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NEET 2023-24

Mark 720	Group PCB	PRE FINAL ROUND -01	Date : 17/03/2024 Time : 3 :20 Hours

Answer Key Version - S (PCB NEET 2023-24)

Physics

Sec. A	11. 3	22. 3	33. 1	43. 1	**Sec. A**	61. 4	72. 2	83. 3	93. 3
01. 4	12. 3	23. 3	34. 4	44. 1	51. 4	62. 1	73. 2	84. 1	94. 3
02. 1	13. 4	24. 1	35. 2	45. 3	52. 1	63. 4	74. 3	85. 3	95. 3
03. 3	14. 4	25. 2	**Sec. B**	46. 3	53. 4	64. 4	75. 3	**Sec. B**	96. 1
04. 1	15. 3	26. 2	36. 1	47. 3	54. 4	65. 4	76. 3	86. 3	97. 4
05. 3	16. 1	27. 1	37. 2	48. 1	55. 2	66. 4	77. 2	87. 1	98. 4
06. 2	17. 2	28. 2	38. 1	49. 1	56. 2	67. 3	78. 2	88. 4	99. 3
07. 3	18. 3	29. 1	39. 1	50. 2	57. 2	68. 3	79. 3	89. 3	100. 3
08. 2	19. 2	30. 1	40. 2		58. 4	69. 1	80. 1	90. 3	
09. 1	20. 2	31. 2	41. 1		59. 2	70. 4	81. 1	91. 1	
10. 2	21. 3	32. 3	42. 4		60. 1	71. 4	82. 4	92. 2	

Biology

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

PHYSICS

SECTION - A (35 Questions)

01. **(4)** $a = \frac{S^2}{t^4} = \frac{(\text{metre})^2}{(\text{second})^4} = m^2 s^{-4}$

02. **(1)** KE. $= \frac{1}{2} mV^2$

$[KE] = ML^2 T^{-2}]$

If unit of M and L are doubled

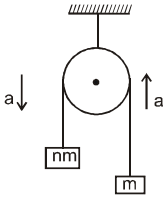
Then unit of K.E.

K.E. $= [(2M)(2L)^2 T^{-2}]$

$= 8 [ML^2 T^{-2}]$ unit of K.E. is 8 times.

03. **(3)** $a = \frac{(nm-m)}{nm+m} g$

$= \frac{(n-1)}{(n+1)} g$



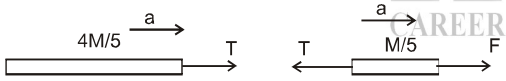
$a_1 = a_2 = a$

$a_{cm} = \frac{nma_1 - ma_2}{(nm+m)} = \frac{(n-1)}{(n+1)} \times a$

$a_{cm} = \frac{(n-1)^2}{(n+1)^2} g$.

04. **(1)** Velocity can't change its value suddenly.

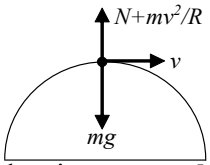
05. **(3)** $a = \frac{F}{M}$



By FBD

$T = \frac{4M}{5} \times a = \frac{4M}{5} \times \frac{F}{M} = \frac{4F}{5} \Rightarrow T = 4$ N.

06. **(2)**



For leaving contact N = 0

$\Rightarrow \frac{mv^2}{R} = mg \Rightarrow v = \sqrt{gR}$.

07. **(3)** use $m_1 v_1 = m_2 v_2 = P$

K.E. $= \frac{1}{2} m v_1^2 + \frac{1}{2} m_2 v_2^2$

$= \frac{1}{2} m_1 \left(\frac{P}{m_1}\right)^2 + \frac{1}{2} m_2 \left(\frac{P}{m_2}\right)^2$

$= \frac{1}{2} \frac{P^2(m_2+m_1)}{m_1 m_2}$.

