AITS FULL TEST-03

ANSWER KEY

PHYSICS

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

CHEMISTRY

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

BIOLOGY

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

PHYSICS

SECTION-A

Q.1 (1)

If we place concave lens of focal length 60 cm in contact with previous lens then :-

$$\frac{1}{f_{eq}} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{f_{eq}} = \frac{1}{20} + \frac{1}{(-60)} = \frac{1}{30}$$

$f_{eq} = 30$ cm

Now point object will be at focus combined lens whose image will from at ∞.

Q.2 (2)

The eye is least strained, the final image is formed at infinite.

$L = v_0 + f_e$

$7 = v_0 + 5$

$v_0 = 2$ cm

For objective

$$\mu_0 = \frac{f_0 \times v_0}{f_0 - v_0} = \frac{0.5 \times 2}{0.5 - 2} = -\frac{2}{3}\text{cm}$$

Q.3 (2)

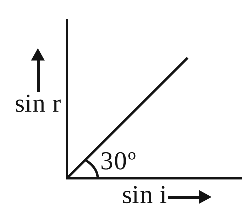
Correct Answer – 2

$$R = \frac{h}{\sqrt{\mu^2 - 1}} = \frac{4}{\sqrt{\left(\frac{5}{3}\right)^2 - 1}} = \frac{4 \times 3}{4}$$

$= 3$ m

Diameter $d = 2R = 6$m

Q.4 (3)



$$\frac{\sin r}{\sin i} = \tan 30° = \frac{1}{\sqrt{3}}$$

$1 \times \sin i = \sqrt{3} \sin r$

$\mu_1 \sin i = \mu_2 \sin r$

$\mu_1 = 1, \mu_2 = \sqrt{3}$

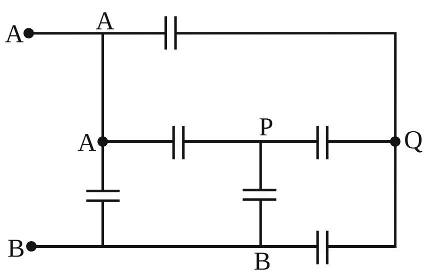
$$\frac{\mu_2}{\mu_1} = \sqrt{3} \Rightarrow \frac{v_1}{v_2} = \sqrt{3} \text{ (Since } \mu \propto 1/v)$$

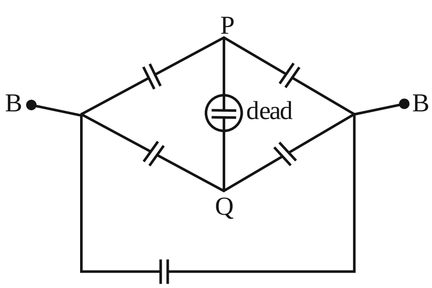
$\mu_2 \sin C = \mu_1 \sin 90°$

$$\sin C = \frac{\mu_1}{\mu_2} = \frac{1}{\sqrt{3}} \Rightarrow C$$

$= \sin^{-1}\left(1/\sqrt{3}\right)$

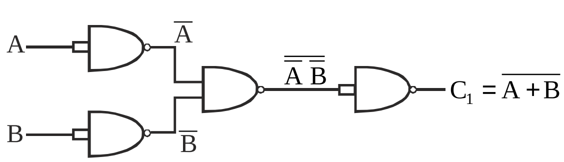
Q.5 (2)



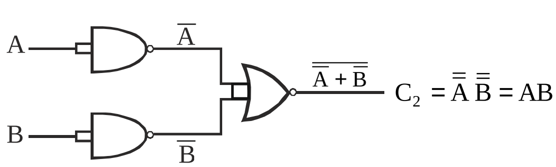


Balanced wheatstone bridge

Q.6 (1)



$\overline{\overline{A}\,\overline{B}} = \overline{\overline{A}} + \overline{\overline{B}} = A + B$



Q.7 (2)

Reverse biased potential for the Zener breakdown,

$V_r = Ed = 10^6 \times 2.5 \times 10^{-6} = 2.5$ volt.

