ENTHUSIAST, LEADER & ACHIEVER COURSE

TARGET : PRE-MEDICAL 2013

ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) Path to Success

MAJOR TEST

ALLEN AIIMS # 04 | **DATE : 24 - 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.	**4**	**2**	**3**	**4**	**3**	**3**	**3**	**2**	**3**	**3**	**4**	**3**	**2**	**3**	**2**	**1**	**4**	**1**	**2**	**3**	**2**	**2**	**2**	**4**	**3**
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.	**2**	**4**	**2**	**4**	**3**	**4**	**3**	**3**	**4**	**4**	**4**	**3**	**4**	**3**	**2**	**4**	**4**	**4**	**3**	**4**	**3**	**4**	**3**	**2**	**1**
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.	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**4**	**3**	**1**	**2**	**1**	**4**	**2**	**2**	**3**	**3**	**2**	**1**	**3**	**3**	**1**	**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.	**1**	**3**	**1**	**3**	**3**	**1**	**2**	**4**	**2**	**3**	**2**	**2**	**3**	**4**	**1**	**1**	**1**	**2**	**1**	**4**	**4**	**4**	**2**	**2**	**3**
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.	**2**	**4**	**3**	**4**	**3**	**3**	**2**	**3**	**2**	**1**	**4**	**2**	**1**	**3**	**2**	**4**	**3**	**4**	**2**	**1**	**2**	**3**	**1**	**4**	**2**
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.	**1**	**4**	**3**	**3**	**1**	**1**	**1**	**3**	**3**	**1**	**1**	**1**	**1**	**3**	**4**	**1**	**1**	**1**	**1**	**4**	**1**	**4**	**2**	**2**	**4**
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.	**4**	**2**	**4**	**1**	**1**	**2**	**1**	**1**	**4**	**2**	**3**	**2**	**1**	**1**	**4**	**2**	**1**	**2**	**3**	**4**	**1**	**3**	**1**	**3**	**3**
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.	**4**	**3**	**2**	**1**	**2**	**1**	**1**	**3**	**2**	**4**	**2**	**4**	**4**	**3**	**1**	**4**	**1**	**3**	**2**	**2**	**3**	**3**	**1**	**4**	**1**

HINT – SHEET

1. NCERT-XI Option-1 Pg. # 39
Option-2 Pg. # 35 Para 3.2.1
Option-3 Pg. # 36
Option-4 Pg. # 35

2. NCERT-XI Pg. # 13

4. NCERT-XII Option-1 Pg. # 06
Option-2 Pg. # 06
Option-3 Pg. # 06
Option-4 Pg. # 19

5. NCERT Page No. 53

6. NCERT Page No. 57

10. NCERT-XI Pg. # 303

11. NCERT-XI Pg. # 121, 114, 110

12. NCERT XI Page no. # 136

13. NCERT-XII Pg. # 140, Para-4

14. NCERT-XII Pg. # 140, Para-4

15. NCERT-XII Pg. # 146, Line 6

16. NCERT-XII Pg. # 144, Para-2

17. Water moves from high Ψ_w to low Ψ_w so Ψ_w of cell sap should be lower than the Ψ_w of soil solution if entry of water (endosmosis) in roots is required.
Ψ_w of any solution is always less than Ψ_w of pure water.
जल अधिक Ψ_w से कम Ψ_w की ओर गति करता है अत: यदि जड़ों में जल के प्रवेश (अन्त: परासरण) की आवश्यकता है तो कोशिका रस का Ψ_w मृदा विलयन के Ψ_w से कम होना चाहिए।
किसी भी विलयन का Ψ_w शुद्ध जल के Ψ_w से सदैव कम होता है।

18. NCERT(E) Page No. 197 (Topic = Iron)
NCERT(H) Page No. 197 (2^{nd} last पेराग्राफ)

19. NCERT(E) Page No. 157

20. Absolute gowth = increase

$$\text{Relative growth} = \frac{\text{increase}}{\text{initial area}} \times 100$$

Leaf 'A' Absolute growth = $12.5 - 10 = 2.5\ cm^2$

$$\text{Relative growth} = \frac{2.5}{10} \times 100 = 25\%$$

Leaf 'B' Absolute growth = $50 - 40 = 10\ cm^2$

$$\text{Relative growth} = \frac{10}{40} \times 100 = 25\%$$

निरपेक्ष वृद्धि = बढ़ोतरी

$$\text{आपेक्षिक वृद्धि} = \frac{\text{बढ़ोतरी}}{\text{प्रारम्भिक क्षेत्रफल}} \times 100$$

