ANSWER KEY

ATIS FINAL TRACK

PART TEST-07

PHYSICS

SECTION-A

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

SECTION-B

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

CHEMISTRY

SECTION-A

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

SECTION-B

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

BIOLOGY-I

SECTION-A

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

SECTION-B

Q.136 (1) **Q.137** (4) **Q.138** (1) **Q.139** (1) **Q.140** (2) **Q.141** (3) **Q.142** (3) **Q.143**-(2) **Q.144** (3) **Q.145** (1)
Q.146 (3) **Q.147** (1) **Q.148** (4) **Q.149** (2) **Q150** (3)

BIOLOGY-II

SECTION-A

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

SECTION-B

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

PHYSICS

Q.1 (1)

$$\frac{5}{R}=\frac{3^2}{9^2}\Rightarrow R=45$$

$$R_{eq}=\frac{R}{7}=\frac{45}{7}=6.5$$

Q.2 (4)

$R=R_0[1+\alpha(T-T_0)]$
$4.5=4[1+0.00125(T-300)]$

Q.3 (4)

$$\mu=\frac{V_d}{E}$$

$$[\mu]=\frac{[V_d]}{[E]}$$

$$=\frac{[L^1T^{-1}]}{[M^1L^1T^{-3}A^{-1}]}$$

$$=[M^{-1}L^0T^2A^1]$$

Q.4 (4)

$$R=\frac{\rho l}{A}\Rightarrow R\propto\frac{1}{A}$$

$$i=neAV_d\Rightarrow i\propto V_d$$

$$v_d=-\left(\frac{eE}{m}\right)\tau\Rightarrow v_d\propto\tau$$

Q.5 (2)

$$R_{AB}=\frac{R}{2}=\left(\frac{1}{2}\right)(\pi r\times 12)$$

$$=\left(\frac{1}{2}\right)(\pi\times 10\times 10^{-2}\times 12)=0.6\pi\Omega$$

Q.6 (1)

$$R=\frac{\rho l}{A}=\frac{\rho l^2}{V}\Rightarrow\frac{dR}{R}=2\frac{dl}{l}$$

Q.7 (4)

$$\varepsilon_{net}=\frac{\frac{\varepsilon_1}{r_1}-\frac{\varepsilon_2}{r_2}}{\frac{1}{r_1}+\frac{1}{r_2}}=\frac{10-5}{1+1}=\frac{5}{2}$$

$$i=\frac{\varepsilon_{net}}{R+\frac{r_1r_2}{r_1+r_2}}=\frac{\frac{5}{2}}{2+\frac{1}{2}}=1A$$

Since b is at higher potential then a, current flows from b to a.

Q.8 (4)

Ohm's law is TRUE, when the resistivity of the material is independent of the applied electirc field.

Q.9 (4)

$$\text{Mobility, }\mu=\frac{V_d}{E}=\frac{\frac{J}{ne}}{\frac{J}{\sigma}}=\frac{\sigma}{ne}=\text{Constant}$$

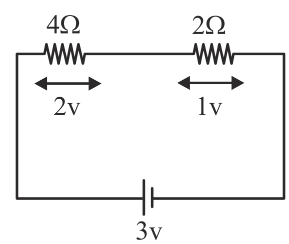
Q.10 (1)

Resistance of the bulb $R=\frac{V^2}{P}=\frac{220\times 220}{100}$

The new power for the voltage of 110 volt is

$$P'=\frac{V'^2}{R}=\frac{110\times 110}{484}=25\text{ watt.}$$

Q.11 (1)



Q.12 (3)

$$R_s=\frac{R_g\times i_g}{i-i_g}=\frac{100\times 10}{100-10}=\frac{100}{9}$$

Q.13 (1)

$V=i(R+S)$
$20=(0.01)(20+S)$
$S=1980\,\Omega$

Q.14 (1)

current through the wire is same

$i_A=i_B=i_C\because i=neAV_d$ and $J=\frac{i}{A}$

Q.15 (4)

Room heater require wire of high resistivity, convert electrical energy into heat, so Nichrome is preffered it convert electric energy into light energy.

Q.16 (4)

$$J = \frac{I}{A} = nev_d$$

$$\frac{4I}{\pi d^2} = nev \quad ....(i)$$

$$\frac{16I}{\pi d^2} = nev' \quad ....(ii)$$

From equation (i) and (ii)

$$\frac{4I}{16I} = \frac{v}{v'} \Rightarrow v' = 4v$$

Q.17 (3)

When wire is stretched

Volume = constant

$Al = \pi r^2 l$ = constant

$$l \times \frac{l}{r^2}$$

Resistance $R = \frac{\rho \ell}{A}$ so $R \propto \frac{1}{r^4}$

Q.18 (3)

In a perpendicular magnetic field, the radius of circular path travelled by electron beam is

$$r = \frac{mv}{eB}$$

$$\therefore\ r = \frac{9 \times 10^{-31} \times 1.6 \times 10^{7}}{1.6 \times 10^{-19} \times 0.1}$$