Q.8 (3)

A bond is broken on the n-side and the electron freed from the bond jumps to a broken bond on the p-side to complete it.

A hole diffuses from the p side to the n side in a p - n junction; that is, an electron moves from the n side to the p side. This implies that a bond is broken on the n side. As the electron travels towards the p side, which is rich in holes, it combines with a hole. A hole is created because of the deficiency of one electron. So, when an electron combines with a hole, it completes that bond.

Q.9 (2)

$F = Kx \Rightarrow F_{max} = Kx_{max} = KA$

$$\text{Total energy} = \frac{KA^2}{2} = E$$

$$\Rightarrow FA = 2E \Rightarrow A = \frac{2E}{F}$$

Q.10 (2)

$V = \omega\sqrt{A^2 - x^2}$

and $V = A\omega \cos(\omega t + \phi)$

$$KE = \frac{1}{2}mv^2 = \frac{1}{2}mA^2\omega^2 \cos^2(\omega t + \phi)$$

$$\Rightarrow KE = \frac{1}{2}KA^2 \cos^2(\omega t + \phi)$$

$$= \frac{1}{2}KA^2\left[1 - \cos(2\omega t + 2\phi)\right]$$

$\Rightarrow$ angular frequency $= 2\omega$

$\Rightarrow$ frequency get doubled

Q.11 (4)

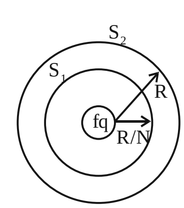
For conducting sphere,

$E_{inside} = 0$

$$\vec{E}_{out\,side} = \frac{Kq}{r^2}\hat{r}$$

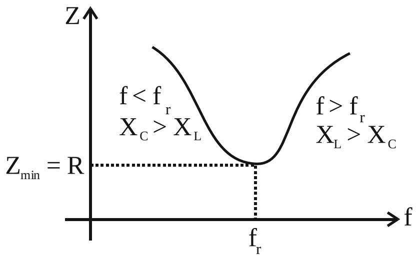
Q.12 (3)

From gauss law, electric flux through any closed surface is $\frac{1}{\varepsilon_0}$ times the charge inside.



Flux through sphere 1 and sphere 2 are same.

Q.13 (2)



If $f > f_r$, $X_L > X_C$

$\Rightarrow$ inductive circuit

$\Rightarrow$ voltage leads current

If $f < f_r$ $\Rightarrow X_L < X_C$

$\Rightarrow$ capacitve circuit

$\Rightarrow$ current leads voltage

Q. 14 (3)

$[v^2] = [L^2 T^{-2}]$

$[rg] = [L LT^{-2}]$

$$\Rightarrow \left[\frac{v^2}{rg}\right] = [M^0L^0T^0]$$

Q.15 (4)

Reading = MSR + (VSR × CC) – ZE

$= 6\text{ mm} + (5 \times 0.1)\text{ mm} - (-0.3\text{ mm})$

$= 6.8\text{ mm}$

Q. 16 (3)

$$[S.T.] = \left[\frac{MLT^{-2}}{L}\right] = [MT^{-2}]$$

$[S.T.] = [F^\alpha]\,[a^\beta]\,[t^\gamma]$

$= [MLT^{-2}]^\alpha\ [LT^{-2}]^\beta\ [T^\gamma]$

$= [M^\alpha\ L^{\alpha+\beta}\ T^{-2\alpha-2\beta+\gamma}]$

$\Rightarrow \alpha = 1,\ \beta = -1,\ \gamma = -2$

Q.17 (3)

Contribution of electric field and magnetic field in EM wave will be equal.