पत्ती 'A' निरपेक्ष वृद्धि = $12.5 - 10 = 2.5\ cm^2$

आपेक्षिक वृद्धि = $\frac{2.5}{10} \times 100 = 25\%$

पत्ती 'B' निरपेक्ष वृद्धि = 50 – 40 = 10 cm^2

आपेक्षिक वृद्धि = $\frac{10}{40} \times 100 = 25\%$

25. NCERT Pg. # 327

33. NCERT Pg. # 149 (E)

35. NCERT Pg. # 148 (E)

36. NCERT, Page No. # 225

39. NCERT, Page No. # 242

40. NCERT, Page No. # 243, 250

41. For (1) acceleration of system

$= \frac{\text{Net force in the direction of acceleration}}{\text{Total mass}}$

$= \frac{0.2g}{0.5+0.2} = \frac{2g}{7} = 2.8\ m/s^2$

For (2) by using v = u +at we have

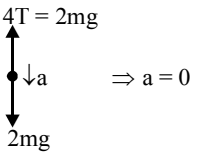
$0 = -7 + (2.8)t \Rightarrow t = 2.5$ s

For (3) distance travelled in first 5s

$= 2 \times [(-7\ (2.5) + \frac{1}{2}(2.8)\ (2.5)^2] = 17.5$ m

42. Let acceleration of man be 'a'

For man + platform system



$\Rightarrow a = 0$

43. $2\theta + 4\theta = 90° \Rightarrow 6\theta = 90° \Rightarrow \theta = 15°$

<u>At angle 2θ & 4θ</u> : $R = \frac{u^2 \sin 2\times 30°}{g} = \frac{\sqrt{3}u^2}{2g}$

<u>at angle θ</u> : $R = \frac{u^2 \sin 2\times 15°}{g} = \frac{u^2}{2g}$

$\frac{R_\theta}{R_{2\theta \text{ or } 4\theta}} = \frac{u^2/2g}{\sqrt{3}u^2/2g} = \frac{1}{\sqrt{3}} = \frac{x}{2}$ so, $x = \frac{2}{\sqrt{3}}$

44. For speeding down $\vec{a}.\vec{v} < 0 \Rightarrow a_x v_x + a_y v_y < 0$

45. by $v^2 = u^2 - 2as$

$0 = 10^2 - 2a \times 25$

$a = 2\ m/s^2$ (Retardation)

For ↓ retardation :

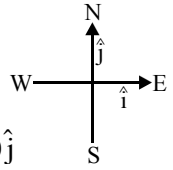
$T = m(g + a) = 800(10 + 2) = 9600$ N

46. $\vec{V}_{AG} = \vec{V}_{AB} + \vec{V}_{BC} + \vec{V}_{CD} + \vec{V}_{DG}$

$= -\vec{V}_{BA} - \vec{V}_{CB} - \vec{V}_{DC} - \vec{V}_{GD}$

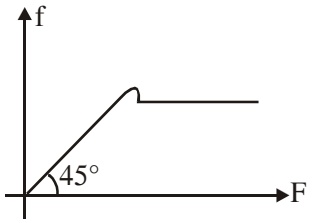
$= -10\hat{i} - (-20\hat{j}) - (-30\hat{i}) - 40\hat{j}$

$= 20\hat{i} - 20\hat{j}$



Direction = S – 45° – E

47.



48. By using COME, gain in KE = loss in PE

$\Rightarrow \frac{1}{2}Mv^2 = Mg\left(\frac{L}{2}\sin\theta\right) - \left(\frac{Mb}{L}\right)g\left(\frac{b}{2}\sin\theta\right)$

