MAJOR TEST

ALLEN AIIMS # 01 | **DATE : 09 - 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**	**3**	**1**	**1**	**3**	**3**	**4**	**2**	**1**	**1**	**1**	**3**	**4**	**1**	**4**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**2**
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.	**1**	**3**	**4**	**3**	**4**	**2**	**1**	**4**	**2**	**1**	**4**	**2**	**3**	**4**	**4**	**1**	**2**	**1**	**3**	**3**	**4**	**2**	**3**	**2**	**2**
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.	**2**	**3**	**3**	**2**	**4**	**3**	**2**	**2**	**1**	**3**	**4**	**3**	**4**	**1**	**3**	**4**	**3**	**1**	**2**	**2**	**4**	**2**	**4**	**1**	**4**
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.	**2**	**1**	**1**	**2**	**1**	**3**	**4**	**2**	**4**	**3**	**4**	**4**	**1**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**1**	**2**	**1**	**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.	**4**	**3**	**2**	**4**	**1**	**3**	**2**	**2**	**4**	**3**	**2**	**4**	**1**	**2**	**2**	**4**	**4**	**3**	**1**	**2**	**1**	**1**	**1**	**2**	**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.	**3**	**3**	**1**	**1**	**2**	**1**	**4**	**2**	**1**	**1**	**4**	**4**	**4**	**3**	**4**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**3**	**3**
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.	**3**	**1**	**3**	**4**	**3**	**2**	**4**	**3**	**4**	**1**	**3**	**4**	**2**	**3**	**1**	**1**	**2**	**1**	**2**	**4**	**1**	**4**	**1**	**2**	**1**
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**	**1**	**2**	**2**	**1**	**1**	**4**	**2**	**4**	**1**	**4**	**2**	**2**	**2**	**1**	**2**	**3**	**1**	**3**	**3**	**2**	**4**	**3**	**1**	**3**

HINT – SHEET

1. $E \propto p^a A^b T^c$

$ML^2T^{-2} = [MLT^{-1}]^a (L^2)^b [T]^C$

After solving

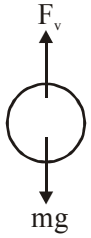
$a = 1, b = \frac{1}{2}, C = -1$

2. $v = a(-\alpha) e^{-\alpha t} + b(\beta)e^{\beta t}$

$v = -a \alpha e^{-\alpha t} + b\beta e^{\beta t}$

$a = \frac{dv}{dt} = a\alpha^2 e^{-\alpha t} + b\beta^2 e^{\beta t} > 0$ (always)

4.



$mg = F_{viscous}$

Ball will attain terminal velocity

6. By COLM

$mv + 0 = (m + M)v'$

then $v' = \left(\frac{mv}{m+M}\right)$

$KE = \frac{1}{2}(m+M)v'^2$

$= \frac{1}{2}(m+M)\left(\frac{mv}{m+M}\right)^2$

$= \frac{1}{2}mv^2\left(\frac{m}{m+M}\right)$

8. $x = 3t - 4t^2 + t^3$

$v = \frac{dx}{dt} = 3 - 8t + 3t^2$

at $t = 0 \quad v_i = 3$ m/s

at $t = 4 \quad v_f = 19$ m/s

According to work energy theorem

$w = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$$= \frac{1}{2}m(v_f^2 - v_i^2)$$

$$= \frac{1}{2}\left(\frac{3}{1000}\right)(361-9)$$

$$= \frac{3}{2}\times\frac{352}{1000}$$

$$= 528 \text{ mJ}$$

9. $N = \frac{mv^2}{R}$ .....(1)

$f \geq mg$ .....(2)

