ENTHUSIAST, LEADER & ACHIEVER COURSE

TARGET : PRE-MEDICAL 2013

ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) Path to Success

MAJOR TEST

ALLEN AIIMS # 05 | DATE : 29 - 05 - 2013

FULL SYLLABUS

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A.	**1**	**1**	**1**	**2**	**2**	**1**	**3**	**4**	**2**	**4**	**1**	**2**	**2**	**4**	**4**	**1**	**4**	**4**	**1**	**2**	**4**	**1**	**2**	**2**	**4**
Q	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
A.	**4**	**2**	**1**	**2**	**3**	**2**	**4**	**2**	**3**	**3**	**4**	**1**	**2**	**3**	**4**	**2**	**1**	**4**	**3**	**4**	**3**	**3**	**1**	**2**	**4**
Q.	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
A.	**1**	**3**	**3**	**1**	**1**	**1**	**4**	**2**	**4**	**1**	**1**	**3**	**3**	**1**	**4**	**1**	**1**	**3**	**2**	**1**	**1**	**3**	**3**	**2**	**1**
Q.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
A.	**4**	**4**	**3**	**2**	**4**	**3**	**3**	**3**	**4**	**3**	**4**	**3**	**2**	**3**	**3**	**1**	**3**	**4**	**1**	**3**	**2**	**3**	**3**	**4**	**2**
Q.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
A.	**4**	**1**	**3**	**4**	**1**	**4**	**2**	**4**	**3**	**3**	**1**	**4**	**4**	**3**	**4**	**2**	**4**	**2**	**3**	**1**	**3**	**4**	**3**	**1**	**3**
Q.	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	**4**	**2**	**4**	**4**	**1**	**2**	**3**	**1**	**2**	**1**	**3**	**3**	**1**	**1**	**3**	**1**	**4**	**1**	**1**	**2**	**1**	**4**	**4**	**3**	**2**
Q.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
A.	**2**	**3**	**1**	**3**	**2**	**1**	**4**	**1**	**4**	**3**	**1**	**2**	**3**	**4**	**1**	**1**	**1**	**1**	**4**	**3**	**2**	**2**	**2**	**2**	**2**
Q.	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
A.	**3**	**4**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**3**	**3**	**4**	**2**	**3**	**1**	**1**	**4**

HINT – SHEET

21. $\pi_1 v_1 + \pi_2 v_2 = \pi_R(v_1 + v_2)$

(Resultant O.P.) $\pi_R = \dfrac{\pi_1 v_1 + \pi_2 v_2}{v_1 + v_2}$

23. Iron in the complex is Fe^{3+}

$K_3Fe(CN)_6 \;+\; 3e^- \longrightarrow 3K^+\; 6CN^- + Fe$

1 mol   3 F

$\dfrac{32.9}{329} = 0.1$ mol   0.3 F

24. Avg. atomic mass of

$$Fe = \frac{5\times 54 + 90\times 56 + 5\times 57}{100}$$

25. First find empirical formula of compound & formula of compound is XeF_6

26. $r \propto \dfrac{P}{\sqrt{M}}$

$$\therefore\; n_{He} : n_{CH_4} : n_{SO_2} = \frac{1}{\sqrt{4}} : \frac{2}{\sqrt{16}} : \frac{3}{\sqrt{64}}$$

$$= \frac{1}{2} : \frac{2}{4} : \frac{3}{8} = 8 : 4 : 3$$

27. $2C(s) + 3H_2 \rightarrow C_2H_6\ (g)$

$\Delta_f H^o = [2 \times \Delta_{Sub}\ 1 \times (C, S) + 3 \times B.E.\ (H–H)$

$– [B.E.\ (C – C) + 6 \times BE\ (C – H)]$

$\Rightarrow – 85 = 2 \times 718 + 3 \times 436 – (x + 6y)$

$\Rightarrow x + 6y = 2829$ ....(1)

Similarly for $C_3H_8(g)$

$2x + 8y = 4002$

$x = 345,\ y = 414$

31. NCERT Page # 220 XI-I

34. $\dfrac{r^+}{r^-} = \dfrac{180}{187} = 0.962$

36. $HgCl_2 + SnCl_2 \longrightarrow \underset{\text{(White)}}{Hg_2Cl_2} + SnCl_4$

