LEADER TEST SERIES / JOINT PACKAGE COURSE

TARGET : PRE-MEDICAL 2016

Test Type : **ALL INDIA OPEN TEST** (MAJOR) Test Pattern : AIPMT

TEST DATE : 17 - 04 - 2016

ANSWER KEY

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

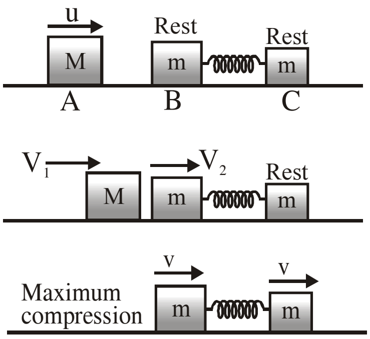
HINT – SHEET

1. Direction $\Rightarrow \dfrac{-4\hat{i}+3\hat{j}}{\left|-4\hat{i}+3\hat{j}\right|} = \dfrac{-4\hat{i}+3\hat{j}}{5}$

$$\vec{v} = 10\ \text{m/s}\left(\frac{-4\hat{i}+3\hat{j}}{5}\right)$$

$$= \left(-8\hat{i}+6\hat{j}\right)\ \text{m/s}$$

2. (I) (II) (III)



In first collision between block A & B

$$V_1 = \left(\frac{M-m}{M+m}\right)u + 0$$

$$V_2 = \left(\frac{2M}{M+m}\right)u + 0$$

At the time of maximum compression velocities of blocks B and C become equal

$mv_2 = mv + mv$

$mv_2 = 2mv$

$$v = \frac{v_2}{2} = \left(\frac{M}{M+m}\right)u$$

velocity of C w.r.t. to A

$$= \frac{Mu}{M+m} - \left(\frac{M-m}{M+m}\right)u = \left(\frac{m}{M+m}\right)u$$

3. $\dfrac{dQ}{12} = \dfrac{k(2A)(T_1 - T_2)}{\ell}$ ...(1)

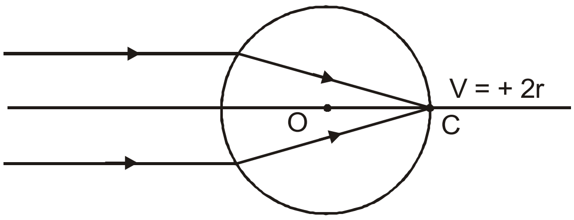
$\dfrac{dQ}{t} = \dfrac{kA(T_1 - T_2)}{2\ell}$ ...(2)

from (1) & (2)

$\dfrac{t}{12} = 4$

t = 48 sec

5.



$\dfrac{\mu_2}{v} - \dfrac{\mu_1}{u} = \dfrac{\mu_2 - \mu_1}{R}$ $\qquad \dfrac{\mu}{2r} - \dfrac{1}{-\infty} = \dfrac{\mu - 1}{r}$

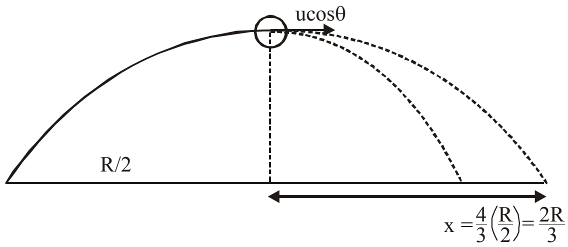
$\dfrac{\mu}{2r} = \dfrac{\mu - 1}{r} \Rightarrow \mu = 2\mu - 2 \Rightarrow \mu = 2$

6. P = $\vec{F} \cdot \vec{v}$

$F \longrightarrow \dfrac{F}{2}$; $v \longrightarrow \dfrac{v}{2}$

Then $P \longrightarrow \dfrac{P}{4}$

7.



