation has some epidermal cells forming root hairs.

Q.128 (3)
New NCERT Pg. No. 92, Class XII
In the schematic structure of a transcription unit, the promoter region is labeled B, and the coding strand is labeled D.



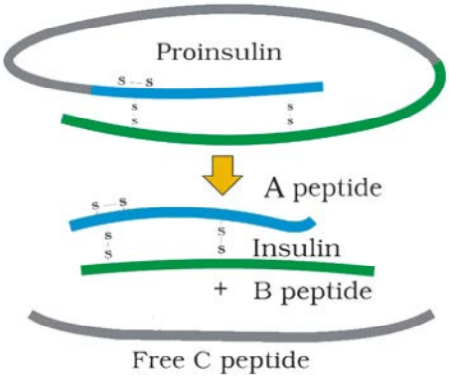
Q.129 (4)
New NCERT Pg. No. 105, Class XII
VNTRs (Variable Number of Tandem Repeats) are usually much smaller, ranging from a few to hundreds of base pairs, not 100 to 250kb.

Q.130 (3)
New NCERT Pg. No. 144, Class XI
The Calvin cycle requires 18 ATP and 12 NADPH molecules to make one molecule of glucose.

Q.131 (2)
New NCERT Pg. No. 14, 15, Class XII

Q.132 (1)
New NCERT Pg. No. 61, Class XI
- China rose shows alternate phyllotaxy.
- Calotropis shows opposite phyllotaxy.
- Alstonia shows whorled phyllotaxy.

Q.133 (3)
New NCERT Pg. No. 182, Class XII



Q.134 (3)
New NCERT Pg. No. 224, Class XII
The ethical argument for conserving biodiversity is based on the intrinsic value of every species, recognizing their right to exist regardless of their utility to humans.

Q.135 (1)
New NCERT Pg. No. 156, Class XI

Q.136 (4)
New NCERT Pg. No. 34, Class XII
After ovulation, remnants of ruptured follicle forms graafian follicle which changes into corpus luteum. Corpus luteum acts as a temporary endocrine gland and releases mainly progesterone and estrogen, inhibin and relaxin hormones.

Q.137 (2)
New NCERT Pg. No. 183, Class XI
Earthworm – Moist cuticle
Aquatic arthropoda/mollusca – Gills
Insects – Tracheal tubes
Birds/mammals – Lungs

Q.138 (3)
New NCERT Pg. No. 221, Class XI
A is troponin which is present at regular intervals on tropomyosin.
B is tropomyosin which suns along entire length of actin and masks the myosin binding site on actin.
C is F-actin which is polymer of globular protein, G-actin.

Q.139 (4)
New NCERT Pg. No. 121, Class XI
During the S (Synthesis) phase, DNA replication occurs, but the newly formed DNA molecules are not yet distinct and remain intertwined. The G_2 (Gap 2) phase follows the S phase, where the cell continues to grow and prepares for mitosis, but the DNA molecules are still not distinct.

Q.140 (3)

New NCERT Pg. No. 114, Class XI

Phallic gland is found in male cockroach.
Brood pouch of female cockroach contains opening of gonopore, spermatheca, and collaterial glands.

Q.141 (3)

New NCERT Pg. No. 116, Class XII

Due to the deposition of soot and carbon particles on bark of trees, the bark gets darked after industrialisation. As a result, the melanised moths get easily camouflaged in dark back ground, leading to increase in their number.

Q.142 (3)

New NCERT Pg. No. 44, Class XII

Multi load 375 is a copper-releasing IUD.

Q.143 (1)

New NCERT Pg. No. 179, Class XII

Lepidopterans – Tobacco budworm and army worm
Cleopterans – Beetles
Dipterans – Flies and mosquitoes

Q.144 (1)

New NCERT Pg. No. 241, 245, Class XI

Grave's disease is also known as exopthalmic goitre which is due to hyperthryoidism.

Q.145 (4)

New NCERT Pg. No. 232, 233, Class XI

When a neuron is not conducting any impulse i.e., in resting state, it is more permeable to K^+ and is nearly impermeable to Na^+ β negatively charged proteins.

Q.146 (4)

New NCERT Pg. No. 94, Class XI

The fluidity of the cell membrane is primarily due to the lateral movement of proteins within the lipid bilayer. This lateral movement allows for various functions such as cell signaling, transport, and interaction with other cells.