$= 9 \times 10^{-4}$ m

Q.19 (3)

Magnetic induction at the centre of a circular coil

$$B = \frac{\mu_0}{2} \cdot \frac{ni}{R}$$

$$\Rightarrow\ B \propto \frac{n}{R}$$

Here, $n_1 = 1, n_2 = 2$

$l = 2\pi R_1 = 2 \times 2\pi R_2$

$$\Rightarrow\ R_2 = \frac{R_1}{2}$$

$$\therefore\ \frac{B_1}{B_2} = \frac{n_1}{n_2} \times \frac{R_2}{R_1}$$

$$= \frac{1}{2} \times \frac{R_1/2}{R_1} = \frac{1}{4}$$

$$\Rightarrow\ B_1 : B_2 = 1 : 4$$

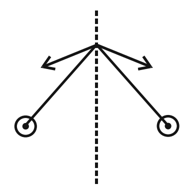
Q.20 (3)

Due to finite length wire -

$$B = \frac{\mu_0}{4\pi} \cdot \frac{I}{\ell} \left[\text{Sin}\,\phi_1 + \text{Sin}\,\phi_2\right]$$

Q.21 (3)

For the points equidistant from both the wires, the net field will be greater if distance is close to the wires.



Q.22 (1)

As $\vec{F} = q(\vec{V} \times \vec{B})$

$$m\vec{a} = q(\vec{V} \times \vec{B})$$

or $\vec{a} = \frac{q}{m}(\vec{V} \times \vec{B})$

So, $\vec{a} \perp \vec{B} \Rightarrow \vec{a} \cdot \vec{B} = 0$

$= 2x + 3 - 4$

$\Rightarrow \boxed{x = 0.5}$

Q.23 (3)

Assertion : Factual

Reason : If magnetic field varies symmetrically

Q.24 (3)

For long solenoid $B = \frac{\mu_0 NI}{\ell}$

= Independent of radius

Q.25 **(2)**

$$B_1 = B_2 = B_3 = \frac{\mu_0 i}{2a}$$

$$B_{net} = \sqrt{3}\, B_1$$

Q.26 **(4)**

Magnetic field due to long wire $(B) = \frac{\mu_0 i}{2\pi(r)}$

$$F_1 = \frac{\mu_0(20)}{2\pi(2\times10^{-2})}\times 20(15\times10^{-2})$$

$$F_2 = \frac{\mu_0(20)}{2\pi(12\times10^{-2})}\times(20)\times(15\times10^{-2})$$

$$F = \frac{400\mu_0}{4\pi}\left(15-\frac{5}{2}\right)$$

$$= 400\times10^{-7}\times\frac{25}{2}\Rightarrow 200\times25\times10^{-7}$$

$= 5000 \times 10^{-7}$N

Q.27 **(1)**

$$\oint\left(\vec{B}.\vec{dl}\right)_A = \mu_0$$

$$\left(\oint\vec{B}.\vec{dl}\right)_B = \mu_0 3$$

$$\left(\oint\vec{B}.\vec{dl}\right)_C = \mu_0 8$$

Q.28 (1)

$$F = Bil\sin 30° = 1.5\times10\times1\times\frac{1}{2} = 7.5N$$

Q.29 (2)

According to Ampere's law

$$\oint\vec{B}.d\vec{\ell} = \mu_0 I$$

only for outside point, path of line integration will enclose the current. Hence, B = 0 inside.

Q.30 (1)

$$r = \frac{mv}{qB}\Rightarrow v = \frac{qBr}{m}$$

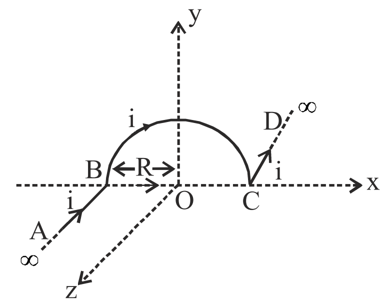
$$KE = \frac{1}{2}mv^2 = \frac{q^2B^2r^2}{2m}$$

$$= \frac{(1.6\times10^{-19})^2(1)^2(0.5)^2}{2(1.67\times10^{-27})}\times\frac{1}{1.6\times10^{-19}}eV$$

$= 11.97\times10^6$ eV

= 11.97 MeV

Q.31 (2)



$$\vec{B}_{AB} = \frac{\mu_0 i}{4\pi R}(-\hat{j})\Rightarrow\vec{B}_{BC} = \frac{\mu_0 i}{4R}(-\hat{k})$$

$$\vec{B}_{CD} = \frac{\mu_0 i}{4\pi R}(+\hat{j})$$

$$\vec{B}_O = \vec{B}_{AB}+\vec{B}_{BC} = \frac{\mu_0 i}{4R}(-\hat{k})$$

Q.32 (3)

$$B_{\text{mid point}} = \mu_0 ni = 4\pi\times10^{-7}\times\frac{50}{10^{-2}}\times4$$