By COLM

mucosθ = $\left(\dfrac{3m}{4}\right)V^1 \Rightarrow V^1 = \dfrac{4}{3}$ (u cos θ)

so total Range become

$\dfrac{R}{2} + \dfrac{2R}{3} = \dfrac{3R + 4R}{6} = \dfrac{7R}{6}$

R = $\dfrac{u^2 \sin 2\theta}{g} = \dfrac{100 \times 100 \times 2 \times \frac{3}{5} \times \frac{4}{5}}{10}$

= 960 m

Total range = 7/6 × 960 = 1120 m

8. In the curves 1-2 and 3-4, we find that the pressure is directly proportional to temperature. So, the volume remains unchanged, i.e., gas does not work. The work done during the isobaric processes 2-3 and 1-4 are as follows:

$W_{2-3} = P_2(V_3 - V_2)$

$W_{1-4} = P_1 (V_1 - V_4)$

Total work done = $P_2(V_3 - V_2) + P_1(V_1 - V_4)$

$\therefore$ $W_T = P_2V_3 - P_2V_2 + P_1V_1 - P_1V_4$

Three moles has been given, so

PV = nRT = 3RT

$\therefore$ $W_T = 3RT_3 - 3RT_2 + 3RT_1 - 3RT_4$

$= 3R[T_1 + T_3 - T_2 - T_4]$

= 3R[400 + 2400 – 800–1200]

= 3R × 800 = 20× 10^3J = 20 kJ.

9. Potential gradient (x) = $\dfrac{IR}{L}$

$= \dfrac{e}{10r} \cdot \dfrac{9r}{L}$

$= \dfrac{9e}{10L}$

$\because \dfrac{e}{2} = x \times \ell_{AJ}$

$\ell_{AJ} = \dfrac{e}{2} \times \dfrac{10L}{9e} = \dfrac{5L}{9}$

10. Displacement = $\dfrac{t\sin(i - r)}{\cos r}$ and

1× sin i = n × sinr

Since i and r are small angles.and i = nr

Displacement = t (i – r)

$\therefore$ Displacement = $t\, i \left(1 - \dfrac{r}{i}\right) = t\, \theta \left(1 - \dfrac{1}{n}\right)$

$= \dfrac{t\theta \;\; (n - 1)}{n}$

11. $x = \sqrt{V + 1}$

$x^2 = V + 1$

$2x \dfrac{dx}{dV} = 1$

$2x = \dfrac{dV}{dx}$

$\dfrac{dV}{dx} = 10$ (at x = 5)

$a = V\dfrac{dV}{dx}$

at x = 5 $\Rightarrow$ V = x^2 – 1 = 25 – 1 = 24

So $a = V\dfrac{dv}{dx}$ = 24 × 10 = 240 unit

12. $\because$ total mechanical energy $E = -\dfrac{GMm}{2r}$

$$\therefore \quad \frac{E_1}{E_2} = \frac{m_1}{m_2} \times \frac{r_2}{r_1} = \frac{3}{1} \times \frac{4r}{r} = \frac{12}{1}$$

13. $$\rho = \frac{PM_W}{RT}$$

or $$\rho \propto \frac{P}{T}$$

or $$\left(\frac{P}{T}\right)_A = \frac{P_0}{T_0} \text{ and} \left(\frac{P}{T}\right)_B = \frac{3}{2}\frac{P_0}{T_0}$$

$$\left(\frac{P}{T}\right)_B = \frac{3}{2}\left(\frac{P}{T}\right)_A$$

$$\therefore \quad \rho_B = \frac{3}{2}\rho_A = \frac{3}{2}\rho_0$$

14. $$\frac{40}{60} = \frac{R}{S}, \quad \frac{2}{3} = \frac{R}{S} \qquad .....(1)$$

$$\frac{64}{36} = \frac{R(12+S)}{12S} \qquad \frac{16}{9} = \frac{R(12+S)}{12S} \quad ....(2)$$

(1)/(2)

$S = 20\Omega$, $R = \dfrac{40}{3}\Omega$

15. As $D >> d$ & $\lambda << d$.

Hence we can use $\beta = \dfrac{\lambda D}{d}$

so distance between 5th bright fringe and 3rd dark fringe = $5\beta - (2\beta + \beta/2)$

$$= \frac{5}{2}\beta = \frac{5}{2} \times \frac{6.5 \times 10^{-7} \times 1}{10^{-3}}$$

= 1.625 mm

17. Acceleration of a uniform body of radius R and mass M and moment of inertia I rolls down (without slipping) on an inclined plane making an angle θ with the horizontal is given by

$$a = \frac{g\sin\theta}{1 + \dfrac{I}{MR^2}}$$

18. $$F = -kx$$

For first case: $x = 5$ cm $= 0.05$ m

and $F = mg = 10$ N

$\therefore \quad 10 = k \times 0.05$

or $$k = \frac{10}{0.05} = 200$$

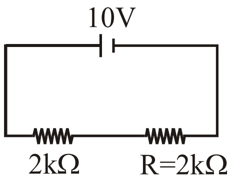
For second case: Consider simple harmonic motion,

$$y = A \sin \omega t$$

$$\left.\frac{dy}{dt}\right|_{max} = A\omega\cos \omega t\,|_{max.} = A\omega$$

$$\therefore \quad v_{max} = A\sqrt{\frac{k}{m}} = 0.1\sqrt{\frac{200}{2}}$$

$$= 0.1\sqrt{100} = 1 m/s$$

19. 