$\Rightarrow v = \sqrt{\frac{g\sin\theta}{L}(L^2 - b^2)}$

49. Fringe width $\beta = \frac{(a+b)\lambda}{2a(\mu-1)\alpha}$

50. Path differnce = $11.5\ \lambda = \frac{23}{2}\lambda$ = odd

multiple of $\frac{\lambda}{2}$

51. $\alpha = \frac{d\omega}{dt} = 4at^3 - 3bt^2$

$\Rightarrow \int_{\omega_0}^{\omega} d\omega = \int_0^t (4at^3 - 3bt^2)dt$

$\Rightarrow \omega - \omega_0 = (at^4 - bt^3)_0^t$

$\Rightarrow \omega = \omega_0 + at^4 - bt^3$

52. Inertia ∝ mass

and moment of inertia ∝ (mass) (distance)^2

53. $Q = \sigma AT^4 t$

$= 5.67 \times 10^{-8} \times 0.1 \times (1000)^4 \times (0.3 \times 60)$

$= 102060$ J

54. $P = \alpha V$ and $PV = \mu RT$ gives $\frac{T}{V^2}$ = constant

$\Rightarrow \frac{T_1}{T_2} = \left(\frac{V_1}{V_2}\right)^2 \Rightarrow \frac{300}{T_2} = \left(\frac{V}{2V}\right)^2$

$\Rightarrow T_2 = 1200$ K

55. $\Delta W = P(V_2 - V_1)$

so, $P_B > P_A$ then $\Delta W_2 > \Delta W_1$

$\Delta W_1 = P_A(V_2 - V_1)$

$\Delta W_2 = P_B(V_2 - V_1)$

56. $V_{mix} = V_1 + V_2 \qquad \left[V = \frac{\mu RT}{P}\right]$

$$\Rightarrow \frac{\mu_{mix} RT_{mix}}{P_{mix}} = \frac{\mu_1 RT_1}{P_1} + \frac{\mu_2 RT_2}{P_2}$$

$$\Rightarrow \frac{3R \times 370}{P_{mix}} = \frac{1R \times 320}{4} + \frac{2R \times 400}{5}$$

$\Rightarrow P_{mix} = 4.6$ atm

57. $E = \frac{1}{2} m\omega^2 A^2 = \frac{1}{2} m(2\pi f)^2 A^2$

$$\therefore \quad A = \frac{1}{2\pi f}\sqrt{\frac{2E}{m}}$$

Putting E = K + U, we get

$$A = \frac{1}{2\pi(25/\pi)}\sqrt{\frac{2\times(0.5+0.4)}{0.2}} = 0.06 \text{ m}$$

58. $F = \frac{dU}{dx} = -8\sin 2x$

$$a = \frac{F}{m} = -8\sin 2x \qquad (\because m = 1kg)$$

For small oscillations, sin2x = 2x
i.e., a = –16x
Since $a \propto -x$
The oscillations are SH in nature.

$$\therefore \quad T = 2\pi\sqrt{\left|\frac{x}{a}\right|} = 2\pi\sqrt{\frac{1}{16}} = \frac{\pi}{2} \text{ sec}$$

61. $T = 2\pi\sqrt{\frac{I}{MH}}$ ... (i)

$$T' = 2\pi\sqrt{\frac{I}{M(H+F)}} \quad \text{... (ii)}$$

by equation (i) and (ii)

$$\frac{T}{T'} = \sqrt{\frac{H+F}{H}} = \frac{2}{1} \quad \text{... (iii)}$$

by solving equation (iii) F = 3H $\Rightarrow \frac{F}{H} = 3$

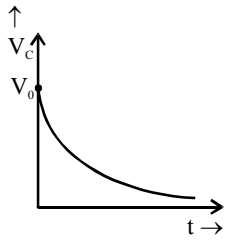
62. $\phi = \vec{B}.\vec{A}$

$$= B_0(\hat{i} + 2\hat{j} + 3\hat{k}).(L^2\hat{k}) = 3B_0L^2$$

63. $\frac{1}{2}mv^2 = e(V_2 - V_1)$

$$v = \sqrt{\frac{2e(V_2 - V_1)}{m}} = \sqrt{\frac{2\times 1.6\times 10^{-19}\times 20}{9.11\times 10^{-31}}} = 2.65\times 10^6 \text{ m/s}$$

64.