$= 25.1\times10^{-3}$ Wb/m^2

$$B_{\text{end point}} = \frac{\mu_0 ni}{2} = 12.6\times10^{-3}\text{ Wb/m}^2$$

Q.33 (3)

$$r = \frac{\sqrt{2mK}}{qB} = \frac{1}{B}\sqrt{\frac{2mV}{q}}$$

$$\Rightarrow r\propto\sqrt{m}\Rightarrow\frac{m_1}{m_2} = \left(\frac{R_1}{R_2}\right)^2$$

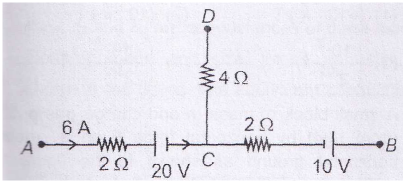
Q.34 (3)

We know from the Faraday's law of electromagnetic induction that an emf and thereby a current is induced in a coil whenever the magnetic flux linked with a circuit changes, Since, the coil remains stationary, there is no change in flux. Therefore, neither emf nor current is induced in the coil.

Q.35 (4)

According right plam rule

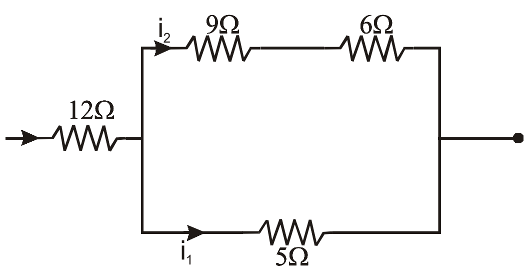
Q.36 (4)



$V_C - 2x + 10 = V_B$
$V_B - V_C = 10 - 2x = 12$
$\Rightarrow x = -1$ A (negative sing indicates that direction) of current is from B to A
$y = 6 + |x| = 7$ A

Q.37 **(2)**

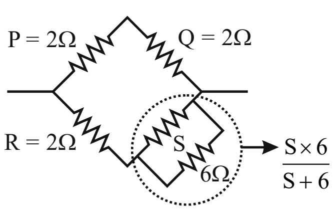
$$\frac{i_1}{i_2} = \frac{15}{5} = \frac{3}{1} \qquad \text{......(i)}$$



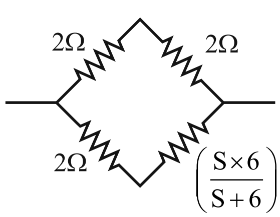
also $\frac{H}{t} = i^2R \Rightarrow 45 = (i_1)^2 \times 5$

$\Rightarrow i_1 = 3$A and from equation (i) $i_2 = 1$A
So $i = i_1 + i_2 = 4$A
Hence power developed in 12 Ω resistance $P = i^2R = (4)^2 \times 12 = 192$ W

Q.38 (2)



This wheat stone is balanced



$$\frac{Z}{Z} = \frac{2}{\frac{S \times 6}{S+6}}$$

$S \times 6 = 2S + 12$
$4S = 12 \Rightarrow (S = 3\,\Omega)$

Q.39 (4)

$$\frac{1}{R_{eq}} = \frac{1}{60} + \frac{1}{(15+5)} + \frac{1}{10}$$

$R_{eq} = 6\,\Omega$
Potential difference applied -
$V = 20 \times 6 = 120V$
Now, for 60 Ω
$V = iR$
$120 = I \times 60$
$I = 2$ A

Q.40 (2)
Bulb 'C' is short circuited
$\therefore R_{eff.}$ decreases
Hence, i ↑ through bulb A & B

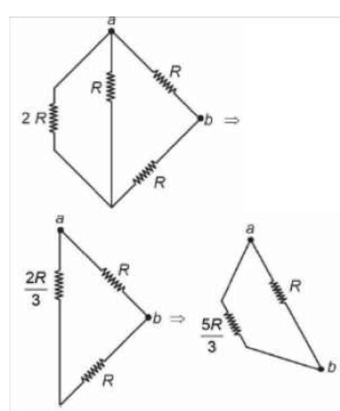
Q.41 (2)
To obtain minimum resistance, All resistors must be connected in parallel.