$\mu N \geq mg$ .....(3)

from (1), (2) & (3)

$$\mu\left(\frac{mv^2}{R}\right) \geq mg \quad \Rightarrow \mu \geq \frac{Rg}{v^2}$$

$$\mu \geq 0.25$$

12. Momentum of H atom = Momentum of photon.

$$mv = \frac{E}{C} = \frac{3Rh}{4} \quad \left[\because E = Rhc\left(\frac{1}{1} - \frac{1}{4}\right)\right]$$

$$v = \frac{3Rh}{4M}$$

13. $i_p = (1.6 \times 10^{-19})\, n_e$ and $n_e = \left(\frac{x}{100}\right)\frac{P\lambda}{hc}$

14. $$\frac{(N)_{active}}{(N)_{active} + (N)_{decay}} = \frac{1}{2^{t/T_{1/2}}}$$

$$\frac{1}{5} = \frac{1}{\frac{2^t}{T_1/2}}$$

15. As the block moves up with the fall of coin. ℓ decreases, similarly h will also decrease because when the coin is in water, it displaces water equal to its own volume only.

17. $$PV = \frac{M}{M_w}RT, \Rightarrow T \propto \frac{1}{M}$$

18. $\Delta L_1 = \Delta L_2,\ L_1\alpha_1\Delta\theta = L_2\alpha_2\Delta\theta$

$$\frac{L_1}{L_2} = \frac{\alpha_2}{\alpha_1}$$

19. $\eta_1 = \frac{200}{473}, \eta_2 = \frac{200}{273}, \frac{\eta_1}{\eta_2} = \frac{273}{473} = 0.577$

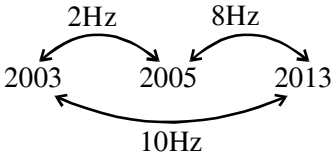
20. for A $\rightarrow$ AD, $P_{AB}V^\gamma = P(2V)^\gamma$, $P_{AD} = P2^\gamma$

$= 2^{3/2}\,P = 2\sqrt{2}\,P$

for C $\rightarrow$ IT, $P_{IT}V = P(2V)$, $P_{IT} = 2P$

for B $\rightarrow$ IB, $P = P_1$

23.



2Hz $\rightarrow$ $\frac{1}{2}\ \frac{2}{2}$ (Total 2 maxima in 1s)

8Hz $\rightarrow$ $\frac{1}{8}\ \frac{2}{8}\ \frac{3}{8}\ \frac{4}{8}\ \frac{5}{8}\ \frac{6}{8}\ \frac{7}{8}\ \frac{8}{8}$

(Total 8 maxima in 1s)

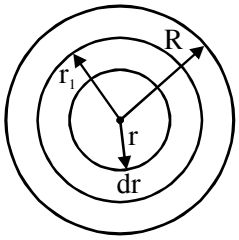
10Hz $\rightarrow$ $\frac{1}{10}\ \frac{2}{10}\ \frac{3}{10}\ \frac{4}{10}\ \frac{5}{10}\ \frac{6}{10}\ \frac{7}{10}\ \frac{8}{10}\ \frac{9}{10}\ \frac{10}{10}$

(Total 10 maxima in 1s)

But $\frac{1}{2} = \frac{4}{8}$ and $\frac{2}{2} = \frac{8}{8} = \frac{10}{10}$

So number of beats = (10 + 8 + 2) – (3) = 17

30.



Charge enclosed by sphere of radius r_1

$$q = \int \rho 4\pi r^2\, dr = \int_0^{\eta} \frac{A}{r}4\pi r^2 dr = \frac{4\pi A r_1^2}{2}$$

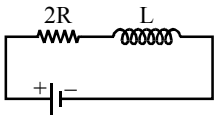
Required electric field = $\frac{q}{4\pi\varepsilon_0 r_1^2} = \frac{A}{2\varepsilon_0}$

31. NCERT Page 33

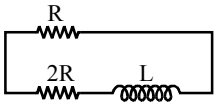
$$\phi = \frac{q_{in}}{\epsilon_0}$$

33. Refractive index of medium $\mu = \frac{c_0}{v_m}$

$$= \frac{\frac{1}{\sqrt{\epsilon_0 \mu_0}}}{\frac{1}{\sqrt{\epsilon \mu}}} = \sqrt{\frac{\epsilon}{\epsilon_0} \times \frac{\mu}{\mu_0}} = \sqrt{\epsilon_r \mu_r}$$