If $U = \frac{1}{2}U_0 \Rightarrow \frac{1}{2}CV_C^2 = \frac{1}{2}\times\frac{1}{2}CV_0^2$

$$\Rightarrow V = \frac{V_0}{\sqrt{2}} = \frac{V_0}{2^{1/2}} \quad \text{then } t_1 = \frac{T_{1/2}}{2}$$

If $Q = \frac{1}{4}Q_0 \Rightarrow CV_C' = \frac{1}{4}CV_0$

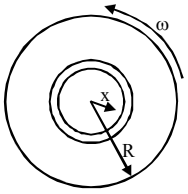
$$\Rightarrow V_C' = \frac{V_0}{4} = \frac{V_0}{2^2} \quad \text{then } t_2 = 2T_{1/2}$$

Therefore $\frac{t_1}{t_2} = \frac{1}{4}$

65. $B_1 = \frac{\mu_0 I_1}{2\pi d}, B_2 = \frac{\mu_0 I_2}{2\pi d}$

$$B_{Net} = \sqrt{B_1^2 + B_2^2} = \frac{\mu_0}{2\pi d}\sqrt{I_1^2 + I_2^2}$$

66. Let a ring of radius x and width dx.
Assume charge on ring is dq
Area of ring dA = 2π x dx



$$\sigma = \frac{dq}{dA} \Rightarrow dq = \sigma\, 2\pi\, x\, dx$$

Current due to this ring $dI = \frac{dq}{T} = \frac{\sigma 2\pi x dx}{2\pi}\omega$

$dI = \omega\, \sigma\, x\, dx$

Magnetic field due to ring at centre $dB = \frac{\mu_0 dI}{2x}$

$= \frac{1}{2}\mu_0 \sigma \omega dx$

Magnetic field due to disc at centre

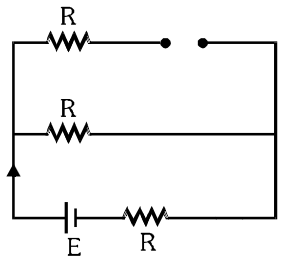
$B = \frac{1}{2}\mu_0 \sigma \omega \int_0^R dx = \frac{1}{2}\mu_0 \sigma \omega R$

67. For maximum power $X_L = X_C \Rightarrow 2\pi f L = \frac{1}{2\pi fC}$

$C = \frac{1}{4\pi^2 f^2 L}$

68. The number density n of conduction electrons in the copper is a characteristic of the copper and is about 10^{29} at room temperature for both the copper rod X and the thin copper wire Y.
Both X and Y carry the same current I since they are joined in series.
From $I = neAv_d$
We may conclude that rod X has a lower drift velocity of electrons compared to wire Y since rod X has larger cross-sectional area. This is so because the electrons in X collide more often with one another and with the copper ions when drifting towards the positive end. Thus, the mean time between collisions of the electrons is more in X and than in Y.

69. Just after the switch is closed



$I = \frac{E}{2R}$

70. Heat produced $H = \frac{V^2}{R}t = \frac{V^2 At}{\rho \ell} = \frac{V^2 \pi r^2 t}{\rho \ell}$

$\Rightarrow H \propto \frac{r^2}{\ell}$

71. Apply energy conservation

$$\frac{-GMm}{\sqrt{R^2+8R^2}} + 0 = -\frac{GMm}{R} + \frac{1}{2}mv^2$$

$$\Rightarrow \frac{1}{2}v^2 = \frac{GM}{R} - \frac{GM}{3R} = \frac{2}{3}\frac{GM}{R}$$

$$\Rightarrow v = \sqrt{\frac{4}{3}\frac{GM}{R}}$$

72. $v = -100$ & $u = -25$

$$P = \frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{100}{-100} - \frac{100}{25} = -1 + 4 = +3D$$

73. $L = f_0 + f_e$ and $|MP| = \frac{f_0}{f_e}$

$\Rightarrow 15 = f_0 + f_e$ & $4 = \frac{f_0}{f_e}$

$\Rightarrow f_e = 3$ cm and $f_0 = 12$ cm

75. $(M+\Delta m) \rightarrow \left(\frac{M}{2}\right) + \left(\frac{M}{2}\right)$

$Q = \Delta mc^2$ $\because$ mass of two nuclei are same so

$$\frac{\Delta mc^2}{2} = \frac{1}{2}\frac{M}{2}v^2$$

76. $E = mc^2 \Rightarrow \frac{dE}{dt} = c^2\frac{dm}{dt}$

$$\Rightarrow \frac{dm}{dt} = \frac{4.5\times10^{35}}{9\times10^{16}}\text{kg/s} = 5 \times 10^{18} \text{ kg/s}$$