$$R = \frac{3 \times 6}{3+6} = 2K\Omega$$

voltage reading :

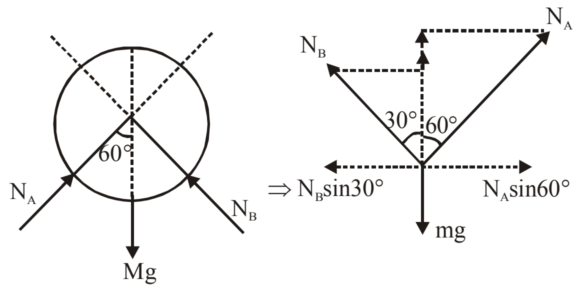
$$V = \frac{2}{2+2} \times 10 = 5 \text{ Volt}$$

20. $$\frac{1}{f} = (\mu - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

$$\frac{1}{30} = (\mu - 1)\left[\frac{1}{10} - \frac{1}{-\infty}\right]$$

$$\frac{1}{36} = (\mu - 1)\frac{1}{10}$$

$$\mu = 1 + \frac{1}{3} = \frac{4}{3}$$

21. 

$$N_A \sin 60° = N_B \sin30°$$

$$N_A \cdot \frac{\sqrt{3}}{2} = N_B \frac{1}{2}$$

$$\sqrt{3}\, N_A = N_B$$

$$\boxed{\sqrt{3}\, N_A = N_B}$$

22. $I = 5 \times mR^2$
$= 5 \times 2000 \times (10)^2$
$= 10^6$ gm–cm^2

23. $y_1 = \sin\left(4t - 2x + \frac{\pi}{2}\right)$

$y_2 = \sin\left(4t - 2x + \frac{\pi}{4}\right)$

Phase difference between two waves is,

$$\Delta\phi = \left(4t - 2x + \frac{\pi}{4}\right) - \left(4t - 2x + \frac{\pi}{2}\right) = \frac{\pi}{4} - \frac{\pi}{2} = -\frac{\pi}{4}$$

24. $i = 5 + 5 \sin(100\,\omega t)$

average value

$\langle i \rangle = 5 + 5 \langle \sin(100\,\omega t) \rangle$

In one time period $\langle \sin(100\omega t) \rangle = 0$

$\langle i \rangle = 5A$

25. $100 = n \times \frac{hc}{\lambda} = \frac{n \times 6.67 \times 10^{-34} \times 3 \times 10^{8}}{5000 \times 10^{-10}}$

$100 = \frac{n \times 20 \times 10^{-26}}{5 \times 10^{-7}}$

$25 \times 10^{19} = n$

$2.5 \times 10^{20} = n$

26. $x = t^2 + 4t$ at $t = 0$ $v_1 = 4$ m/s

$v = (2t + 4)$ $t = 2$ $v_2 = 8$ m/s

$W = \frac{1}{2} m v_2^2 - \frac{1}{2} m v_1^2$

$= \frac{1}{2}(2)\ [(8)^2 - (4)^2]$

$= 64 - 16 = 48$ J

27. $\Delta\ell = \frac{FL}{AY}$

$\frac{\Delta\ell_S}{\Delta\ell_B} = \frac{F_S}{F_B} \times \frac{L_S}{L_B} \times \frac{A_B}{A_S} \times \frac{Y_B}{Y_S}$

$= \frac{3M}{2M} \times a \times \frac{1}{b^2} \times \frac{1}{c} = \frac{3a}{2b^2c}$