34. Charging 

$\lambda_1 = \frac{L}{2R}$

Discharging 

$\lambda_2 = \frac{L}{3R}$

$$\frac{\lambda_1}{\lambda_2} = \frac{L/2R}{L/3R} = \frac{3}{2}$$

35. $B_P = 2 \times \frac{\mu_0 i}{4\pi x}[(\sin 90° + \sin(-45°)]$,

where $x = \frac{d}{\sqrt{2}}$

36. $A = \pi R^2$ or $R = \sqrt{\frac{A}{\pi}}$

Now $B = \frac{\mu_0 i}{2R}$ or $i = \frac{2BR}{\mu_0}$

$$M = iA = \frac{2BR}{\mu_0}A = \frac{2BA}{\mu_0}\sqrt{\frac{A}{\pi}}$$

37. $P = v_{rms} I_{rms} \cos\phi$

$240 = 100 \times 4 \cos\phi$

$$\cos\phi = \frac{3}{5} = \frac{R}{Z}$$

$$\therefore \quad Z = \frac{V}{I} = \frac{100}{4} = 25$$

$$\frac{R}{25} = \frac{3}{5} \Rightarrow R = 15\Omega$$

$$\sqrt{R^2 + X_L^2} = 25\Omega \Rightarrow X_L{}^2 = 625 - 225 \Rightarrow X_L = 20\Omega$$

As $2\pi f L = 20\Omega$

So $L = \frac{20}{2\pi f} = \frac{20}{2\pi \times 50} = \frac{1}{5\pi}H$

40. $\theta = \frac{\Delta}{d} = \frac{(2n-1)\lambda}{2d} = \frac{(2\times 1 - 1)\times 5000 \times 10^{-10}}{2 \times (0.1/\pi) \times 10^{-3}}$

$$\theta = \frac{5 \times 10^{-3} \times \pi}{2} \text{ radian}$$

$$= \frac{5 \times 10^{-3} \times \pi}{2} \times \frac{180}{\pi} = 0.45°$$

55. $\frac{P_2}{P_1} = \frac{\omega_2}{\omega_1}$

$$\frac{8}{10} = \frac{\omega_2}{15}$$

gas leaked = $\omega_1 - \omega_2$

56. $F^- \underset{\in A}{\overset{1P}{\rightleftharpoons}} F \quad \Delta H_{1E} = -320$ kj/mol

57. 22 K gold is alloy used in/as ornaments.

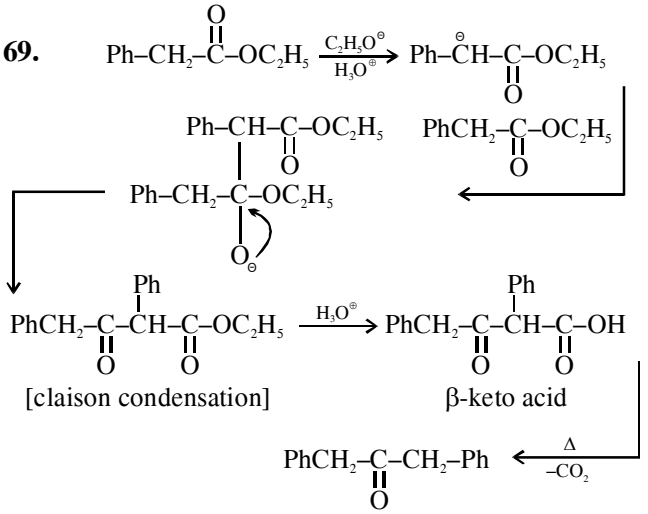
59. I_3^{-1} linear shape approx 180° bond angle.

