AITS FULL TEST-07

ANSWER KEY

PHYSICS

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

CHEMISTRY

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

BIOLOGY

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

PHYSICS
SECTION-A

Q.1 (2)

For SHM

$a = -\omega^2 x$

Q.2 (1)

$V_s = \frac{I_s}{R}$

$R = \frac{I_s}{V_s} = 10^3\,\Omega$

Q.3 (4)

Acceleration of blocks

$a = \frac{(6-4)}{(6+4)} \times 10 = 2\,m/s^2$

Again $v = u + at$

$v = 0 + 2 \times 5$

$= 10\,m/s$

Q.4 (4)

Factual

Q.5 (3)

$U_1 = U_2$

$n_1(C_V)_1 T_1 = n_2(C_V)_2 T_2$

$n_1 \times \frac{3R}{2} \times 10T = n_2 \times \frac{5R}{2} \times 6T$

$n_1 \times 30 = n_2 \times 30$

$\frac{n_1}{n_2} = 1$

Q.6 (4)

$\vec{r} = \hat{i} - \hat{j}$

$\vec{F} = -F\hat{k}$

$\vec{\tau} = \vec{r} \times \vec{F} = \left(\hat{i} - \hat{j}\right) \times \left(-F\hat{k}\right)$

$\vec{\tau} = F\left(\hat{i} + \hat{j}\right)$

Q.7 (3)

$U_i + W = U_f$

$W = U_f - U_i = \frac{3kQ^2}{(2a)} - \frac{3kQ^2}{a} = -\frac{3kQ^2}{2a}$

Q.8 (4)

Mean free path $(\lambda) = \frac{1}{\sqrt{2}\pi n d^2}$.

Q.9 (4)

As frequency remains same, stopping potential doesn′t get changed.

Also , Intensity $\propto \frac{1}{r^2}$

r′ =3r

Intensity becomes $\frac{1}{9}^{th}$

$\Rightarrow$ Saturation current also becomes $\frac{1}{9}^{th}$ of initial value

$I'_S = \frac{1}{9} \times 18 = 2.0\,mA$

Q.10 (4)

$\lambda = \frac{h}{p}$

if p = same

then λ = same

Q.11 (2)

$V = 1.61 \times 2.2 \times 3.1$

$= 10.9802\,m^3$

The above result must be rounded off upto 2 significant figures .

$\therefore V = 1.1 \times 10^1\,m^3$

Q.12 (3)

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

$\omega = [T^{-1}]$

$I = MR^2 = (M^1L^2)$

Q.13 (2)

We know velocity of electron in n^{th} shell of hydrogen atom is given by

$v = \frac{2\pi k Z e^2}{nh}$ $\quad\therefore\quad v \propto \frac{1}{n}$

Q.14 (4)

Factual

Q.15 (2)

For balanced wheatstone bridge

$\frac{100}{400} = \frac{200R}{(200+R)\times 400}$

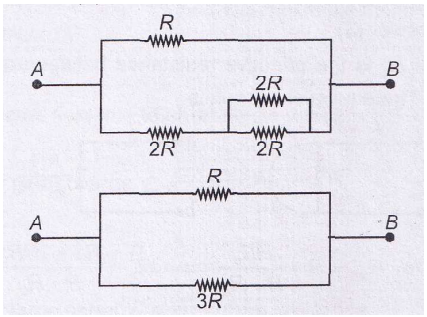
Solving we get

$R = 200\Omega$

Q.16 (1)

Reading of galvanometer remains same whether swith S is open or closed, hence no current will flow through the switch i.e. R and G will be in series and same current will flow through them. $I_R = I_G$.

Q.17 (4)



$R_{AB} = \frac{3R}{4}$

Q.18 (2)

$B = \mu_0 H$; $\mu_0 ni = \mu_0 H$

$\frac{100}{0.2} \times 5.2 = H$

$H = 2600\,A/m$

Q.19 (1)

$i = i_0 \sin \omega t$

$= \sqrt{2} i_{rms} \sin \omega t$

$= \sqrt{2} \times 3 \times \sin\left(2\pi \times 50 \times \frac{1}{600}\right)$

$= 3\sqrt{2} \sin \frac{\pi}{6}$

$= 3\sqrt{2} \times \frac{1}{2} = \frac{3}{\sqrt{2}} A$

Q.20 (3)