Q.18 (2)

Volume = constant $\Rightarrow A = \dfrac{\text{volume}}{\text{length}}$

$\ell_{\text{initial}} = \ell_0,\ \ell_{\text{final}} = 1.3\ \ell_0$

$$R = \frac{\rho l}{A} = \frac{\rho l}{\left(\frac{V}{l}\right)} = \frac{\rho l^2}{V}$$

$$R' = \frac{\rho}{V} = (1.3 l_0)^2 = 1.69\frac{\rho l^2}{V}$$

$\Rightarrow R' = 1.6\,R$

% increase in $R = \dfrac{\Delta R}{R} \times 100$

$$= \left(\frac{1.69R - R}{R}\right) \times 100$$

$= 69\%$

Q.19 (3)

$I \times 500 = 12 - 2 = 10V$

$I = 20\text{ mA}$

$$IR = 2 \Rightarrow R = \frac{2}{20 \times 10^{-3}} = 100\Omega$$

Q.20 (2)

$$I_g = \frac{0.2}{20} = 0.01A$$

Required shunt,

$$S = \frac{I_g \times G}{I - I_g} = \frac{1.01 \times 20}{10 - 0.01} \simeq 0.02\Omega$$

Q. 21 (1)

Applying relative motion (solving in elevator frame)

$$t = \sqrt{\frac{2h}{a_{\text{relative}}}} = \sqrt{\frac{2 \times 1.2}{10 + 2}}$$

$$= \sqrt{\frac{2.4}{12}} = \sqrt{0.2} = \frac{1}{\sqrt{5}}$$

Q.22 (1)

$u = 0,\ a = g$

$$S(0 \text{ to } ls) = 0 + \frac{1}{2}g(1)^2 = \frac{g}{2}$$

$$S(0 \text{ to } 6s) = 0 + \frac{1}{2}g(6)^2 = 18g = \frac{36g}{2}$$

$$S(0 \text{ to } 5s) = 0 + \frac{1}{2}g(5)^2 = \frac{25g}{2}$$

$$S(5 \text{ to } 6s) = \frac{36g}{2} - \frac{25g}{2} = \frac{11g}{2}$$

Q.23 (1)

$\rightarrow$ Monoatomic gas has 3 translational degree of freedom

$\rightarrow$ Rigid diatomic gas $\rightarrow$ 3 translation + 2 rotational

$\rightarrow$ Non rigid diatomic gas $\rightarrow$ 3 translational + 2 rotational + 1 vibration

$\rightarrow$ Polyatomic gas $\rightarrow$ 3 translational + 3 rotational and more than one vibrational

Q.24 (4)

$$C_v = \frac{fR}{2} \Rightarrow \frac{C_v}{R} = \frac{f}{2} = \frac{5}{2}$$

$\Rightarrow f = 5$

Q.25 (3)

For liquids, viscosity is due to the intermoelcular forces. When we increase the temperature, the molecules acquire higher energy and thus intermolecular forces are weakened. Hence, the viscosity of liquids decreases with increase in temperature. For gases, viscosity is due to collision between gas molecules. With increase in temperature, gas molecules attain more kientic energy and the rate of collision is more. Hence, viscosity of gases increases with increases in temperature.

Q.26 (2)

$$m_1v_1 = m_2v_2 \text{ or } \frac{m_1}{m_2} = \frac{v_2}{v_1}$$

$$\frac{r_1^3}{r_2^3} = \frac{v_2}{v_1} \text{ or } \frac{r_1}{r_2} = \left(\frac{v_2}{v_1}\right)^{1/3}$$

Q.27 (4)

$$\vec{B} = N\left[\frac{\mu_0 i}{2r}\right] = \frac{50 \times 4\pi \times 10^{-7} \times 2}{2 \times 4 \times 10^{-2}}$$

$= 1.57 \times 10^{-3}$ T.

Q.28 (4)

From result,

$$\frac{\text{Magnetic moment}}{\text{Angular momentum}} = \frac{q}{2m}$$

$$\frac{\vec{\mu}}{\vec{L}} = \frac{q}{2m}$$

and $\vec{L} = \vec{r} \times \vec{p} = \vec{r} \times m\vec{v}$

$$|\vec{L}| = mvr$$

$$\Rightarrow |\vec{\mu}| = \mu = \frac{qvr}{2}$$

Q.29 **(3)**

$$T = \frac{T_1 + T_2 + T_3 + T_4}{4}$$

Q.30 (2)

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

and $\lambda = 30°$

$\Rightarrow g' = g - R\omega^2 \cos^2 30°$

$$\Rightarrow g - g' = R\omega^2\left(\frac{\sqrt{3}}{2}\right)^2$$

$$\Rightarrow g - g' = R\omega^2\frac{3}{4}$$

$$\Rightarrow g - g' = \frac{3}{4}R\omega^2$$

Q.31 (1)

