AITS FULL TEST-09

ANSWER KEY

PHYSICS

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

CHEMISTRY

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

BIOLOGY

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

PHYSICS

Q. 1 (2)

$$\text{absolute error} = \frac{|0.1+0.1+0.2|}{3}$$

$$= 0.1$$

$$\text{Relative error} = \frac{0.1}{2} = 0.05$$

Percentage error = 0.05×100

$= 5\%$

Q.2 (2)

$$a = \frac{d^2x}{dt^2}$$

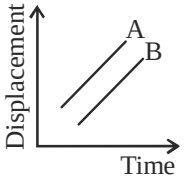
$$\frac{dx}{dt} = 2\beta t\ ,\ \frac{d^2x}{dt^2} = 2\beta$$

$= 16\ \text{cm/s}^2$

Acceleration is constant at $16\ \text{cm/s}^2$

Q.3 (2)

Slope of displacement-time graph gives velocity



Slope of A&B is same

Q.4 (2)

Relative velocity = 144 km/h

= 40 m/s

$\Rightarrow$ Length = 40 m/s × 8 s

= 320 m

Q.5 (2)

$u_y = 150 \sin 60°$

$$= 150 \times \frac{\sqrt{3}}{2} = 75\sqrt{3}\ \text{m/s}$$

$v_y = 150 \cos 60° = 75$ m/s

$v_y = k_y + (-g)t$

$\Rightarrow 75 = 75\sqrt{3} - 10t$

$$t = \frac{75\sqrt{3}-75}{10}$$

$$= \frac{15}{2}\left(\sqrt{3}-1\right)\text{sec.}$$

Q.6 (1)

A physical beam balance measures normal reaction which will be greater than the weight of body when elevator accelerating upwards.

Q.7 (4)

$\omega = 2\pi n = 7\pi$

$F = mr\omega^2$

$\mu mg = mr\omega^2$

$$\mu = \frac{r\omega^2}{g}$$

Q.8 (2)

Momentum lost by bullet

= momentum gained by bob.

Bob velocity, $v = 0.2\ v$

$v_b = \sqrt{2gh}$

$= \sqrt{2\times10\times20} = 20$ m/s

$\Rightarrow 0.2u = 20$

$u = 100$ m/s

Q.9 (1)

$$\text{Power} = P\frac{dv}{dt} = h\rho g \times \frac{5\times10^{3}\times10^{-6}}{60}$$

$$= \frac{120\times10^{-3}\times13.6\times10^{3}\times10\times5\times10^{-3}}{60}$$

$= 1.36$W

Q.10 (1)

Given moment of inertia 'I' = 1.5 kgm^2

Angular Acc "α" = 20 Rad/s^2

$$KE = \frac{1}{2}I\omega^2$$

$$1200 = \frac{1}{2}1.5\times\omega^2$$

$$\omega^2 = \frac{1200\times2}{1.5} = 1600$$

$\omega = 40$ rad/s^2

$\omega = \omega_0 + \alpha t$

$40 = 0 + 20\,t$

$t = 2$ sec.

Q.11 (2)

$$\alpha = \frac{\Delta\omega}{\Delta t} = \frac{25\times2\pi}{5} = 10\pi\ \text{rad/sec}^2$$

$$\tau = \left(\frac{5}{4}MR^2\right)\alpha$$

$$= \frac{5}{4}\times5\times10^{-3}\times(10^{-2})^2\times10\pi$$

$= 1.9625\times10^{-5}$ Nm

$\simeq 2.0\times10^{-5}$ Nm

Q.12 (2)

Gravitational potential

$$= -\frac{GM}{\frac{3a}{2}} + \left(-\frac{GM}{2a}\right)$$

$$= -\frac{GM}{a}\left(\frac{2}{3}+\frac{1}{2}\right)$$

$$= -\frac{7}{6}\frac{GM}{a}$$

Θ.13 (2)

$T^2 \propto P^3$

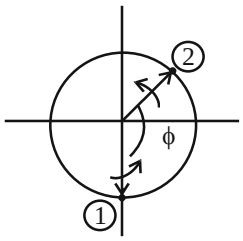
$$\left(\frac{T'}{T}\right)^2 = \left(\frac{9R}{R}\right)^3$$

$T\square^2 = T^2\cdot9^3$

$T\square = T\cdot3^3$

$T\square = 27\ T$

Q.14 (4)



$$\phi = \frac{\pi}{2}+\frac{\pi}{3}$$

$$= \frac{5\pi}{6}$$

Q.15 (2)

For closed organ pipe, first overtone, $f_2 = \frac{3v}{4\ell c}$

for open organ pipe,

Third overtone, $f_5 = \frac{4}{2}\frac{v}{\ell_0}$

$f_2 = f_5$

$$\Rightarrow \quad \frac{3v}{4\ell c} = \frac{4v}{2\ell_0}$$

$$\frac{\ell_1}{\ell_2} = \boxed{\frac{\ell_c}{\ell_0} = \frac{3}{4}}$$

Q. 16 (1)

The volume change during vaporisation of water is much larger than that during melting of ice. Thus, more work is done during vaporisation and hence more heat required.