$Hg_2Cl_2 + SnCl_2 \longrightarrow \underset{\text{(Grey)}}{Hg} + SnCl_4$

38. $CaC_2O_4 + MnO_4^- \xrightarrow{H^+} Ca^{+2} + CO_2 + Mn^{+2}$ (Colourless/रंगहीन)

$CaC_2O_4 \xrightarrow{\text{Heat}} \underset{(Z)}{CaO} + \underset{(Y)}{CO_2} + \underset{(X)}{CO}$

$\underset{(Z)}{CaO} + H_2O \longrightarrow \underset{(B)}{Ca(OH)_2}$

$\underset{(B)}{Ca(OH)_2} + \underset{(Y)}{CO_2} \longrightarrow \underset{\text{(millkiness / दुधियापन)}}{CaCO_3}$

40. $[Co(NH_3)_4Cl_2]Cl$ Complex (संकुल)
If it passes from anion exchange resine than Cl^- Ion hold by resine. So no ppt formed with $AgNO_3$ solution.
यदि संकुल को ऋणायनिक विनियामक रेजिन से गुजारा जाये तो यह Cl^- को पकड़ लेगा इसलिये विलयन $AgNO_3$ के साथ अवक्षेप नही देगा।

42. $Li_2CO_3 \xrightarrow{\Delta} Li_2O + CO_2$

$Na_2CO_3 \xrightarrow{\Delta}$ No Rx^n
CO_2 obtained by Li_2CO_3 so Li_2CO_3 is 75% Na_2CO_3 is 25%
चुकी CO_2 केवल Li_2CO_3 से प्राप्त होती है अत: Li_2CO_3 की प्रतिशतता 75 तथा Na_2CO_3 25%

45. $CuSO_4 + NaOH \longrightarrow \underline{Cu(OH)_2} + Na_2SO_4$

$\underline{Cu(OH)_2} \xrightarrow{NH_3} \underset{\text{Deep blue}}{[Cu(NH_3)_4]^{+2}}$

$[Cu(NH_3)_4]^{+2} \xrightarrow[\text{तनु}]{HNO_3} \underline{Cu(NO_3)_2}$ (हल्का नीला विलयन)

61. NCERT XI Pg. # 36
62. NCERT XI Pg. # 4
65. NCERT Page no. # 47, 48
70. NCERT-XI Pg. # 309, 310, 311
71. NCERT-XI Pg. # 103
72. NCERT-XI, Pg # 126, 131, 136
73. NCERT-XII Pg. # 140 Line-6
74. NCERT-XII Pg. # 138 Line-1
75. NCERT-XII Pg. # 136 Line-7.8
77. $\Psi_W = \Psi_S + \Psi_P$ [NCERT (E), (H) Pg. # 180]
Water potential (जल विभव) (Ψ_W) = – 30 bar
Osmotic potential (परासरण विभव) (Ψ_S) = – 72 bar
$\Psi_P = \Psi_W - \Psi_S$
$\Psi_P = -30 - (-72) = -30 + 72 = 42$ bar
$\Psi_P = TP$ so TP = 42 bar

78. NCERT (E), Page No. # 197 (Topic : Sulphur)
NCERT (H), Page No. # 197 (3rd Last paragraph)
80. NCERT (E), Page No. # 158 (3rd Paragraph)
NCERT (H) Pg. # 158
85. NCERT Pg. # 319
93. NCERT Page No. 153
94. NCERT Page No. 157
95. NCERT Page No. 151
103. Let T be the tension in the rope and a its acceleration. Therefore, the acceleration of the man $= \left(\frac{3g}{2} - a\right)$.