Escape velocity, $v_e = \sqrt{\frac{2GM}{R}}$

Where R = Radius of planet

M = Mass of planet

G = Universal gravitational constant

Also $M = \rho \times \frac{4\pi}{3}R^3$

$$\Rightarrow v_e = \sqrt{2G\rho\frac{4\pi}{3}R^2}$$

$$\Rightarrow v_e \propto \sqrt{\rho R^2}$$

$$\Rightarrow \frac{v_e'}{v_e} = \sqrt{\frac{(2\rho)\left(\frac{R}{2}\right)^2}{\rho R^2}} = \sqrt{\frac{1}{2}}$$

$$\Rightarrow v_e' = \frac{v_e}{\sqrt{2}}$$

Q.32 (4)

$$\text{Average power} = \frac{\text{Total work done}}{\text{Total time taken}}$$

Mass = 90 tonne = 90 × 1000 kg

Height = 200 m

Time taken = 1 hour = 3600 s

$$\Rightarrow \langle P_{avg} \rangle = \frac{mgh}{\Delta t} = \frac{90 \times 1000 \times 9.8 \times 200}{3600}$$

= 49000 W

= 49 kW

Q.33 (1)

Power = Total energy emitted per second

$$\text{Total energy} = \begin{pmatrix}\text{No. of}\\ \text{photons}\end{pmatrix} \times \begin{pmatrix}\text{Energy of}\\ \text{one photons}\end{pmatrix}$$

$$\Rightarrow P = \frac{N\left(\frac{hc}{\lambda}\right)}{t}$$

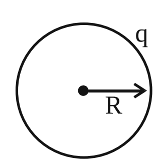
$$\Rightarrow 60 = \frac{N \times (6\cdot6 \times 10^{-34}) \times (3 \times 10^8)}{5000 \times 10^{-10} \times 1}$$

$\Rightarrow$ N = $1\cdot5151 \times 10^{20}$ photons per second

Q.34 (3)

Electric field, $E = \frac{Kq}{R^2}$

Electric potential, $V = \frac{Kq}{R}$



Acoording to question,

$E_1 = E_2$

$$\Rightarrow \frac{Kq_1}{R_1^2} = \frac{Kq_2}{R_2^2} \qquad \Rightarrow \frac{q_1}{q_2} = \left(\frac{R_1}{R_2}\right)^2$$

Ratio of electric potential,

$$\frac{v_1}{v_2} = \frac{\frac{Kq_1}{R_1}}{\frac{Kq_2}{R_2}} = \left(\frac{q_1}{q_2}\right)\left(\frac{R_2}{R_1}\right)$$

$$\Rightarrow \frac{v_1}{v_2} = \left(\frac{R_1}{R_2}\right)^2 \frac{R_2}{R_1} = \frac{R_1}{R_2}$$

Q.35 **(1)**

Energy stored = Energy density × volume

$$= \frac{1}{2}\epsilon_0 E^2 Ad$$

$$= \frac{1}{2}\epsilon_0 \left(\frac{q}{A\epsilon_0}\right)^2 Ad$$

$$= \frac{q^2 d}{2A\epsilon_0}$$

SECTION-B

Q.36 (4)

Mutual inductance is defiend for system or piar of coils. It is not defiend for an individual coil.

$\Rightarrow$ $M_{12} = M_{21}$

Also $\phi_{secondary} = M\, i_{primary}$

$\Rightarrow$ Mutual inductance can be increased by increasing ϕ

$\Rightarrow$ M can be increased by brining the coils closer.