28. $\xleftarrow{}$ (v) 4m/s O observer $\xleftarrow{}$ (v) 4m/s

$n' = n\left[\frac{\nu}{\nu - \nu_s}\right]$

$n'' = n\left[\frac{\nu}{\nu + \nu_s}\right]$

$\Delta n = n' - n''$

$= n\nu\left[\frac{1}{\nu - \nu_s} - \frac{1}{\nu + \nu_s}\right]$

$= n\nu\left[\frac{2\nu_s}{\nu^2 - \nu_s^2}\right]$

$\simeq \frac{2n\nu_s}{\nu} = \frac{2 \times 240 \times 4}{320}$

$= 6$

29. $W = MB(\cos\theta_1 - \cos\theta_2)$

$\sqrt{3} = MB(\cos 0° - \cos 60°)$

$MB = 2\sqrt{3}$

$t = MB \sin\theta = 2\sqrt{3} \times \sin 60° = 3J$

30. ${}_{90}Th^{232} \longrightarrow {}_{82}Pb^{208} + 6\,{}_2He^4 + 4\,{}_{-1}\beta^0$

No. of α - particle = 6

No. of β - particle = 4

31.

32. In case of soap bubble,

$W = T \times 2 \times \Delta A$

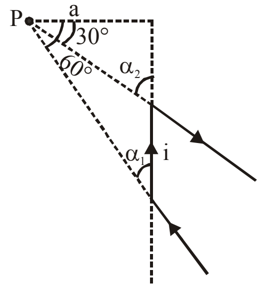
$= 0.03 \times 2 \times 40 \times 10^{-4} = 2.4 \times 10^{-4}$J.

33. $\frac{2kQ^2}{a} - \frac{kQq}{a} - \frac{2kQq}{a} > 0$

$\Rightarrow \frac{2kQ^2}{a} > \frac{3kQq}{a}$

$\Rightarrow 2Q > 3q$

34.



$$B_p = \frac{\mu_0 i}{4\pi a}\ (\cos\alpha_1 - \cos\alpha_2)\ \odot$$

$$= \frac{\mu_0 i}{4\pi a}\ (\cos 30° - \cos 60°)$$

$$= \frac{\mu_0 i}{8\pi a}\left(\sqrt{3}-1\right)\odot$$

35. $R = R_0\left(\frac{1}{2}\right)^{t/T_n}$

$$322 = R_0\left(\frac{1}{2}\right)^{4/T_n} \quad ..... (1)$$

$$161 = R_0\left(\frac{1}{2}\right)^{\frac{36}{T_n}} \quad ..... (2)$$

eq^n (2) ÷ (1)

$$\left(\frac{1}{2}\right)^1 = \left(\frac{1}{2}\right)^{\left(\frac{36-4}{T_n}\right)}$$

$$1 = \frac{36-4}{T_n}$$

T_n = 32 min.

36. $S_{n^{th}} = u + \frac{a}{2}\ (2n-1)$

$$55 = 0 + \frac{10}{2}\ (2n-1)$$

$11 = 2n - 1 \qquad \Rightarrow n = 6$

so total distance fall by the particle

$$S = ut + \frac{1}{2}\ at^2$$

$$= 0 + \frac{1}{2} \times 10 \times (6)^2 = 180 \text{ m}$$

37. $3P = P + h\rho_w g \Rightarrow h\rho_w g = 2P$

when water is drawn out, the pressure at bottom.

$$P^1 = P + \left(h - \frac{h}{5}\right)\rho_w g = P + \frac{4}{5}h\rho_w g$$

$$P^1 = P + \frac{4}{5}(2P) = \frac{13}{5}P$$

39. B due to AB $= \frac{\mu_0 i}{4\pi R}$ sin 45°

$$= \frac{\mu_0 i}{4\pi R} \times \frac{1}{\sqrt{2}} \otimes$$

B due to BC $= \frac{\mu_0 i}{8R} \otimes$

B due to semi infinite wire

$$= \frac{\mu_0 i}{4\pi R} \otimes$$

$$\Rightarrow \frac{\mu_0 i}{4\pi R}\left[\frac{1}{\sqrt{2}} + \frac{\pi}{2} + 1\right]$$

40. ${}_1H^1 + {}_1H^3 \rightarrow {}_1H^2 + {}_1H^2 + Q$

$Q = \Delta m \times 931.5\ \mu eV$

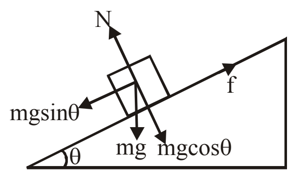
$\Delta m = [m({}_1H^1) + m({}_1H^3) - 2m({}_1H^2)]$

$\Delta m = [4.023874 - 2 \times 2.014102]$ u

$Q = \Delta m \times 931.5$ MeV

$Q = -4.03$ MeV

41.