$h = \frac{2T\cos\theta}{r\rho g}$

$h \propto \frac{1}{r} \Rightarrow \frac{h_2}{h_1} = \frac{r_1}{r_2} \Rightarrow h_2 = 4h_1$

mass of water = $V \times \rho_{water}$

$\frac{M'}{M} = \frac{\pi\left(\frac{r}{4}\right)^2 \times (4h) \times \rho_w}{\pi r^2 \times h \times \rho_w} \Rightarrow \frac{1}{4}$

$\Rightarrow M' = \frac{M}{4}$

Q.21 (4)

From Malus law

$I = \left(\frac{I_0}{2}\right)\cos^2\theta$

$\frac{12.5}{100}I_0 = \frac{I_0}{2}\cos^2\theta$

$\cos^2\theta = \frac{1}{4}$

$\cos\theta = \frac{1}{2}$

$\theta = 60^o$

Q.22 (3)

Q.23 (1)

Q.24 (2)

F.B. $\rightarrow$ Diffusion

R.B $\rightarrow$ Drift

Q.25 (3)

$C = \frac{A\varepsilon_0}{d - t + \frac{t}{k}}$

$C = \frac{A\varepsilon_0}{d - \frac{d}{3} + \frac{d}{3\times 2}} = 6\frac{A\varepsilon_0}{5d}$

Q.26 (4)

$\int vdt = \Delta x$ = displacement

$\int adt = \Delta v$ = change in velocity

Q.27 (3)

$V = \sqrt{\frac{GM}{R}}$

$\frac{M_1}{R_1} = \frac{M_2}{R_2}$

Q.28 (2)

$\Delta k = \frac{1}{2}\times\frac{m_1m_2}{m_1+m_2}u^2 = \frac{1}{2}\times\frac{0.5\times1}{1.5}\times2^2 = 0.67$ J

Q.29 (3)

$n = \frac{f}{f+u}$

solving $u = \frac{f(1-n)}{n}$

Q.30 (1)

Energy stored

$= \frac{1}{2}.Fx \quad = \frac{1}{2}\times400\times2\times10^{-3} = 0.4J$

Q.31 (3)

$E = \frac{\rho r}{3\in_0} = \frac{\rho r\times4\pi}{3(4\pi\in_0)}$

$= \frac{2\times10^{-4}\times5\times10^{-2}\times4\times3.14\times9\times10^9}{3}$

Solving we get

$E = 3.768\times10^5$N/C

$\approx 3.75\times10^5$N/C

Q.32 (3)

$\frac{\lambda}{2} = 40\times10^{-2}$m

Also , $L = \frac{m\lambda}{2}$

$480\times10^{-2} = m\times40\times10^{-2}$

$m = 12$

$\therefore$ no. of overtone = m– 1

$n = 11$

Q.33 (3)

$W = \int\vec{F}\cdot\vec{dr}$

$= \int(x\hat{j} + y\hat{i}).(dx\,\hat{i} + dy\,\hat{j})$

$= \int(xdy + ydx)$

$= \int d(xy) = (xy)_{(0,0)}^{(1,2)} = 1\times2 - 0 = 2J$

Q.34 (4)

Q.35 (2)

$(C_p)_{N_2} = \frac{7R}{2}; (C_p)_{He} = \frac{5R}{2}$

$(C_v)_{N_2} = \frac{5R}{2}; (C_v)_{He} = \frac{3R}{2}$

$\gamma_{N_2} = \frac{7}{5}$

Alos $\gamma_{mix} = \frac{n_1C_{p1} + n_2C_{p2}}{n_1C_{v1} + n_2C_{v2}} = \frac{\frac{7R}{2} + \frac{5R}{2}}{\frac{5R}{2} + \frac{3R}{2}}$

$= \frac{12}{8} = \frac{3}{2}$

Also Average molecular wt . of mixture -

$$M = \frac{n_1M_1 + n_2M_2}{n_1 + n_2} = \frac{n \times 28 + n \times 4}{2n} = 16$$