Q.17 (4)

$E \propto T^4$ [stefan's law]

$$\frac{E'}{E} = \left(\frac{273}{819}\right)^4 = \frac{1}{3^4} = \frac{1}{81} \qquad \boxed{E^1 = \frac{E}{81}}$$

Q.18 (1)

$$V \propto T \Rightarrow \frac{V_1}{V_2} = \frac{T_1}{T_2} \Rightarrow \frac{200}{V_2} = \frac{(273+20)}{(273-20)} = \frac{293}{253}$$

$$V_2 = \frac{200 \times 253}{293} = 172.6\,\text{m}l$$

Q.19 **(1)**

$\Delta Q = \Delta U + W$

W = area under PV curve = $\Delta Q - \Delta U$

$= 18P_0V_0 - nC_v\Delta T$

$$= 18P_0V_0 - \frac{3}{2}nR\Delta T$$

$$W = 18P_0V_0 - \frac{3}{2}(P_2V_2 - P_1V_1)$$

$$= 18P_0V_0 - \frac{3}{2}(9P_0V_0 - 2P_0V_0)$$

$$= 18P_0V_0 - \frac{21}{2}P_0V_0$$

$$= 7.5\,P_0V_0$$

Q.20 (1)

$$Y = \frac{F\ell}{A\Delta\ell}, F = \frac{AY\Delta\ell}{\ell}$$

$$\frac{F_1}{F_2} = \frac{A_1}{A_2} \times \frac{\ell_1}{\ell_2} = \left(\frac{1}{2}\right)^2 \times 2 = \frac{1}{2}$$

Q.21 (4)

Pressure difference $P_2 - P_1 = \frac{\rho}{2}\left(V_1^2 - V_2^2\right)$

(According to Bernoulli's theorem)

Q.22 (1)

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

$$g_{moon} = \frac{1}{6}g_{earth} \Rightarrow h_{moon} = 6h_{earth}$$

Q.23 (3)

To avoid formation of bubbler the balls shovld be wetted with the used viscovs liquid.

Q.24 (1)

$$\frac{2K\lambda}{r} = \frac{\sigma}{\varepsilon_0} \qquad (\xi = 3\mu)$$

$$\sigma = \frac{2\varepsilon_0\lambda}{4\pi\varepsilon_0 r}$$

$$\sigma = 0.424 \times 10^{-9}\,\frac{C}{m^2}$$

Q.25 (4)

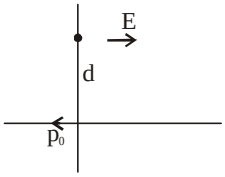
$V_A - V_B = \vec{E}.\overrightarrow{AB} = -5 \times 10^3[0.2 + 0.4]$

$= -3000$V.

Q.26 (4)

$V = 0$

$$E = -\frac{K\vec{P}}{r^3}$$



$$= -\frac{\vec{p}}{4\pi\varepsilon_0 d^3}$$

Q.27 (2)

$$H_{loss} = U_{stored} = \frac{1}{2}CV^2$$

$$= \frac{1}{2} \times 2 \times 10^{-6} \times 4 \times 10^4$$

$= 4 \times 10^{-2}$ Joule

Q.28 (2)

On increasing temperature, the thermal speed of electrons increases. Thus, less time between two collisions.

Q.29 (2)

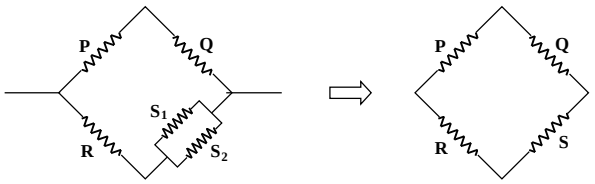
After pressing K_1, K_2 is then closed and after that Rheostat is varied.

Q.30 (2)

$$V_R = 2V = \left(\frac{R}{500 + R}\right) \times 12$$

$\Rightarrow R = 100\,\Omega$

Q.31 (4)



$$\frac{P}{Q}=\frac{R}{S}\Rightarrow\frac{P}{Q}=\frac{R(S_1+S_2)}{S_1S_2}$$

Q. 32 (3)

$B_0 = B_{BB'} + B_{BA} + B_{AA'} + B_{CC'} + B_{CO} + B_{DD'}$

$$= \frac{\mu_0 T}{4\pi R}+\frac{\mu_0 T}{8R}+\frac{\mu_0 T}{4\pi R}+0$$

$$+\left(\frac{-\mu_0 I}{8R}\right)+0$$

$$=\frac{\mu_0 I}{4\pi R}$$

Q.33 (1)

$$R=\frac{mv}{qs}=\frac{\sqrt{2mK}}{qB}$$

$R_1 = R_2$

$$\frac{\sqrt{2m_pK_p}}{eB}=\frac{\sqrt{2(4m_p)K_\alpha}}{(2e)(2B)}$$

$$\frac{K_p}{K_\alpha}=\frac{1}{4}$$

Q.34 (1)

$$S_i=\frac{nAB}{K}$$

$$S_V=\left(\frac{nAB}{KR}\right)$$

As R increases, $\frac{n}{R}$ ratio remains same.