Q.37 (3)

Initial angular velocity, $\omega_0 = 0$

Angular acceleration, $\alpha = 2\frac{rad}{s^2}$

Apply, $\theta = \omega_0 t + \frac{1}{2}\alpha t^2$

$\Rightarrow \theta = \frac{1}{2}(2)\ (10)^2 = 100$

No. of revolution, $N = \frac{\theta}{2\pi} = \frac{100}{6\cdot 28} \approx 16$

Q.38 (4)

$k_1 = 24$ cm

$r = 7$ cm

$I = I_G + Mr^2$

$Mk^2 = Mk^2_1 + Mr^2$

$k = \sqrt{k_1^2 + r^2} = \sqrt{24^2 + 7^2}$

$= 25$ cm

Q.39 (4)

$T = m\omega^2 r$

$$\omega^2 = \frac{T}{mr} = \frac{400}{5\times 5} = 16$$

$\omega = 4$ rad/sec.

Q.40 (2)

From newton's 2[nd] law :

$$\vec{F}_{avg} = \frac{\Delta\vec{P}}{\Delta t} = \frac{\text{Linear impulse}}{\text{time taken}}$$

$$\Rightarrow \left|\Delta\vec{P}\right| = \vec{F}_{avg}(\Delta t)$$

$1N = 10^5$ days

and $f_{avg} = 100$ dyne $= 100 \times 10^{-5}$ N $= 10^{-3}$ N

$\Rightarrow$ $\Delta P = (10^{-3})\ 3 = 3$ milli (N – S) = 3 mNS

Q.41 **(1)**

If initial momentum of particles is zero, then they loss all their energy in inelastic collision but here initial momentum is not zero.

Principle of conservation of momentum holds good for all collision.

Q.42 (3)

First law of thermodynamics is based on law of conservation of energy and it can be written as

dQ = dU – dW.

where dW is work done on the system

Q.43 (4)

$X_L = \omega L = 200 \times 0.2 = 40\Omega$

$R = 10\Omega$

Power factor, $\cos\phi = \frac{R}{Z} = \frac{1}{\sqrt{2}}$

and $Z = \sqrt{R^2 + (X_L - X_C)^2}$

$$\Rightarrow \frac{R}{\sqrt{R^2 + (X_L - X_C)^2}} = \frac{1}{\sqrt{2}}$$

$\Rightarrow 2R^2 = R^2 + (X_L - X_C)^2$

$\Rightarrow R^2 = (X_L - X_C)^2$

$\Rightarrow X_L - X_C = \pm R$

$\Rightarrow X_C = 50\Omega$ or 30Ω

Q. 44 (4)

Applying junction law at O

$$\frac{(V_0 - 6)}{4} + \frac{(V_0 - 8)}{2} + \frac{(V_0 - 10)}{4} = 0$$

$\Rightarrow 2V_0 - 16 + 2V_0 - 16 = 0$

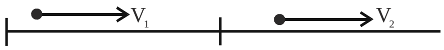
$\Rightarrow 4V_0 = 32$

$\Rightarrow V_0 = 8$ volt

$i_{2\Omega} = \frac{V_0 - 8}{2} =$ zero

Q. 45 (3)

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time taken}}$$



$$\Rightarrow V_{avg} = \frac{\frac{S}{4}+\frac{3S}{4}}{t_1+t_2}$$

$$= \frac{S}{\frac{S}{4}\left(\frac{1}{V_1}+\frac{3}{V_2}\right)} = \frac{4V_1V_2}{V_2+3V_1}$$

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$t_1 = \frac{\frac{S}{4}}{V_1} = \frac{S}{4V_1}$$

$$t_2 = \frac{3S}{4V_2}$$

Q.46 (3)

Deutron is ${}_1H^2$ and alpha particle is ${}_2He^4$.

Nuclear reaction is

$${}_1H^2 + {}_8O^{16} \longrightarrow {}_2He^4 + {}_7X^{14}$$

X is nitrogen

Q.47 (2)

Magnetic force, $\vec{F}_m = q\left(\vec{V}\times\vec{B}\right)$

From property of cross product,

$\vec{V}$ is perpendicular to $\vec{F}$ and $\vec{B}$ is perpendicular to $\vec{F}$

$\Rightarrow \vec{V}\cdot\vec{F} = 0$ and $\vec{B}\cdot\vec{F} = 0$

$\Rightarrow -2 + 6 - z = 0 \Rightarrow z = 4$

and $\vec{B}\cdot\vec{F} = 0$

$\Rightarrow -1 + 2y - 3 = 0$

$\Rightarrow 2y = 4 \Rightarrow \boxed{y = 2}$

Q.48 (3)