79. Mass = Volume × density

$M = \frac{4}{3}\pi r^3 \times \rho \Rightarrow m \propto r^3$

$$\frac{8m}{m} = \left(\frac{r_2}{r_1}\right)^3 \Rightarrow \frac{r_2}{r_1} = \frac{2}{1}$$

$$v_T \propto r^2 \Rightarrow \frac{(v_T)_2}{(v_T)_1} = \left(\frac{r_2}{r_1}\right)^2 = \frac{4}{1}$$

$\Rightarrow (v_T)_2 = 4(v_T)_1 \Rightarrow n = 4.$

80. Weight of rise liquid = $2\pi rT\cos\theta$

$mg = 2\pi rT\cos\theta \Rightarrow m \propto r$

$$\Rightarrow \frac{m_2}{m_1} = \left(\frac{r_2}{r_1}\right) = \frac{2r}{r} = 2$$

$\Rightarrow m_2 = 2m_1 = 2 \times 5g = 10g.$

81. For solu. 'A' : $K = \frac{1}{R}\left(\frac{\ell}{A}\right)$; $\frac{\ell}{A} = x$(cell const.)

$$K_1 = \frac{1}{40} \times x$$

For solu. 'B' : $K_2 = \frac{1}{70} \times x$

If equal vol. of solu. are mixed then vol. becomes doubled & conductivity of mix. becomes halved.

$\therefore$ Conductivity of the mix. will be

$$= \frac{(K_1 + K_2)}{2}$$

$\therefore$ for the mix. : $\frac{(K_1 + K_2)}{2} = \frac{1}{R} \times x$

$R \rightarrow$ Resistance of the mix.

82. The redox Reaction is as follows

$Sn \longrightarrow Sn^{4+} + 4e^-$

$Cr_2O_7^{2-} + 6e^- \longrightarrow 2Cr^{3+}$

gmeq. of Sn = gmeq. of $K_2Cr_2O_7$

$$\frac{W(gm)}{E} = N \times V(\ell)$$

$$\frac{1}{118.7/4} = 0.1 \times V(L)$$

83. $\Delta T_f = i(K_f \times \text{molality})$

$$0.744 = i\left(1.86 \times \frac{20 \times 1000}{100 \times 500}\right)$$

$i = 1$

88. $H_2C_2O_4(\ell) + \frac{1}{2}O_2(g) \longrightarrow H_2O(\ell) + 2CO_2(g)$

$\Delta n_g = \frac{3}{2}$

$$\Delta u = \frac{-0.312 \times 8.75}{1/90} = -245.7 \text{ kJ/mol}$$

$\Delta H = \Delta u + \Delta n_g RT$

$$\Delta H = \Delta u + \Delta ngRT$$

$$= -245.7 + \frac{3}{2} \times \frac{8.314 \times 300}{1000}$$

$= -246.947$ kJ/mol

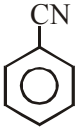
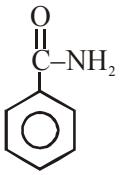
104. NCERT XI P-II, Page no. 296, 302, (see S-block)

106. (3) is most covalent and do not form complex

108. $X = CH_3\text{–}\underset{\underset{O}{\|}}{C}\text{–}CH_2\text{–}CH_2\text{–}CH_2\text{–}\underset{\underset{O}{\|}}{C}\text{–}OH$

109. Carbonyl compounds give 2,4-DNP test

110. $X = CH_3\text{–}CH{=}O$, $Y = OHC\text{–}CHO$

115. X =  ; Y = 

116. NCERT-XII Pg. # 144 Para-2

121. NCERT-XI Pg. # 25

125. NCERT-XI Pg. # 121, 114, 110

126. NCERT XI Page no. # 169

130. Nitrogenase enzyme is found only in certain prokaryotes.
[NCERT Page 202 1st paragraph]
नाइट्रोजिनेज एंजाइम केवल कुछ प्रोकेरियोट्स में ही होता है।
[NCERT Page 202 1st पेराग्राफ]

131. Photolysis of water releases extra H^+ in thylakoid lumen and during reduction $NADP^+$ remove H^+ from stroma which decrease the concentration of H^+ in stroma.
जल के प्रकाशिक विघटन से थाइलेकोइड गुहा में अतिरिक्त H^+ मुक्त होते हैं एवं अपचयन के दौरान $NADP^+$ स्ट्रोमा से H^+ लेता है जिससे स्ट्रोमा में H^+ की सान्द्रता घट जाती है।

132. NCERT Pg. # 213

136. NCERT Pg. # 69

137. NCERT Pg. # 76