Q.35 (3)

Induced emf is given by, $E \propto -\frac{d\phi}{dt}$

$$\alpha -\frac{di}{dt}$$

for linear graph

$\frac{di}{dt}$ = constant

Q.36 (1)

We know $X_L = \omega L$ and $X_C = \frac{1}{\omega C}$

(a) For $X_L > X_C$, voltage leads the current (ii)
(b) For $X_L = X_C$, voltage and current are in same phase (i)
(c) For $X_L < X_C$, current leads the voltage (iv)
(d) For resonant frequency $X_L = X_C$, current is maximum (iii)

Q. 37 (2)

In L - C - R series AC circuit. Power dissipated initially increases with increase in frequency then reaches the maximum value at resonant frequency.

Q.38 (4)

$$z=\sqrt{100^2+(200-200)^2}$$

$= 100\,\Omega$

$$i_{rms}=\frac{V_{rms}}{z}=\frac{200\sqrt{2}}{100}=2\sqrt{2}A$$

Q. 39 (1)

Thickness of slab = (9 + 5) × μ
= 14 × 1·5
= 21 cm

Q.40 (3)

$i = e$

$$r_1=r_2=\frac{A}{2}=30°$$

by Snell's law

$$1\times\sin i=\sqrt{3}\times\frac{1}{2}=\frac{\sqrt{3}}{2}$$

$i = 60$

Q.41 (4)

Image by convex lens :

$$\frac{1}{v}-\frac{1}{u}=\frac{1}{f}\ ;\quad \frac{1}{v}+\frac{1}{20}=\frac{1}{5};\ v=\frac{20}{3}\ \text{cm}$$

Image by concave lens :

$$u=\left[\frac{20}{3}-2\right]=\frac{14}{3}\text{cm}\qquad \frac{1}{v}-\frac{1}{u}=\frac{1}{f}\ ;\ \frac{1}{v}-\frac{3}{14}=-\frac{1}{5}$$

$v = 70$ cm

Q. 42 (3)

$$I_{max}=\left(\sqrt{I_1}+\sqrt{I_2}\right)^2$$

$$I_{min}=\left(\sqrt{I_1}-\sqrt{I_2}\right)^2$$

$$\frac{I_{max}-I_{min}}{I_{max}} = \frac{\left(\sqrt{I_1}+\sqrt{I_2}\right)^2-\left(\sqrt{x_1}-\sqrt{x_2}\right)^2}{\left(\sqrt{I_1}+\sqrt{I_2}\right)^2}$$

$$= \frac{(2+1)^2-(2-1)^2}{(2+1)^2} \qquad = \frac{3^2-1^2}{3^2} = \frac{8}{9}$$

Q.43 (3)

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

$$\Rightarrow \lambda_{max} = \frac{hc}{\phi} = \frac{6.6\times10^{-34}\times3\times10^{8}}{4\times1.6\times10^{-19}} = 310\text{nm}$$

Q.44 (3)

Possible number of spectral lines $= \frac{n(n+1)}{2}$

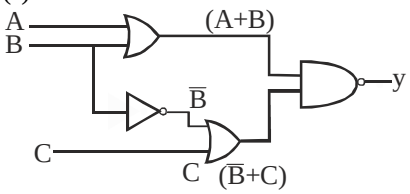
Q.45 (1)

$A \rightarrow$ Series limit of laymen
$B \rightarrow 3^{rd}$ line of Balmer
$C \rightarrow 2^{rd}$ line of paschan

Q.46 (3)

Atomic mass of ${}^{9}_{4}Be = 9$
Radius $R \propto A^{1/3}$
$R_X = 2R_{Be}$
$\Rightarrow (A_X)^{1/3} = 2(9)^{1/3}$
$A_X = 2^3 \times 9$
$= 72$

Q.47 (2)



$y = (A+B)(\overline{B}+C)$

Q.48 (2)

For intrinsic semiconductor concentration of electron & holes always equal

Q.49 (2)

As temperature increases and at curie temperature ferromagnetic substances change to paramagnets.