Hence equivalent resistance of combination = $\frac{r}{10}$

Q.42 (4)

$V_A - V_B = 1.5 \times 1$	$V_B - 2.5 \times 1 + 2 - V_D = 0$
$V_A - V_B = 1.5$	$V_B - V_D - .5 = 0$
$V_A - 0 = 1.5$	$0 - V_D = 0.5$
$V_A = 1.5$ V	$V_D = -0.5$ V

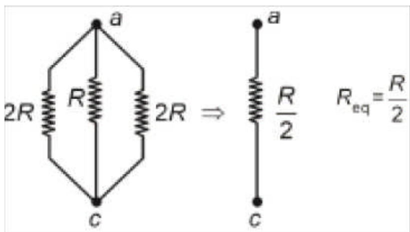
Q.43 (2)
Resistance between a and b



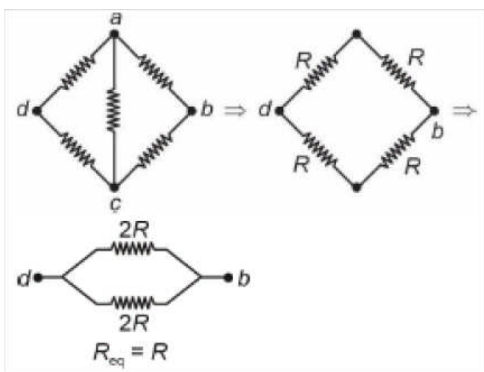
$$\frac{1}{R_{eq}} = \frac{1}{R} + \frac{3}{5R} = \frac{8}{5R}$$

$$R_{eq} = \frac{5R}{8}$$

- Resistance between a and c:



- Resistance between b and d:



Q.44 (4)

$$B = \frac{\mu_0 I}{2\pi r} \Rightarrow B \propto \frac{1}{r}$$

Q.45 (1)

$$T = \frac{2\pi m}{qB} = \frac{2\pi \times 1}{0.5 \times 4} = \pi s$$

At this time the particle returns to the x-axis coordinates : $(2\pi, 0, 0)$ m

Q.46 (3)

$$B_{centre} = \frac{\mu_0 i}{2R}$$

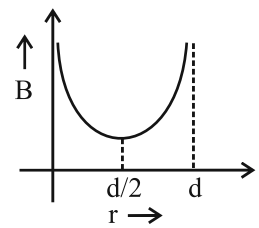
$$B_{axis} = \frac{\mu_0 i}{2} \frac{R^2}{\left(R^2 + \frac{R^2}{R}\right)^{3/2}} = \frac{\mu_0 i R^2}{2\left(\frac{3R^2}{2}\right)^{3/2}}$$

$$= \frac{\mu_0 i}{\left(\frac{\sqrt{27}}{\sqrt{2}}\right)R}$$

Energy density $\propto B^2$

$$\therefore \text{ Ratio} = \frac{1}{2^2}\left(\frac{27}{2}\right) = \frac{27}{8}$$

Q.47 (3)



Q.48 (2)

Straight wire will experienc force only and circular wire will experience torque only so, overall conductor will experience both torque as well as force.

Q.49 (2)

The magnitude of torque experienced by the coil,

$\tau = NIAB \sin\theta$

$= 20 \times 12 \times (10 \times 10^{-2})^2 \times 0.80 \times \sin 30^o$

$\tau = 2.4 \times 0.80 \sin 30^o$

$$= \frac{2.4 \times 0.80}{2} = 0.96 Nm$$

Q.50 (2)

$$B = 10T = \frac{\mu_0 I}{2\pi R^2} \cdot \frac{3R}{4}$$

$$\Rightarrow \frac{\mu_0 I}{2\pi R} = \frac{40}{3} T$$

$$B^1 = \frac{\mu_0 I}{2\pi(5R)} = \frac{1}{5} \times \frac{40}{3} = \frac{8}{3} T$$

CHEMISTRY

SECTION-A

Q.51 (3)

$\Delta H = E_f - E_b$

$-90 = 200 - E_b$

$E_b = 292$ kcal

Q.52 (4)

Rate $= k[2A]^2 \times [2B]^3$

$= 32k[A]^2 \times [B]^2$

Q.53 (2)

$$t_{\frac{1}{2}} = \frac{0.693}{K} = 20$$

$$K = \frac{0.693}{20}$$

$$t_{33\%} = \frac{20 \times 2.303}{0.693} \log \frac{100}{67} \quad ....(I)$$

$$t_{67\%} = \frac{20 \times 2.303}{0.693} \log \frac{100}{33} \quad ....(II)$$

$= 66.46\,[\log 100 - \log 33]$

$= 66.46\,[2 - 1.52]$

$= 66.46 \times 0.48$

$= 31.9 = 32$ min

$t_{33\%} = 66.46\,[2 - 1.83]$

$= 66.46 \times 0.17$

$= 11.30$

Time Interval $= 20$

Q.54 (3)

$\Delta H = E_a^f - E_a^b$

$5 = 15 - E_a^b$

$E_a^b = 15 - 05 = 10$ kcal/mol

Q.55 (2)

Order of reaction is an experimental fact and it may equal or may not be equal to molecularity of rxn.