mgsinθ – f = ma

mgsinθ – μmgcosθ = ma

θ = 60° a = g/2

g(sin 60° – μ cos 60°) = g/2

$$\frac{\sqrt{3}}{2} - \mu\left(\frac{1}{2}\right) = \frac{1}{2}$$

$$\boxed{\sqrt{3} - 1 = \mu}$$

42. An anisotropic material means a material which shows different properties along different directions. Consider a cuboid of length x, width y and height z, Its volume is V = xyz.
Taking log,

$\log V = \log x + \log y + \log z$ ...(i)

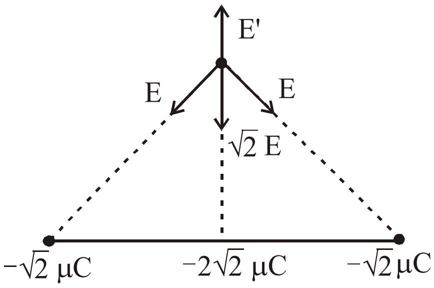
Suppose the body is heated through $d\theta$°C; then differentiating equation (i),

$$\frac{1}{V}\frac{dV}{d\theta} = \frac{1}{x}\frac{dx}{d\theta} + \frac{1}{y}\frac{dy}{d\theta} + \frac{1}{z}\frac{dz}{d\theta}$$

But, $dV = V\gamma\, d\theta$
$dx = x\alpha_1\, d\theta$
$dy = y\alpha_2\, d\theta$
$dz = z\alpha_3\, d\theta$

Therefore, $\gamma = \alpha_1 + \alpha_2 + \alpha_3$.

43.



$E_{net} = E' - \sqrt{2}\,E$

$$= \frac{2\sqrt{2}K \times 10^{-6}}{1} - \frac{\sqrt{2}\cdot\sqrt{2}\times 10^{-6}K}{2}$$

$= 16.46 \times 10^3$ N/C

46. He $\xrightarrow[IP(\downarrow)]{}$ Xe
Max IP – He
Min IP – Xe

47. SF_6 = Octahedral all six S – F bond length are same

48. pH range for titration is 6 to 11.

49. Addition takes place by following Markovnikov's rule.

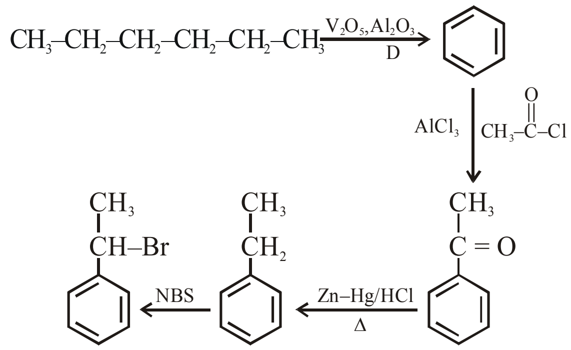
50. $MgSO_4 \cdot 7H_2O\,(s) \rightarrow MgSO_4(s) + 7H_2O(\ell)$
234 g 126 g
234 g $MgSO_4 \cdot 7H_2O$ gives = 126 g H_2O
2.34 g $MgSO_4 \cdot 7H_2O$ gives = 1.26 g H_2O

51. Ionisation energy of $T\ell$ is higher than $A\ell$

53. $$\frac{r_1}{r_2} = \sqrt{\frac{d_2}{d_1}} = \sqrt{\frac{16}{1}}$$

= 4 : 1

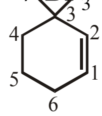
54.



55. Fact

57. Degree of Hydrolysis $\propto$ Covalent character
order of covalent character
$\Rightarrow BF_3 < BCl_3 < BBr_3 < BI_3$

58.



3, 3-Dimethyl Cyclohexene
(correct name)

59. 3° alcohol reacts with HCl at room temperature

60. $$E_{Cu|Cu^{+2}} = E^{\circ}_{Cu|Cu^{+2}} - \frac{0.0591}{2}\log\left[Cu^{2+}\right]$$

$$0 = -0.34 - \frac{0.0591}{2}\log\left[Cu^{2+}\right]$$

$$\log Cu^{2+} = \frac{-0.34\times 2}{0.059} = -\,11.51$$

$[Cu^{2+}] \simeq 3 \times 10^{-12}$ M

62. NO_2 is brown coloured gas while in dimer it colourless

63. Geometrical isomers are diastereomers also

64. Benzoylation of phenol is known as schotten Baumann reaction.

65. In bcc $\sqrt{3}\,a = 4r$

$$\frac{\sqrt{3}}{2}a = 2r$$

$$\therefore\ 2r = \frac{\sqrt{3}}{2} \times 4 \times 10^{-10} = 3.46 \times 10^{-10}\ m$$

66.