The equations of motion of the mass and the man are

$$T - mg = ma \qquad ...(i)$$

$$\text{and } T - \frac{mg}{2} = \frac{m}{2}\left(\frac{3g}{2} - a\right) \qquad ...(ii)$$

Eliminating a from Eqs. (i) and (ii). we get

$$T = \frac{7mg}{6}$$

104. Let m_A and m_B be the masses of skaters A and B and a_A and a_B their respective accelerations, when they pull at each other. From Newton's third law, action and reaction forces are equal m magnitude, i.e.

$$m_Aa_A = m_Ba_B \text{ or } m_A\frac{v_A}{t} = m_B\frac{v_B}{t}$$

or $m_Av_A = m_Bv_B$ or $m_A^2v_A^2 = m_B^2v_B^2$ ...(i)
where v_A and v_B are their respective speeds and t is the time taken for them to meet. Let s_A and s_B be the distances travelled by them when they meet, we have,
$2a_As_A = v^2_A$ and $2a_Bs_B = v^2_B$
Using these equations in Eq. (i), and $m_Aa_A = m_Ba_B$,

we get $\frac{s_A}{s_B} = \frac{m_B}{m_A} = \frac{70}{50} = \frac{7}{5}$. Since $s_A + s_B =$ 6m; $s_A = 3.5$ and $s_B = 2.5$ m.

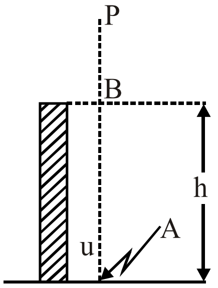
105. Let h = AB be the height of the tower and P be the highest point reached (figure). The time taken by the ball to go from B to P = 4/2 = 2s and the time taken to go from A to P = 8/2 = 4s. Therefore, time taken by the ball to go from A to B is t = 4 – 2 = 2s.

If u is the velocity of projection, then

$0 = u - 10 \times 4 \Rightarrow u = 40\ ms^{-1}$

$\therefore\ h = ut + \frac{1}{2}gt^2$

$= 40 \times 2 + \frac{1}{2}(-10)(2)^2 = 60$ m



106. Velocity of sphere when it collides with block is

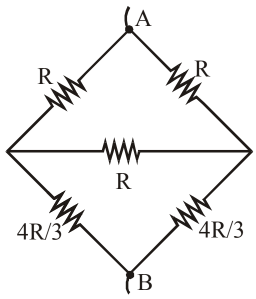
$$u_s = \sqrt{2gl(1-\cos\theta)} = \sqrt{2\times10\times1\times\left(1-\frac{1}{2}\right)} = \sqrt{10}$$

since the block finally comes to rest and therefore the velocity of block just after collision with sphere is

$$q = v_b^2 - 2\mu gs \Rightarrow v_b = \sqrt{2\times0.4\times10\times0.8} = \sqrt{6.4}$$

$$e = \frac{v_b - v_s}{u_s - u_b} = \frac{\sqrt{6.4}-0}{\sqrt{10}-0} = 0.8$$

107. Given circuit can be reduced to



Therefore $R_{AB} = \frac{7}{6}R$

108. By COME

decrease in P.E = increase in K.E.

$$\left(\frac{M}{L}\ell_0\right)g\frac{\ell_0}{2} - Mg\frac{L}{2} = \frac{1}{2}MV^2$$

$$\Rightarrow V = \sqrt{\frac{g}{L}(\ell_0^2 - L^2)}$$

109. $A_1v_1 = A_2v_2 \Rightarrow T_1\left(\frac{d_1}{2}\right)^2 v_1 = T_1\left(\frac{d_2}{2}\right)^2 v_2$

$\Rightarrow d_1^2 v_1 = d_2^2 v_2$

$\Rightarrow d_1^2\ (20) = \left(\frac{d_1}{5}\right)^2 v_2$

$\Rightarrow v_2 = 500$ cm/s = 5 m/s

Hz. Range $d = v_2\,T$

$$d = v_2\sqrt{\frac{2h}{g}} = 5 \times \sqrt{\frac{2\times1.25}{10}} = 2.5m$$

111. Phase difference = $\frac{2\pi}{\lambda}$ (Path difference)

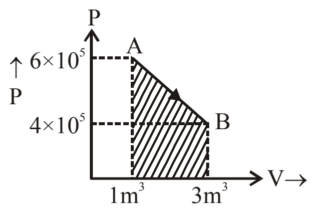
$\Delta\phi = \frac{2\pi}{\lambda}\cdot\frac{\lambda}{8} = \frac{\pi}{4}$

$I' = I + I + 2I\cos\frac{\pi}{4} = \left(2+\sqrt{2}\right)I$

$I'' = (a + a)^2 = 4I$

$\frac{I'}{I''} = \frac{2+1\cdot41}{4} = \frac{3\cdot14}{4} = 0\cdot853$

112.