Q.56 (2)

$$K = \frac{0.693}{t_{\frac{1}{2}}} = \frac{0.693}{69.3} = 10^{-2}\ s^{-1}$$

Rate $= k[A] = 10^{-2} \times 0.10 = 10^{-3}$ Ms^{-1}

Q.57 (2)

$\Delta H = E_a^{\beta} - E_a^b$

$-20 = 85 - E_a^b$

$E_a^b = 85 + 20 = 105$

Q.58 (2)

$$2N_2O_4 \rightleftharpoons 4NO_2$$

$$-\frac{1}{2}\frac{d[N_2O_4]}{dt} = \frac{k}{2} = ror$$

$$\frac{1}{4}\frac{d[NO_2]}{dt} = \frac{k'}{4} = ror$$

$$\frac{k}{2} = \frac{k'}{4}$$

$2k = k'$

Q.59 (2)

$$\frac{r_1}{r_2} = \left(\frac{[A]_I}{[A]_{II}}\right)^a$$

$$\frac{2.4 \times 10^{-3}}{0.6 \times 10^{-3}} = \left(\frac{2.2}{1.1}\right)^a$$

$4 = (2)^a$

$a = 2$

Q.60 (2)

$$t_{50\%} = t_{\frac{1}{2}} = 45 \text{ min.} \therefore K = \frac{0.693}{45}$$

$$t_{99.9} = \frac{2.303 \times 45}{0.693} \log \frac{1000}{0.1}$$

$$= \frac{2.303 \times 45 \times 3}{0.693} = 450 \text{ min.} = 7.5 \text{ Hr.}$$

Q.61 (2)

For zero order Rxn.

$$t_{\frac{1}{2}} = \frac{[R_0]}{2K} = \frac{2}{2K} = \frac{1}{K} \qquad \therefore K = \frac{1}{t_{\frac{1}{2}}}$$

And for zero order Rxn

Rate $= K[A]^{\circ}$

$2 \times 10^{-2} = t_{\frac{1}{2}}\,[2]^{\circ}$

$$t_{\frac{1}{2}} = \frac{1}{2 \times 10^{-2}} = \frac{100}{2} = 50 \text{ sec.}$$

Q.62 (3)

$$K = \frac{2.303}{t} \log \frac{R_o}{R_t} = \frac{2.303}{1} \log \frac{100}{25}$$

$$K = 2.303 \times 0.6020$$

$$t_{\frac{1}{2}} = \frac{0.693}{2.303 \times 0.6020} = \frac{1}{2} \text{Hr.}$$

Q.63 (3)

For Ist order Rxn. $K = \frac{2.303}{t_2 - t_1} \log \frac{\text{Rate}_1}{\text{Rate}_2}$

$$K = \frac{2.303}{60-40} \log \left[\frac{0.8}{0.08}\right]$$

$$K = \frac{2.303}{20} \log 10 = \frac{2.303}{20} = 6.01 \text{ min.}$$

Q.64 (2)
Rate constant for psuedo I[st] order rxn. depend on conc. of reactant present in small amount.

Q.65 (2)

$$t_{75\%} = \frac{2.303}{k} \log \frac{100}{25}$$

$$k = \frac{2.303 \times 2 \times 0.301}{100}$$

$$t_{87.5\%} = \frac{2.303}{k} \log \frac{100}{12.5} = \frac{2.303 \times 3 \times 0.301 \times 100}{2.303 \times 2 \times 0.301} = \frac{300}{2}$$

$$= 150 \text{ min.}$$

Q.66 (1)

Reactivity towards $S_N2 \propto \frac{1}{\text{Steric hinderance}}$

$CH_3 - CH_2 - Cl$ is least sterically hindered.

Q.67 (4)
Iso Butane is not formed.

$$C_2H_5 - Cl + C_3H_7 - Cl \xrightarrow{Na|DE} \underset{\text{n–Butane}}{C_2H_5 - C_2H_5}$$

$$+ \underset{\text{n–pentane}}{C_2H_5 - C_3H_7} + \underset{\text{n–Hexane}}{C_3H_7 - C_3H_7}$$

Q.68 (4)
Williamson ether Synthesis process is proceed by Sn^2 mech.

So methyl chloride is more reactive towards Sn^2 than t - Butyl chloride.

Q.69 (2)

$$CH_3CH_2Br \xrightarrow{KCN} \underset{(A)}{CH_3CH_2CN} \xrightarrow[\Delta]{H_2O/H^{\oplus}} \underset{(B)}{CH_3CH_2COOH}$$

Q.70 (3)

$$R - Br + Cl^- \xrightarrow[Sn^2]{DMF} R - Cl + Br^{\ominus}$$

least sterically hindrend Alkyl Halide is most Reactive towards Sn^2.

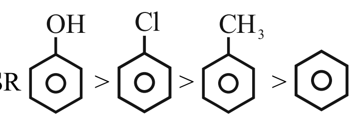
Q.71 (4)

(A) $(CH_3)_3 CHCH_2 Br \xrightarrow[Sn^2]{C_2H_5OH} (CH_3)_2 CHCH_2OC_2H_5 + HBr$

(B) $(CH_3)_3 CHCH_2Br \xrightarrow[Sn^2]{C_2H_5O^{\ominus}} (CH_3)_2 CHCH_2OC_2H_5 + Br^{\ominus}$

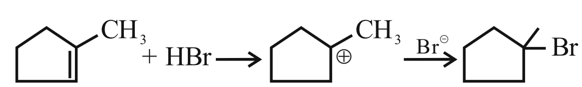
In reaction (A) no carbocation rearrangement is observed so reaction proceed via Sn^2.
In (B) $C_2H_5O^{\ominus}$ is a strong $Nu^{\ominus}$ which favours Sn^2.