Now ,speed of sound -

$$V = \sqrt{\frac{\gamma RT}{M}} \Rightarrow \frac{V_{mix}}{V_{N_2}} = \sqrt{\frac{\gamma_{mix}}{\gamma_{N_2}} \times \frac{M_{N_2}}{M_{mix}}} = \sqrt{\frac{\frac{3}{2}}{\frac{7}{5}} \times \frac{28}{16}}$$

$$= \sqrt{\frac{3 \times 28 \times 5}{2 \times 7 \times 16}} = \sqrt{\frac{15}{8}}$$

SECTION-B

Q.36 (4)

Sudden or adiabatic process

$TV^{\gamma-1}$ = constant for

$T_1V_1^{\gamma-1} = T_2V_2^{\gamma-1}$

$$\Rightarrow T_2 = \left(\frac{V_1}{V_2}\right)^{\gamma-1} \times T_1 \Rightarrow T_2 = \left(\frac{V}{V/8}\right)^{\frac{5}{3}-1} \times 300$$

$\Rightarrow T_2 = 1200$ K or 927°C

Q.37 (1)

$M = iA$

$= 1 \times \pi (1)^2$

$= \pi$

Q.38 (3)

$$Y = \frac{\text{stress}}{\text{strain}}$$

Q.39 (1)

Percentage error in the value of

$$x = \frac{1}{3}(\text{P.E. in a}) + 2 \times (\text{P.E. in b}) + \text{P.E. in c}$$

$$= \frac{1}{3} \times 0.3 + 2 \times 1 + 0.9 = 3\%$$

Q.40 (1)

Q.41 (4)

factual

Q.42 (1)

$$V_{av} = \frac{u+v}{2} = \frac{0+at}{2} = \frac{10 \times 4}{2} = 20 \text{m/s}$$

Q.43 (2)

$$\therefore g = \frac{GM}{R^2} \quad ; \quad M = g\frac{R^2}{G}$$

Q.44 (1)

Q.45 (2)

Q.46 (4)

$$\beta = \frac{\lambda D}{d} \Rightarrow \frac{\beta_2}{\beta_1} = \frac{\lambda_2 D_2 d_1}{\lambda_1 D_1 d_2}$$

$\Rightarrow \beta_2 = 2.5 \times 10^{-4}$m

Q.47 (2)

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

Also $p = \frac{h}{\lambda}$

Q.48 (1)

With change in shape of conductor its capacitance changes

$\therefore$ potential changes

as $V = \frac{Q}{C}$

Q.49 (1)

Q.50 (1)

For A mass number = 34

Total binding energy = 1.2 × 34 = 40.8 MeV

For B mass number = 26

total binding energy = 1.8 × 26 = 46.8 MeV

Difference of BE = 6 MeV

CHEMISTRY

SECTION-A

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

Q.80 (1)

Assertion and Reason true and R is the correct explanation of A.

Q.81 (3)

Q.82 (1)

Both statements are true.

Zr and Hf have similar sizes due to lanthanide contraction.

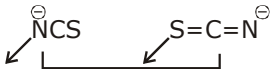
$KMnO_4$ oxidises oxalic acid to CO_2 and changes to Mn^{+2} ion, which is colourless.

Q.83 (1)

Q.84 (2)

$\ddot{N}H_2 - CH_2 - CH_2 - \ddot{N}H_2$. It contains two donor atoms i.e. nitrogen. So it is a bidentate ligand.

Q.85 (4)



Ambident ligand

Since both cation & anion constitute coordination sphere so it exhibit coordination isomerism and contains ambident ligand so, it shows linkage isomerism.

SECTION-B

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

BOTANY

SECTION - A

Q.101 (3) **Q.102** (1) **Q.103** (3) **Q.104** (1) **Q.105** (4)
Q.106 (4) **Q.107** (2) **Q.108** (2) **Q.109** (1) **Q.110** (4)
Q.111 (2) **Q.112** (3)

Q.113 (4)

Amount of DNA is also reduced to half after meiosis II.

Q.114 (3)

Q.115 (1)

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

PEP carboxylase is the primary CO_2 acceptor in C_4-plants and this enzyme works at high temperature only. Thus, C_4 plants can survive in high temperature.

Q.116 (2) **Q.117** (2) **Q.118** (2) **Q.119** (2) **Q.120** (3)
Q.121 (1) **Q.122** (3) **Q.123** (3) **Q.124** (1)

Q.125 (1)

AA × aa is a test cross.