$W = \frac{1}{2} \times [6 \times 10^5 + 4 \times 10^5] \times 2$

$W = 10 \times 10^5\ N/m^2$

113. Upto 2f, complete light reaches at disc.

115. $\frac{dQ}{dt} = \frac{KA}{L}(T_1 - T_2)$

$\frac{dQ}{dt} \propto \frac{r^2}{\ell}$ (K = Same, $T_1 - T_2$ = same, $A = \pi r^2$)

116. $P \propto \dfrac{1}{M_W}$ [V, M, R, T = same]

$$\left[PV = \frac{M}{M_w}RT\right]$$

117. Spring constant = K
mass of oscillating body = m_2

then $w = \sqrt{\dfrac{K}{m_2}}$

118. $y = 0.2\sin(10\pi t + 1.5\pi)\cos(10\pi t + 1.5\pi)$
$y = 0.1[2\sin(10\pi t + 1.5\pi)\cos(10\pi t + 1.5\pi)]$
$y = 0.1\sin(20\pi t + 3\pi)$ [sin2A = 2sinAcosA]

then $T = \dfrac{2\pi}{\omega} = \dfrac{2\pi}{20\pi} = 0.1\,\text{sec}$

119. $2.5\lambda = 0.25 \Rightarrow \lambda = 0.1$ m , a = 0.05

$\Rightarrow K = \dfrac{2\pi}{\lambda} = \dfrac{2\pi}{0.1} = 20\pi$ rad/m

v = 330 m/s then
$W = Kv = 20\pi \times 330 = 6600\pi$ rad/sec
Propagating in (+)x-axis then
$y = 0.05\sin(6600\pi - 20\pi x)$
$= 0.05\sin 2\pi(3300 - 10x)$
Now
$v_p = -V(\text{slope})$
$= -330 \times \left(-\sqrt{3}\right)$
$v_p = +330\sqrt{3}$ m/s
$= 330\sqrt{3}$ (upward)

120. We know that

$v = \sqrt{\dfrac{\gamma RT}{M_w}}$

$\Rightarrow v \propto \sqrt{T}$

$\Rightarrow v \propto \dfrac{1}{\sqrt{M_w}}$

$\Rightarrow$ At constant temperature there is no effect of pressure change on speed of sound.

121. $Q_{3\mu F} = \dfrac{C_{3\mu F}}{C_{2\mu F} + C_{3\mu F}} \times Q$

$Q_{3\mu F} = \dfrac{3}{3+2} \times 80\mu C = 48\mu C$

122. Decresaing in potential energy of capacitor = increasing in potential energy of inductor.

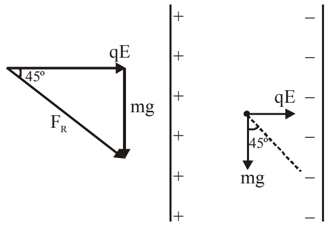
$\Rightarrow \dfrac{1}{2}CV_1^2 - \dfrac{1}{2}CV_2^2 = \dfrac{1}{2}LI^2$

$\Rightarrow I = \sqrt{\dfrac{C(V_1^2 - V_2^2)}{L}}$

123. $\tan 45° = \dfrac{mg}{qE} = 1$

$E = \dfrac{mg}{q}$

$\dfrac{V}{d} = \dfrac{mg}{q}$



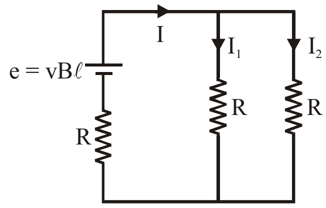
$V = \dfrac{mgd}{q} = \dfrac{1.6 \times 10^{-27} \times 10 \times 10^{-2}}{1.6 \times 10^{-19}} = 10^{-9}\,V$