Q.72 (4)

(1) Rate of ESR 

(2) Rate of NAR $HCHO > CH_3CHO > CH_3COCH_3$
(3) Rate of Sn^2 R-I > R-Br > R–Cl > R–F
(4) Rate of Sn^2 $CH_3 - Cl > CH_3CH_2Cl > CH_3-\underset{\underset{CH_3}{|}}{CH}-Cl$

Q.73 (4)



Q.74 (3)
$C_2H_5ONa + Br\,C_2H_5 \rightarrow C_2H_5 - O - C_2H_5 + NaBr$
This reaction is known as williamson's synthesis.

Q.75 (4)
$R - I > R - Br > R - Cl > R - F$

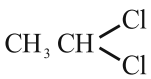
Q.76 (2)

$$CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_2 - CH_3 \xrightarrow[E_2]{Alc \cdot KOH} CH_3 - CH = CH - CH_3$$

Q.77 (4)

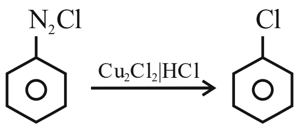
(1) $CH_3CH_2Br + KCN \rightarrow CH_3CH_2CN$
(2) $CH_3CH_2Br + AgCN \rightarrow CH_3CH_2NC$
(3) $CH_3CH_2Br + KNO_2 \rightarrow CH_3CH_2ONO$
(4) $CH_3CH_2Br + AgNO_2 \rightarrow CH_3CH_2NO_2$

Q.78 (4)



gem – di Halide

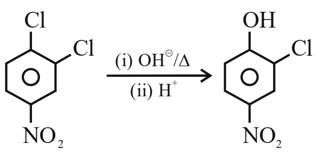
Q.79 (3)



Q.80 **(3)**

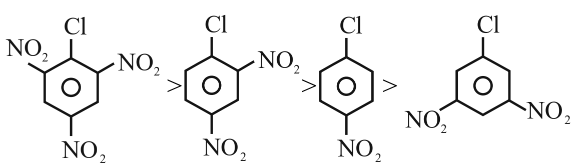
Rate of S_{N^1} $\propto$ stability of carbocation

Q.81 (2)



$-NO_2$ shows –m effect at para position so that –Cl will be more reactive for SnAr.

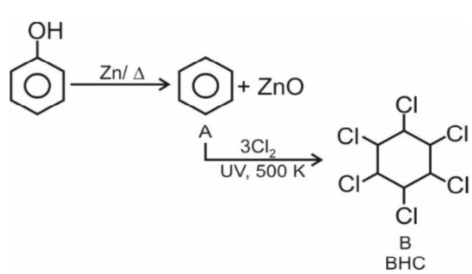
Q.82 (4)
Reactivity order for SnAr



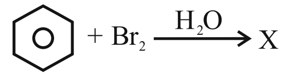
Q.83 (3)

Reaction is proceed by free radical Addition mechanism.

Q.84 (2)



Q.85 (2)



Stable due to Aromaticity.

Q.86 (1)

$$\log k = \log A - \frac{E_a}{2.303RT} \quad .....(1)$$

$$\log k = \log 10 - \frac{1000}{T} \quad \text{(given)} \quad .....(2)$$

Compairing equation (1) & (2)

$$\frac{E_a}{2.303R} = 1000$$

$E_a = 4.60$ k cal mol^{-1}

Q.87 (2)

$$t75\% = \frac{2.303}{k} \log \frac{100}{25},$$

$$k = \frac{2.303 \times 2 \times 0.301}{30} = 0.02310$$

Rate = k [A]
Rate = 0.02310×0.3
$= 0.00693 = 6.93 \times 10^{-3}$

Q.88 (4)
Unit of rate constant = $[mol\ L^{-1}]^{1-n}\ s^{-1}$
$= [mol\ L^{-1}]^{1-3}\ s^{-1}$
$= [mol\ L^{-1}]^{-2}\ s^{-1}\ mol^{-2}L^2s^{-1}$
$\therefore$ n = 3
So order of rxn. = 3

Q.89 (2)

$$k = 3 \times 10^{-3}\ min^{-1} = \frac{3 \times 10^{-3}}{60}\ s^{-1} = 0.05 \times 10^{-3}$$

$$= 5 \times 10^{-5}\ s^{-1}$$

$\therefore$ Rate = k [R]

$$[R] = \frac{Rate}{k} = \frac{2 \times 10^{-4}\ M s^{-1}}{5 \times 10^{-5} s^{-1}} = \frac{20}{5} = 4M.$$