Q.50 (1)

Speed of Electromagnetic wave $= \frac{E}{B} = c$

$$\Rightarrow \frac{B}{E} = c^{-1} = \frac{1}{c}$$

CHEMISTRY

Q.51 (1)
Q. 52 (4)
Q. 53 (3)
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Q.57 (2)
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Q.73 (3)
Q.74 (4)
Q. 75 (2)
Q.76 (4)
Q.77 (3)
Q.78 (4)
Q.79 (3)
Q.80 (1)
Q.81 (1)

A & R are ture and R is the correct explanation of A.

Q.82 (1)

Both statements are true

Q.83 (2)
Q.84 (3)
Q.85 (2)
Q.86 (2)
Q.87 (3)
Q.88 (2)
Q.89 (3)
Q.90 (2)
Q.91 (4)
Q. 92 (1)
Q. 93 (3)
Q. 94 (2)
Q. 95 (3)
Q.96 (4)
Q.97 (4)
Q. 98 (1)
Q.99 (1)
Q.100 (3)

BIOLOGY

Q.101 (4)
Q.102 (4)
Q.103 (3)
Q.104 (3)
Hint: Pteridophytes require water for fertilisation.
Gametophytes of pteridophytes require cool, damp and shady places to grow.

Q.105 (3)
Q.106 (1)
Cymose inflorescence may have more than one flowers as in jasmine (Biparous cyme)

Q.107 (3)
Q.108 (2)

Q.109 (1)
Q.110 (4)

Q.111 (1)
Q.112 (1)
In an animal cell, cell furrow occurs on the plasma membrane during cytokinesis. This furrow gradually deepens and ultimately joins the centre, thus dividing the cell cytoplasm into two.

Q.113 (4)
Q.114 (3)
Q.115 (2)
Q.116 (2)
Q.117 (3)
Constant growth rate in root and shoot elongation is the simplest expression of arithmetic growth. Mathematically, it can be expressed as
$L_t = L_0 + rt$
L_t = length at time 't'
L_0 = length at time 'zero'
r = growth rate / elongation per unit time
Q.118 (3)
Q.119 (3)
Hint: Insect pollinated flowers are colourful, bright and fragrant to attract insects for pollination.
Pollen grains are sticky in insect pollinated flowers.

Q.120 (4)
Q.121 (4)
Q.122 (4)
Q.123 (3)
Q.124 (1)
Q.125 (3)
Q.126 (3)
Q.127 (1)
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NCERT (XI) Ch - 10, Pg. 165, Fig. 10.2 (b)
Q.143 (2)
Q.144 (1)
Q.145 (4)
Q.146 (1)
Q.147 (3)
Q.148 (1)
Q.149 (3)
Q.150 (2)
Q.151 (2)
Q.152 (3)
Q.153 (2)
Q.154 (3)
Hint: Thin and flexible articular membrane.
Exoskeleton for each segment consists of a dorsal tergum, a ventral sternum and lateral pleura; these plates are joined to each other by a thin and flexible articular membrane known as arthrodial membrane.

Q.155 (2)
Q.156 (2)
Q.157 (3)
Q.158 (3)
Q.159 (3)
Q.160 (3)
a. Diplotne
b. Pachytene
c. Leptotene
d. Metaphase l
e. Diakinesis

Q.161 (3)
Q.162 (1)
Q.163 (3)
Q.164 (3)
Hint: These cells are granular, phagocytic and most abundant type of WBCs.
Differential leukocyte count i.e., DLC reveals percentage of type of WBCs in blood.
Neutrophils - 60-65%
Lymphocytes - 20-25%
Monocytes - 6-8%
Eosinophils - 2-3%

Q.165 (3)
Q.166 (1)

Q.167 (3)
Q.168 (1)
Q. 169 (1)
Q.170 (4)
Q.171 (3)
Q.172 (2)
Q.173 (2)
Q.174 (1)
Q.175 (3)
Q.176 (3)
Q.177 (4)
Q.178 (4)
Q.179 (3)
Hint : They existed around 15 mya.
Ramapithecus was more man-like while Dryopithecus was more ape-like. They existed around 15 mya. They were hairy and walked like gorillas and chimpanzees.
Q.180 (1)
Q.181 (4)
Q.182 (3)
Q.183 (1)
Q.184 (2)
Q.185 (3)
Q. 186 (3)
Q.187 (2)
Hint: Tendons contain parallel bundles of fibres and cells.
Lamellae are exclusive to bones while lacunae are found in both bones and cartilage. Tendons and ligaments are example of dense regular connective tissue.

Q.188 (1)
Q.189 (1)
Q.190 (2)
Q.191 (4)
Q.192 (1)
Q.193 (3)
Q.194 (3)
Q.195 (2)
Q.196 (1)
5S rRNA, tRNA and SnRNA

Q.197 (3)

Q.198 (4)
Q.199 (2)
Q.200 (3)