Q.147 (3)

New NCERT Pg. No. 37, 38, 39, 43, Class XI

In sponges, cellular level of organisation is present.
Digestive system of platyhelminthes is incomplete.
Platyhelminthes have mesoderm so they are triploblastic organisms.

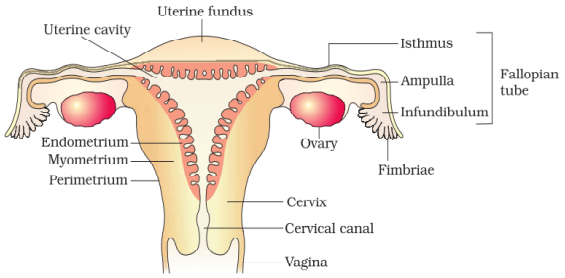
Q.148 (3)

New NCERT Pg. No. 102, Class XII

The human genome contains approximately 3×10^9 base pairs and about 20,500 genes. Chromosome 1 has the maximum number of genes, while the Y-chromosome has the fewest. Dystrophin is indeed the largest known human gene.

Q.149 (2)

New NCERT Pg. No. 29, Class XII



Q.150 (2)

New NCERT Pg. No. 37, Class XII

Trophoblast	–	Outer layer of blastocyst attached to endometrium
Cleavage	–	Mitotic division of zygote
Inner cell mass	–	It differentiate as embryo
Implantation	–	Embedding of blastocyst in endometrium

Q.151 (1)

New NCERT Pg. No. 133, Class XII

forelimbs of vertebrates, Brains of vertebrates, Thorns of bougainvillea and tendries of cucurbita → Homologous organs show divergent evolution

Sweet potato and potato, wings of butterfly and birds, Eye of octopus and mammals, Flippers of penguins and dolphin → Analogous organs show convergent evolution

Q.152 (3)

New NCERT Pg. No. 133, Class XII

Ringworm is a fungal disease and is mainly caused due to the genera : *Epidermophyton*, *Trichophyton* and *Microsporum*.

Q.153 (3)

New NCERT Pg. No. 138, 139, 140, 141, Class XII

Cancer cells have lost the property of contact inhibition by virtue of which normal cells restricts the growth of surrounding neighbouring cells.

Q.154 (4)

New NCERT Pg. No. 72, Class XII

In human pedigree analysis, a square represents a male, a circle represents a female, and a filled symbol indicates an affected individual. The symbol representing a parent with three affected offspring is a specific notation and not commonly used in standard pedigree charts.

Q.155 (4)

New NCERT Pg. No. 134, 135, Class XII

T-lymphocyte – Rejection of transplanted organ
Macrphages – Cellular barrier of innate immunity
Anti-tetanus injection – passive immunity
Tonsils – secondary lymphoid organs

Q.156 (1)

New NCERT Pg. No. 201, Class XI

In ECG, P-wave represents the electrical depolarisation of atria.
T-wave represents the return of ventricles from excited to normal state.

Q.157 (4)

New NCERT Pg. No. 122, 123, Class XI

- Metaphase: Chromosomes arranged at equatorial plate (iii)
- Interphase: The phase between two successive M-phases (iv)
- Telophase: Nuclear envelope assembles around chromosome clusters (ii)
- Prophase: Initiation of condensation of chromosomal material (i)

Q.158 (3)

New NCERT Pg. No. 50, Class XI

Corvus – Crow
Columba – Pigeon
Psittacula – Parrot
Struthio – Ostrich
Neophron – Vulture

Q.159 (4)

New NCERT Pg. No. 241, Class XI

Somatostatin inhibits the release of growth hormone from pituitary gland.

Q.160 (3)

New NCERT Pg. No. 170, Class XII

Ti plasmids of *Agrobacterium tumifaciens* is modified into cloning vector which is now no more pathogenic to plants.

Q.161 (4)

New NCERT Pg. No. 111, Class XI

The primitive conditions present on earth was high temperature, volcanic eruptions, reducing atmosphere containing methane, ammonia, hydrogen, water vapour.