Q.90 (1)
For zero order Rxn.

$$t = \frac{R_0 - R}{k}$$

$$t_{50\%} = \frac{100 - 50}{k} = \frac{50}{k}, \quad k = \frac{50}{t_{50\%}}$$

$$t_{90\%} = \frac{100-10}{k} = \frac{90}{k}$$

$$t_{90\%} = \frac{90}{50} \times t_{50\%} = 1.8 \times t_{50\%}$$

Q.91 (4)

$2P + Q \longrightarrow R$

differential rate equation

$$-\frac{1}{2}\frac{d[P]}{dt} = -\frac{d[Q]}{dt} = \frac{d[R]}{dt} = R[P]^2[Q]$$

Q.92 (3)

The given graph b/w $t_{\frac{1}{2}}$ and a is of zero order rxn.

Therefore for zero order rxn. graph b/w $\frac{-d[A]}{dt}$ & time will be of option (3) As for zero order reaction rate remain constant.

Q.93 (1)

For zero order Rxn.

$$t = \frac{[A_0]-[A_t]}{k}$$

$[A_0] - [A_t] = kt$

$[A_0] = kt + [A_t].$

$= (2 \times 10^{-2} \times 25) + 0.05$

$= 50 \times 10^{-2} + 0.05$

$= 0.50 + 0.05 = 0.55\,M \sim 0.5\,M$

Q.94 (4)

$$t_{99\%} = \frac{2.303}{k}\log\frac{100}{1} = \frac{2.303 \times 2}{k} = 32 \text{ .....(I)}$$

$$t_{99.9\%} = \frac{2.303}{k}\log\frac{100}{0.1} = \frac{2.303 \times 3}{k} \text{ .....(II)}$$

from eq. (I) $k = \frac{2.303 \times 2}{32}$

put this value of k in eq. (II)

$$t_{99.9\%} = \frac{2.303 \times 3 \times 32}{2.303 \times 2} = 48 \text{ min.}$$

Q.95 (1)

On increasing temperature rate of rxn. increase
So conc. of product also increase.

Q.96 (1)

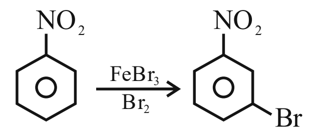
Swarts Reaction

$$3CCl_4 + 2SbF_3 \longrightarrow \underset{\text{Freon-12}}{3CF_2Cl_2} + 2SbCl_3$$

Q.97 (1)

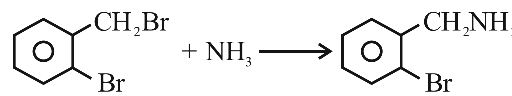
$$CHCl_3 + O_2 \longrightarrow \underset{\text{phosgene gas}}{COCl_2}$$

Q.98 (2)

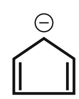


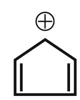
m–Bromo nitroBenzene

Q.99 (1)



Q.100 (3)

 Aromatic

 Anti Aromatic

BIOLOGY-I

SECTION-A

Q.101 (1)

Point mutation occur due to change in a single base pair of DNA

Q.102 (4)

Green seed colour is a recessive trait in ea plant.

Q.103 (1)

Q.104 (3)

Q.105 (3)

Q.106 (1)

Q.107 (1)

Henking observed X-chromosomes.

Q.108 (1)

This can happen when one parent is heterozygous and the other one is homozygous recessive.

Q.109 **(3)**

Father of couple: I^AI^B Mother of couple: I^oI^o

Possible blood groups $\begin{bmatrix} I^AI^0 & I^BI^0 \\ [A] & [B] \end{bmatrix}$

Possible blood groups $\begin{bmatrix} I^AI^B & I^AI^0 & I^BI^0 & I^0I^0 \\ [AB] & [A] & [B] & [O] \end{bmatrix}$

in children

Q.110 (2)

Male Drospphila is smaller than female.

Q.111 (2)

(b) Statements I and II are correct. Statements III and IV are incorrect and can be corrected as

- Codominance cannot be manifested phenotypically in humans as ABO blood group in humans is three alleles of gene I (I^A,I^B,i).
- ABO blood grouping system in humans does not follow Mendel's laws of inheritance.

Q.112 (1)

In pleiotropy, a single gene controls several phenotypes.

Q.113 (2)

Q.114 (2)

$XX \times X^cY$ $X^cX^c \times XY$

↓ ↓

XY X X^cY

↓

X^cX (Carrier), XX (Normal) — Daughter

X^cY (Colour blind), XY (Normal) — Sons

Q.115 (4)

Q.116 (2)

Q.117 (1)

Q.118 (3)

Q.119 (2)

Q.120 (2)

Q.121 (2)

Q.122 (3)

Q.123 (2)

Q.124 (2)

Q.125 (4)

Q.126 (4)

Q.127 (2)

Just before detection of hybridised DNA by autoradiography, hybridisation is done by using labelled VNTR probe.