	EAN
$Ni(CO)_4$	36
$Ni(CO)_4]^{2-}$	34

68. Canonical structure having all atoms with complete octet is more stable than having atom with incomplete octet

69. Fehling sol. does not oxidise ketone and aromatic aldehyde.

70. Rate const of a reaction does not depend. upon staichiometry of the reaction.

71. +ve charge on CMA

$(\uparrow) =$ M – C bond strength $(\downarrow)$

$=$ C – O bond strength $(\uparrow)$

73. Allylic > 3º$(6H_{\propto})$ > 2° $(4H_{\propto})$

74. $R{-}\overset{\overset{O}{\|}}{C}{-}OH + \overset{\oplus}{Na}\ \overset{\ominus}{H}CO_3 \rightleftharpoons R{-}\overset{\overset{O}{\|}}{C}{-}ONa + H_2\overset{*}{C}O_3 \rightleftharpoons \overset{*}{C}O_3 + H_2O$

75. $x_3y_2\ (aq) \rightarrow 3x^{+2}\ (aq) + 2y^{-3}(aq)$

$i = 1 - \alpha + n\alpha$

$\Delta T_b = i \times K_b \times m$

$= 2 \times 0.52 \times 2$

$= 2.08$

$T_b = 373 + 2.08 = 375.08$

77. $K' = \sqrt{K} = \sqrt{49} = 7$

78. Sucrose = Glucose + Fructose

Disaccharides

79. Benzyl halide involves formation of relatively more stable carbocation in SN^1 reaction.

81. $XeF_4 \Rightarrow$ Square planner

$ICl_4^- \Rightarrow$ Square planner

$PCl_5 \Rightarrow$ T.B.P

$BrF_5 \Rightarrow$ Square Pyramidal

$NO_2^+ \Rightarrow$ Linear

83. Buna-S as well as Neoprene both are synthetic rubber.

84. Cannizzaro reaction is redox reaction does not involve C – C bond formation.

85. $NV = (NV)_{Base} - (NV)_{acid}$

$N(100+100) = 0.2 \times 100 - 0.1 \times 100$

$N = \frac{10}{200}$ {Here $N = OH^-$}

$POH = -\log [OH^-]$

$POH = -\log \frac{1}{20} = 1.3$

$pH = 14 - 1.3 = 12.7$

86. Lattic energy $\propto q_1q_2$

87. $N^{+5} \rightarrow N^{\circ}$

$n = 5$

89. Fact.

90. $CH_4(g) + 2O_2\ (g) \rightarrow CO_2(g) + 2H_2O(\ell)$

$q_p = \Delta H = -\ x\ kJ/g \times 16\ g/mol = -\ 16\ x\ kJ/mol$

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

$(-16x) = \Delta E + (-2) \times \frac{8.31}{1000} \times 300$

$\Delta E = -\ 16x + 4.986$

94. NCERT XI Pg # 219

100. NCERT XIIth, Page no. 80 (E), 88 (H)

104. NCERT XI Pg # 213

120. NCERT XIIth, Page no. 182 (E), 198 (H)

130. NCERT XIIth, Page no. 88 (E), 96 (H)

132. NCERT-I Page No. # 60

134. NCERT XI Pg # 248,249,250

140. NCERT XIIth, Page no. 71 (E), 79 (H)

142. NCERT-I Page No. # 69, Figure - 4.5

144. NCERT XI Pg # 232

146. Module, Page no. 186,188,189

150. NCERT XIIth, Page no. 201, 202 (E), 218, 220(H)

156. Module, Page no. 171

160. NCERT XIIth, Page no. 91 (E), 99 (H)

161. NCERT-XI Pg. # 34, fig 3.2 (b)

166. NCERT, Page no. 127

170. NCERT XIIth, Page no. 201 (E), 219 (H)

173. NCERT XI Pg # 197

176. NCERT, Page no. 131

179. NCERT XIIth, Page no. 72 (E), 80 (H)

180. NCERT XIIth, Page no. 74, 75 (E), 82, 83 (H)