Q.126 (2)

Tr Rr (heterozygous tall and pink)
↓(self crosse(4)
Tt Rr × Tt Rr
Gametes TR Tr tR tr

TR	TTRR (Red)	TTRr (Pink)	TrRR (Pink)	TrRr (Pink)
Tr	TTR (Pink)	TTrr	TrRr (Pink)	Ttrr
tR	TrRR	TrRr	ttRR	ttrR (Pink)
tr	TrRr	Ttrr	ttRr (Pink)	ttrr

1/16 TTRR
2/16 TTRr
2/16 TtRR
4/16 TtRr
} 9/16-75%

1/16 TTrr
2/16 Ttrr
} 3/16 – 25%

2/16 ttRR
2/16 ttRr
} 3/16 – 50%

1/16 ttrr 1/16 – 50%

Q.127 (4) **Q.128** (2) **Q.129** (2) **Q.130** (2) **Q.131** (3)
Q.132 (2) **Q.133** (1) **Q.134** (2)

Q.135 (4)

Passenger pigeon has become extinct due to excess usage.

Passenger pigeon got extinct by over exploitation by humans.

SECTION - B

Q.136 (4)

Q.137 (4)

The pteridophytes are further classified into four classes : Psilopsida (Psilotum): Lycopsida (Selaginella, Lycopodium), Sphenopsida (Equisetum) and Pteropsida (Dryopteris, Pteris, Adiantum).

In pteridophytes, class-Pteropsida inchides pteris, Adiantune and Dryopteris.

Q.138 (1) **Q.139** (3) **Q.140** (1) **Q.141** (2) **Q.142** (2)
Q.143 (3) **Q.144** (1) **Q.145** (3) **Q.146** (4) **Q.147** (4)
Q.148 (3) **Q.149**(2) **Q.150** (1)

ZOOLOGY

SECTION-A

Q.151 (3)

Q.152 (4)

Q.153 (4)

Agnatha are jawless vertebrates. in which notochord persist throughout life. Agnatha is devided into two classes-Ostracodermi and Cyclostomata. Examples of cyclostomates are Hagfish (Myxine) and lamprey (Petromyzon). Agnatha does not posses exoskeleton and posses cartilaginous vertebral column. Hence Agnatha members lack bony skeleton.

Q.154 (2)

Q.155 (1)

Q.156 (3)

Q.157 (3)

Q.158 (2)

Q.159 (2)

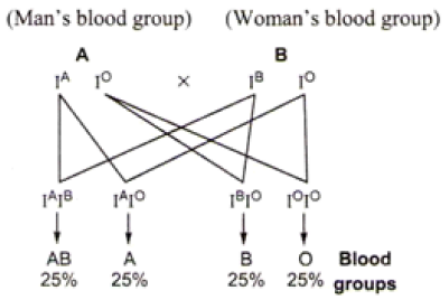
Hint : The phase after metaphase is anaphase.

Sol. : During anaphase, centromere splits, chromatids separate and move to opposite poles.

Cell plate formation occurs during cytokinesis.

Q.160 (1) **Q.161** (1) **Q.162** (3) **Q.163** (3) **Q.164** (3)
Q.165 (4) **Q.166** (2) **Q.167** (1) **Q.168** (3) **Q.169** (1)
Q.170 (3) **Q.171** (2) **Q.172** (1) **Q.173** (4)

Q.174 (1)



There is 25% chances of first offspring having blood group-AB.

Q.175 (4)

Q.176 (3)

Option (3) is incorrect and can be corrected as *t*RNA are specific for each amino acid, e.g. for initiation there is a specific initiator *t*RNA.

Rest of the options are correct for *t*RNA.

Q.177 (4)

Q.178 (3)

Hint: Occurs in retroviruses

Sol.: The enzyme reverse transcriptase is responsible for replication of HIV genome macrophages.

Q.179 (3)

Q.180 (3)

Q.181 (3)

Q.182 (1)

Q.183 (3)

Q.184 (3)

Q.185 (2)

SECTION - B

Q.186 (1)

Q.187 (1)

Q.188 (2)

Q.189 (1)

Q.190 (3)

Q.191 (3)

Q.192 (3)

Q.193 (1)

Q.194 (4)

Q.195 (1)

Q.196 (3)

Q.197 (2)

Q.198 (1)

Q.199 (3)

Q.200 (1)