Q.128 **(2)**

Q.129 (1)

Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

The two chains of DNA have antiparallel polarity. This is because one chain has a free phosphate moiety at the 5′ end of the ribose sugar and another chain has a free phosphate moiety at the 3′ end.

Q.130 (4)

Q.131 (4)

In most of the eukaryotes, structural genes in transcription units are polycistronic.

Q.132 (2)

Q.133 (2)

Q.134 **(1)**

$A = 17\%$

$A = T = 17\%$

$A + T + G + C = 100\%$

$34\% + G + C = 100\%$

$G + C = 66\%$

or $G = C = 33\%$

$G + T = 33 + 17 = 50\%$

$C = 33\%$

Q.135 **(2)**

RNA is formed and processed in the nucleus and then translated in cytoplasm.

SECTION-B

Q.136 (1)

Q.137 (4)
Hint: Punnett square is a graphical representation to calculate possible zygotic combinations.
Sol.: It is used for all mono, di or trihybrid crosses.
It was proposed by British geneticist, R.C. Punnett.

Q.138 (1)

Q.139 (1)

Q.140 (2)

Q.141 (3)

Q.142 (3)

Q.143 (2)
Based on the observations in hybridisation experiment on garden pea plant, Mendel proposed that something was being stably passed down, unchanged, from parent to offspring through the gametes, over successive generations. He called these things as factors.

Q.144 (3)

Q.145 (1)

Q.146 **(3)**

Q.147 (1)

Q.148 (4)

Q.149 (2)

Q150 (3)

BIOLOGY-II
SECTION-A

Q.151 (2)
Q.152 (3)

Q.153 (1)
Darkly stained regions in chromatin are called heterochromatin.

Q.154 (4)
Phage DNA was labelled with ^{32}P by growing bacteria infected with phages in culture medium containing $^{32}PO_4$.

Q.155 (3)

Q.156 (1)

Q.157 (1)

Q.158 (2)

Q.159 (3)

Q.160 (2)

Q.161 (3)

Q.162 (3)

Q.163 (2)

Q.164 (2)

Q.165 (3)

Q.166 (3)
When because of the competition for food and living space, a single ancestral species evolves into different species which occupy different habitats, it is called adaptive radiation.

Q.167 (4)
New genes are added to a new population and lost from the old population. If this change occurs by chance it is called genetic drift.

Q.168 (4)
Natural selection can lead to stabilisation, directional change or disruption.

Q.169 (4)
Homo sapiens arose in the ice age.

Q.170 (1)

Q.171 (3)
Homologous structures in different organisms show similarity in their anatomy.

Q.172 (3)

Q.173 (3)

Q.174 (1)
Adaptive radiation.
Examples of adaptive radiation are
(i) Darwin's Finches of Galapagos Island They had common ancestors but different types of modified beaks according to their food habits.
Darwin differentiated thirteen species of the finches according to their food habits
(ii) Australian Marsupials Darwin explained that adaption radiation gave rise to the varieties of marsupials (pouched mammals) in Australia by the same process of adaptive radiation as found in the finches of Galapagos Islands.
(iii) Placental mammals in Australia exhibit adaptive radiation in evolving into varieties of placental mammals each of which appears to be similar to corresponding marsupials

Q.175 (4)
Most primitive mammals are prototherians.

Q.176 (1)
In 1938, a fish caught in South Africa happened to be a Coelacanth which was thought to be extinct.

Q.177 (1)
de Vries gave his mutation theory on organic evolution while working on *Oenothera lamarckiana*.

Q.178 (1)
About 2000 million years ago the first ecllular forms of life appeared.

Q.179 **(2)**
Flying phalanger is Australian marsupial.
Flying squirrel is placental mammal.

Q.180 (4)

Q.181 (4)

Q.182 (1)

Q.183 (1)

Q.184 (2)
Comparing structural similarities is called comparative anatomy. The more similar two different species body structures are, the closer they evolutionary linked and the more recently they shared a common ancestor

Q.185 (4)

SECTION-B

Q.186 (4)
Q.187 (1)
Q.188 (1)
Q.189 (3)
Q.190 (3)
Q.191 (2)
Q.192 (2)
Gene *i* is responsible for the synthesis of repressor protein and gene *y* for permease.

Q.193 (3)

Q.194 **(1)**
In dsDNA, percentage of purines is equal to percentage of pyrimidines.

Q.195 (1)
Identifying all genes that are expressed as RNA is called ESTs.

Q.196 (2)

Q.197 (1)

Q.198 (3)
Thorns and tendrils of *Bougainvillea* and *Cucurbira* are homologous organs as they have same kind of structure but different functions.

Q.199 (3)

Q.200 (2)
For a long time, it was believed that life came out of decaying and rotting matter like straw mud, etc.
This was the theory of spontaneous generation.
Theory of spontaneous generation (abiogenesis or autogenesis) states that, life originated from non-living things in a spontaneous manner.