124. $B_{xy} = B_{xz} = \dfrac{\mu_0 i}{4R}$

$B_{nor} = \sqrt{B_{xy}^2 + B_{xz}^2} = \dfrac{\mu_0 i}{2\sqrt{2}R}$

125. Equilent circuit

$I = \dfrac{B\ell v}{R + \dfrac{R}{2}} = \dfrac{2B\ell v}{3R}$



$I_1 = I_2 = \dfrac{I}{2} = \dfrac{B\ell v}{3R}$

127. As $V_{esc} \propto \dfrac{1}{\sqrt{R}}$

$\dfrac{V_{planet}}{V_{earth}} = \sqrt{\dfrac{4}{1}} = 2$

$V_{planet} = 11.2 \times 2$ km/sec
$= 22.4$ km/sec

128. In case of zero deflection $\dfrac{2}{\frac{9x}{9+x}} = \dfrac{3}{9}$

$\Rightarrow \dfrac{2(9+x)}{x} = 3 \Rightarrow x = 18\ \Omega$

129. $ML = I^2Rt$ but $R = 50\ \Omega$
$M \times 80 \times 4.2 = (10)^2 \times (50) \times 5.6 \times 60$
$M = 5000$ gm

130. $r_1 = \frac{60}{2} = 30°$
$1 \times \sin i = \mu \times \sin r_1$
$\sin i = \sqrt{3}\sin 30°$
$\therefore\ i = 60°$

131. $n = \frac{1}{\sin\theta_e} = \frac{1}{\sin 45}$
$\frac{c}{v} = \sqrt{2}$
$\therefore\ v = 2.1 \times 10^8$ m/s

132. $\sin\theta_e = \frac{1}{n} = \frac{3}{4}$
$\therefore\ \theta_c = \sin^{-1}\left(\frac{3}{4}\right)$

133. $eV_1 = \frac{12400}{4000} - \phi_0$ ...(1)
$eV_2 = \frac{12400}{3600} - \phi_0$ ....(2)
$e(V_2 - V_1) = (3.44 - 3.1)$ eV
$V_2 - V_1 = 0.34$ volt

134. $\lambda = \frac{h}{mv} = \frac{h}{qBr}, \frac{\lambda_1}{\lambda_2} = \frac{q_2}{q_1} \because \frac{mv^2}{r} = qvB$

135. $\frac{I}{I_0} = \frac{1}{2} = \left(\frac{1}{2}\right)^{3/x_{1/2}}$
$x_{1/2} = 3$mm $\mu = \frac{0.693}{3}\text{mm}^{-1}$

138. As diode is reverse biased it will act as open circuit so
$I = \frac{V}{R} = \frac{5}{10K\Omega} = 0.5\text{mA}$

139. $I_e = \frac{Q}{t} = \frac{ne}{t} = \frac{10^{10} \times 1.6 \times 10^{-19}}{10^{-6}} = 1.6 \times 10^{-3}$ A
$I_b = \frac{2}{100} \times 1.6 \times 10^{-3} = 0.032$ mA

140. Magnetic field at P is tangential.

146. $\therefore$ Back Bonding increases stability.
161. NCERT XI Pg. # 19
162. NCERT XI Pg. # 24
165. NCERT-XI Pg. # 103
166. NCERT-XI, Pg # 134
174. NCERT Pg. # 324
181. NCERT, Part-I, Page No. # 57
182. NCERT, Part-I, Page No. # 41, Last paragraph
NCERT, Part-I, Page No. # 45, Bold statement
197. Reason is wrong if neutrons will be absorb than reaction will stop.
198. 1 Curie = 3.7×10^{10} disintegration/sec.
1 rutherford = 10^6 disintegration/sec.
so 1 Curie = 3.7×10^4 rutherford

199. Work function $\phi_0 = \frac{hc}{\lambda_0}$
so $\phi_0 \propto \frac{1}{\lambda_0}$
so for more workfunction shorter thereshold wavelength required.
$\because \phi_A < \phi_B \therefore \lambda_{0A} > \lambda_{0B}$.