Energy of incident photon = $h\nu$

Minimum energy required = W

or work function = W

Maximum K.E. = $h\nu - W$

So, K.E. $\le KE_{max}$

$\Rightarrow$ K.E. $\le (h\nu - W)$

Q.49 (3)

Heat released = change in potential energy

$$= U_f - U_i = -\frac{PE}{2} - (-PE)$$

$$= \frac{PE}{2}$$

$$= \frac{10^{-26}\times10^{20}\times2\times10^{6}}{2} = 1\text{ J}$$

Q. 50 (4)

Displacement current = conductional current

$$\Rightarrow i_d = i_c = \frac{dq}{dt} = \frac{d(CV)}{dt}$$

$$\Rightarrow i_d = C\frac{dV}{dt} = (1\times10^{-6})\times5$$

$\Rightarrow i_d = 5\times10^{-6}$ A

$\Rightarrow \boxed{i_d = 5\mu A}$

CHEMISTRY

SECTION-A

Q.51 (1)

3.35×10^{-18}

In this power (–18) signifies 17 zeroes preceding to first non zero digit 3 and zeroes preceding non zero digit are not significant.

So number of significant fig. = (3)

Q.52 (1)

Q.53 (3)

ℓ = 2 mean d subshell e^- & for Cu Electronic configuration is Cu = [Ar] $3d^{10}\,4s^1$

$\therefore$ In d subshell there are 10 electrons

Q.54 (4)

$$\frac{4^{th}\, r_{He^+}}{2^{nd}\, r_{Be^{3+}}} = \frac{\frac{52.9\times n^2}{z}}{\frac{52.9\times n^2}{z}} = \frac{52.9\times16\times4}{2\times82.9\times4} = \frac{8}{1}$$

$\therefore$ Ratio = 8 : 1

Q.55 (2)

Q.56 (2)

For reverse reaction $K^1 = \frac{1}{K}$

And reverse reaction divided by 2 $\therefore$ $K^1 = \frac{1}{\sqrt{K}}$

Q.57 (2)

$$Zn(OH)_2 \rightarrow \underset{S}{Zn^{+2}} + \underset{2S}{2OH^-}$$

$K_{sp} = (S)(2S)^2 = 4S^3 = 4\times10^{-15}$

$$\therefore S = \sqrt[3]{\frac{4\times10^{-15}}{4}} = 1\times10^{-5}$$

$\therefore$ $[OH^-] = 2\times1\times10^{-5} = 2\times10^{-5}$ mol^{-1}

Q.58 (1)

$Fe_3O_4 \rightarrow Fe^{3+}$

No change in oxid. no

$FeO + Fe_2O_3 \rightarrow Fe^{+3}$

Oxid. no. increase by 1

$\therefore$ n Factor = 1

Q.59 (3)

$AgCl \rightarrow Ag^{+} + Cl^{-}$

$\quad\quad\quad\quad S \quad\; S$

$K_{sp} = S^2 = (1 \times 10^{-5})^2 = 1 \times 10^{-10} mol\ L^{-1}$

Solubility in 0.05 NaCl $\Rightarrow [Cl^-] = 0.05$ M

K_{sp} of AgCl $= [Ag^+][Cl^-]$

$1 \times 10^{-10} = S[0.05]$

$$S = \frac{1\times10^{-10}}{0.05} = 2 \times 10^{-9} M$$

Q.60 (3)

Q.61 (3)

$$W_{Ag} = Z\ it = \frac{GAM \times i \times t(sec)}{\Lambda F} = \frac{108 \times 9.65 \times 1000}{1 \times 96500}$$