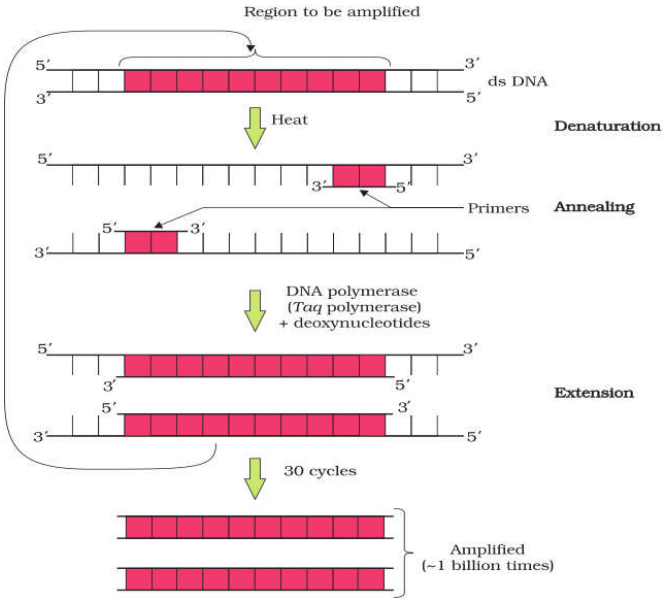
Q.162 (3)

Old NCERT Page No. 113

The hindgut is broader than midgut and is differentiated into ileum, colon and rectum. The rectum opens out through anus.

Q.163 (3)

New NCERT Pg. No. 171, Class XII



Q.164 (1)

New NCERT Pg. No. 48, Class XII

In gamete intra fallopian transfer, ova is transferred to the fallopian tube for in-vivo fertilisation.

Q.165 (3)

New NCERT Pg. No. 171, Class XII

In micro-injection, DNA is directly injected into the nucleus of animal cells.

Q.166 (1)

New NCERT Pg. No. 206, Class XI

Protonephridia – Flatworms
Nephridia – Earthworm
Malphigian tubules – Cockrach
Green glands – Prawn

Q.167 (3)

New NCERT Pg. No. 135, Class XII

Interferons are cytokine barriers that prevent non-infected cells from viral infection.

Q.168 **(4)**

New NCERT Pg. No. 97, Class XI

The cristae are folding of the inner membrane of mitochondria that increase the surface area for ATP production. The assertion that cristae decrease the surface area is incorrect, while the reason explaining cristae as folding is correct.

Q.169 (2)

New NCERT Pg. No. 117, Class XII

Darwin finches refers to the small birds present on Galapagos islands. Starting from a single species from mainland in South America.

Q.170 (2)

New NCERT Pg. No. 101, 02, Class XII

Pseudo copulation by male bees with orchids is an example of mutualism where both species benefit. Lichen is a symbiotic association between fungi and algae (not roots of higher plants), and mycorrhizae is an association between fungi and roots of higher plants.

Q.171 (2)

New NCERT Pg. No. 105, Class XI

In elemental analysis or ash analysis, the ash is remained after burring the living tissue.

Q.172 (2)

New NCERT Pg. No. 199, Class XI

The number of action potential that could be generated in a minute is different at different parts of nodal system.

Q.173 (2)

New NCERT Pg. No. 100, Class XII

The accessibility of promoter regions of prokaryotic DNA by RNA polymerase is regulated by interactions with sequences called operators. These sequences are involved in the control of gene expression.

Q.174 (3)

New NCERT Pg. No. 35, Class XII

During pregnancy, all events of menstrual cycle stops and there is no menstruation.

Q.175 (3)

New NCERT Pg. No. 47, Class XI

In chondrichthyes, fertilisation is usually internal and most of than are viviparous.

Q.176 (3)

New NCERT Pg. No. 231, Class XI

The afferent nerve fibres transmit impulses from tissues/organs to the CNS.

Efferent nerve fibres transmit regulatory impulses from CNS to the peripheral tissues.

Q.177 (4)

Old NCERT Pg. No. 104, Class XI

Figure A represents the matrix fo cartilage while figure B represents the matrix of Bone.

Q.178 (2)

Old NCERT Pg. No. 114, Class XI

Malpighian tubules help in removal of excretory wastes from haemolymph.

Q.179 (3)

New NCERT Pg. No. 61, 69, 70, Class XII

In Drosophila, females are homogametic (XX) and males are heterogametic (XY). The statement incorrectly states that female Drosophila are heterogametic.

Q.180 (4)

New NCERT Pg. No. 248, Class XI

Cortisol is a gluco-corticoid and is steroid-derivative hormone.