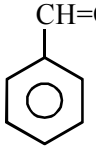
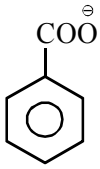
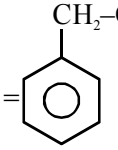
63. $CaC_2 + H_2O \rightarrow C_2H_2 \xrightarrow{X^3} C_6H_6$

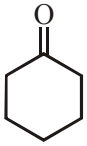
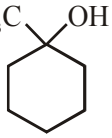
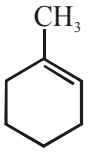
64. $[(NH_3)_5\overset{+3}{Cr}-\overset{-1}{OH}-\overset{+3}{Cr}(NH_3)_5]Br_5^{-5}$

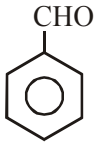
66. B has R configuration and D has R configuration so B and D are identical

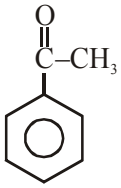
67. Reactivity towards hydration ∝ stability of carbocation

69. 

70. X =  Y =  ; Z =  (Alcohol)

71. A =  ; B =  ; C = 

72. X =  (By Gatterwann koch aldehyde synthesis)

Y =  (By Friedel craft reactioin)

Z = Ph–CH=CH–C(=O)–Ph

(By Aldol condensation)

NCERT= (XI) Part - 2, Page 393

NCERT= (XII) Part - 2, Page 364

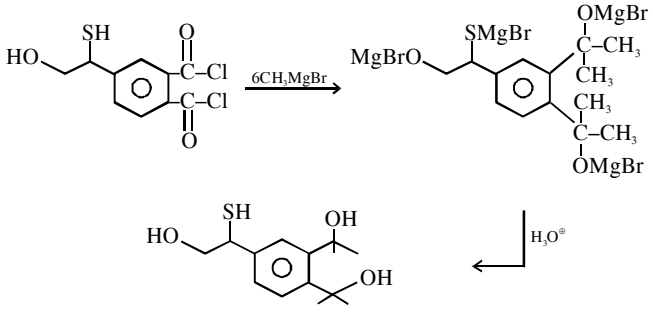
73. P = $CH_3–\underset{\underset{O}{\|}}{C}–CH_3$

Q = CHI_3 R = $CH_3–\overset{\overset{O}{\|}}{C}–ONa$

NCERT= (XI) Part - 2, Page 371

NCERT= (XII) Part - 2, Page 356

74.



77. NCERT (2012) XII part II Page no. # 432/435/436

81. NCERT Page No. A–33, B-35, C-36,38 D-39

82. NCERT Page No. 41

83. NCERT Page No. 17

85. NCERT XI (E) Page # 57

86. NCERT Page No. # 103

87. NCERT Eng. - Page No. # 112, Para.# 3
Hindi - Page No. # 113, Para.# 4

88. NCERT XI Page # 85,97

100. NCERT (E) XII, Fig 3.12, Page No.53

106. NCERT Page # 136 (E) , 145 (H)

109. NCERT XIth Page-337 (E), 338 (H)

110. NCERT XIth Page-305 (E), 304 (H)

111. NCERT XIth Page-325 (E),(H)

150. In CrO_3 Cr is in + 6 ox. state forms covalent bond.

151. Borazine $B_3N_3H_6$ Benzene C_6H_6

153. NCERT (2012) XII part II Page no. # 404 che module No-6 P.No. 99 (E) or 100 (H)

154. NCERT (2012) XII part II Page no. # 448/450

158. $HC \equiv CH \xrightarrow{2CH_3OH} CH_3–\underset{\underset{OCH_3}{|}}{\overset{\overset{OCH_3}{|}}{CH}}$

This is an EAR.

161. NCERT Page # 38

162. NCERT Page # 10 & 11

172. NCERT Page # 77

173. NCERT Page # 81

176. NCERT-XIIth Page-158 (E), 171 (H)