= 10.8g

Q.62 (2)

$$K = \frac{2.303}{t}\log\left[\frac{R_o}{R_t}\right] = \frac{2.303}{15}\log\frac{100}{25}$$

$$= \frac{2.303}{15}\log 4 = \frac{2.303 \times 0.602}{15}$$

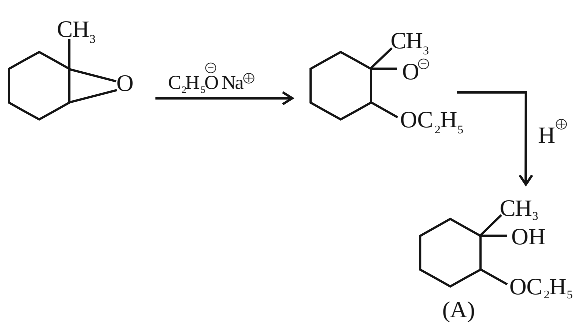
$$t_{1/2} = \frac{0.693}{K} = \frac{0.693 \times 15}{2.303 \times 0.602} = 7.5 \text{ sec.}$$

Q.63 (2)

To show the Iodo form Test Compound Should have

$CH_3-CH(OH)-$ group

Q.64 (1)



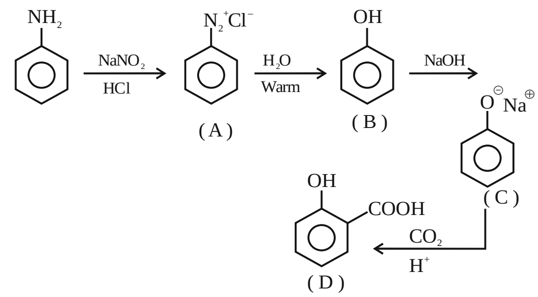
Q.65 (3)

Aromatic Aldehyde will not give Fehling test

Q.66 (4)

$$CH_3-\overset{O}{\overset{\|}{C}}-OH \xrightarrow{NH_3/\Delta} \underset{(x)}{CH_3-\overset{O}{\overset{\|}{C}}-NH_2} \xrightarrow[NaOH]{Br_2/} CH_3-NH_2$$

Q.67 (4)



Q. 68 (4)

Vitamin B and C is water soluble Vitamin .

Q.69 (3)

Molar mass of AgBr = 108+80 = 188 g / mol

188g AgBr Contains 80g Bromine

0 . 2g of AgBr Contains $\frac{80 \times 0.2}{188}$ g of Bromine

$$\text{Percentage of Bromine} = \frac{80 \times 0.2 \times 100}{188 \times 0.28} = 30.39 \approx 30.4\%$$

Q.70 (3)

$I_3^- \rightarrow Sp_3d$

$XeF_2 \rightarrow Sp_3d$

$SF_6 \rightarrow Sp_3d^2$

$XeO_3 \rightarrow Sp^3$

Q.71 (3)

$O_2 \rightarrow \sigma1S^2\ \overset{*}{\sigma}1S^2\ \sigma2S^2\ \overset{*}{\sigma}2S^2\ \sigma2P^2_z\ (\pi2P^2_x = \pi2P^2_y)\ (\overset{*}{\pi}2P^1_x = \overset{*}{\pi}2P^1_y)$

6 e^- are present in antibonding orbital .

Q.72 (3)

$[SiCl_6]^{-2}$ dose not exist because 6 large Cl^- ion cannot be accomdated around Si^{+4} due to limitation of SiZe

Q.73 (3)

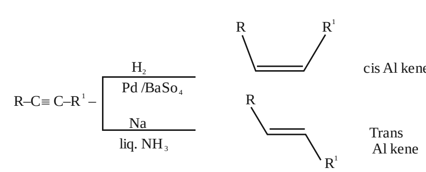
I_2O_5 $\rightarrow$ used in estimation of Co

ClO_2 $\rightarrow$ used as Bleaching agent

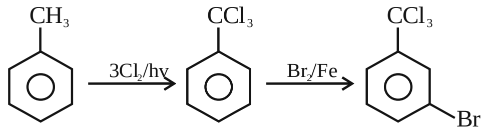
O_2F_2 $\rightarrow$ used in Removing plutonium from spent nuclear fuel

Moscouium $\rightarrow$ A Synthitic Radiodctive element

Q.74 (3)



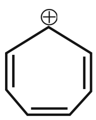
Q.75 (3)



(x) (y)

Q.76 (1)
electromeric effect will show only in the presence of attacking Reagent

Q.77 (3)

 other three is non Aromatic species

Q.78 (3)
$CH_3-\underset{\underset{O}{\parallel}}{C}-CH_2CH_2CH_2COOH$
5 – oxo ohexanoic acid

Q.79 (4)

$$CH_3Cl \xrightarrow{KCN} \underset{(A)}{CH_3CN} \xrightarrow{H_3O^{\oplus}} \underset{(B)}{CH_3COOH}$$

Q.80 (2)
$S^{-2} > Ci > K^{+} > Ca^{+2}$ [Ionic size order]

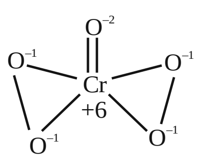
Q.81 (4)
$[Co(NH_3)_3(No_2)_3]$ can show cis and Trans isomerism

Q.82 (3)
NO_2^- is Ambidentale ligand .

Q.83 (4)

$$4FeCrO_4 + 8Na_2Co_3 \xrightarrow{air} 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$$

Q.84 (3)



Q.85 (4)
Conceptual

SECTION-B

Q.86 (4)
$Fe_4[Fe(CN)_6]_3 \rightarrow 4Fe^{+3} + 3[Fe(CN)_6]^{-4}$
7ions produced in aq . medium

Q.87 (2)
electromeric effect is temporary effect

Q.88 (3)
Carbon can show +4 and –4 oxidation state both .
In both the oxidation states carbon completes its duplet and octet to gain stability

Q.89 (3)

$SF_4 \longrightarrow sp^3d$
$CH_4 \longrightarrow sp^3$
$XeF_4 \longrightarrow sp^3d^2 \longrightarrow$ 4 .B .P.+ 2L.P $\rightarrow$ Squar planar shape
$ClF_3 \longrightarrow sp^3d$

Q.90 (3)
$ID = 3.33 \times 10^{-30}$ Cm

Q.91 (3)
Pernicious anaemia is caused by the deficiency of Vitamin B_{12}.

Q.92 (2)

$CH_3-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{\parallel}}{C}-H$ This compound can give aldol reaction

but to show Aldol condensation carbonyl group Should have at least 2α –H .

Q.93 (1)
Half life of Ist order reaction is independent of initial conc.

Q.94 (2)

$$\Lambda^{o}_{m[K_2SO_4]} = 2\lambda^{o}_{mK^+} + 1\lambda^{o}_{mSO_4^{-2}}$$

$\therefore$ So Correct Ans. (2)

Q.95 (2)

$$\Delta T_f = K_f m = \frac{1.86 \times 30 \times 1000}{60 \times 500} = 1.86\,K = 1.86\,°C$$

$$\Delta T_f = T^{o}_{f(H_2O)} - T_{f(sol)} = O^{o}C - T_{f(sol)}$$

$$T_{f(sol)} = -1.86\,°C$$

Q.96 (4)

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

$$[Fe^{+2} \rightarrow Fe^{+2} + e^-] \times 6$$

$$Cr_2O_7^{-2} + 6\,Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$$

So 6mol of Fe^{+2} Oxidised by 1 mol of $Cr_2O_7^{-2}$

Q.97 (2)
$\Delta G = \Delta H - T\Delta S$
At Equilibrium $\Delta G = 0$ $\therefore$ $T\Delta S = \Delta H$

$$T = \frac{\Delta H}{\Delta S} = \frac{37.5 \times 10^3\ Jmol^{-1}}{150 Jk^{-1} mol^{-1}} = 250\ K$$

Q.98 (2)

wt of 1 L of a gas = 1.97 g

$\therefore$ wt of 22.4 L of a gas = 1.97 × 22.4 = 44.1 g

$\therefore$ Gas is CO_2

Q.99 (3)

Be > B > Li

Q.100 (3)

$$\underset{}{RCN} \xrightarrow{LiAlH_4} \underset{[X]}{R-CH_2NH_2} \xrightarrow[H_2O]{NaNO_2+HCl} \underset{[Y]}{RCH_2-OH} \quad \text{Alcohol}$$