08. **(2)** $x = 6t$ $y = 8t - 5t^2$

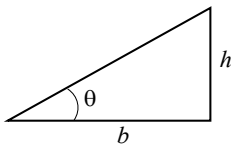
$\frac{dx}{dt} = 6$ $\frac{dy}{dt} = 8 - 10t$

at t = 0

$V_x = 6$ m/sec $V_y = 8$m/sec

$V = \sqrt{V_y^2 + V_x^2} = \sqrt{8^2 + 6^2} = 10$ m/sec

09. **(1)**

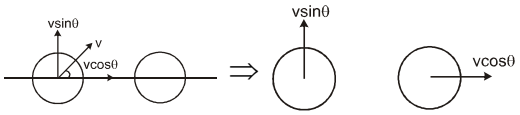


as $\upsilon = \sqrt{Rg \tan\theta}$ $\Rightarrow$ $h = \frac{\upsilon^2 b}{Rg}$

10. **(2)** $\frac{H}{R} = \frac{\tan\theta}{4}$

$\theta = 45°$ & R = 36 m $\therefore$ H = 9 m.

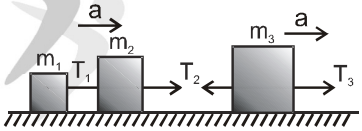
11. **(3)**



be fore collision after collision

So angle between velocity vectors is 90º

12. **(3)** $a = \frac{60}{10+20+30} = 1$ ms^{-2}



$\Rightarrow T_2 = (m_1 + m_2) a = (10 + 20) \times 1 = 30$ N.

13. **(4)** It can be observed that component of acceleration perpendicular to velocity is $a_c = 5 m/s^2$

$\therefore$ radius $= \frac{v^2}{a_c} = \frac{25}{5} = 5$ metre.

14. **(4)**

15. **(3)** Let v be the speed of B at lowermost position, the speed of A at lowermost position is 2v.

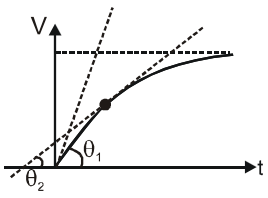
From conservation of energy

$\frac{1}{2} m (2v)^2 + \frac{1}{2} mv^2 = mg(2l) + mgl$.

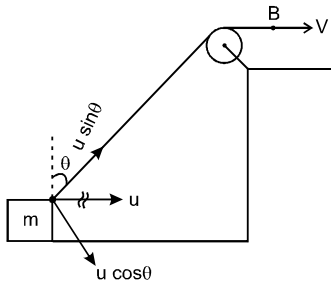
Solving we get $v = \sqrt{\frac{6}{5} gl}$.

16. **(1)** As the slope of tangent decreases, velocity also decreases with time.

after time distance becomes constant i.e particle stops.



17. **(2)**



The length of string AB is constant.

$\Rightarrow$ speed A and B along the string are same $u \sin\theta = V$

$u \sin\theta = V$

$$u = \frac{V}{\sin\theta}$$

18. **(3)** $[Y] = [F^a A^b D^c]$

$[ML^{-1}T^{-2}] = [(MLT^{-2})^a (L^2)^b (ML^{-3})^c]$

equating power of M, L and T

$1 = a + c$, $\quad -1 = a + 2b - 3c$

$-2 = -2a \quad a = 1, \quad c = 0$

$b = -1$

$[Y] = F A^{-1} D^0$.

19. **(2)** $[h] = ML^2T^{-1}$

$$[V_s] = \frac{[W]}{[Q]} = \frac{ML^2T^{-2}}{AT} = ML^2T^{-3}A^{-1}$$

$[\phi] = ML^2T^{-2}$

$[P] = MLT^{-1}$.

20. **(2)**

21. **(3)** $W_G - W_f = 0 \Rightarrow mgh = \mu mgl$

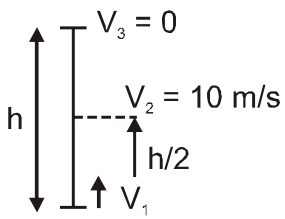
$h = \mu l$

$h = (0.2)l$

$$\Rightarrow l = \frac{1.5}{0.2}$$

$l = 7.5$ m $= (3 + 3 + 1.5)$ m.

22. **(3)**



$V_2^2 = V_3^2 + 2g\frac{h}{2}$

$\Rightarrow (10)^2 = 2 \times 10 \times \frac{h}{2}$

$\Rightarrow h = \frac{100}{10} = 10$ m

23. **(3)** It can be observed that power delivered to particle by force F is -

$P = Fv = K$.

The power is constant. Hence work done by force in time t is -

$\Delta W = Pt = Kt$

24. **(1)** $W_S + W_f = \Delta K$

$-\Delta U + W_f = -K_i$

$-U_f - \mu mgx = -K_i$

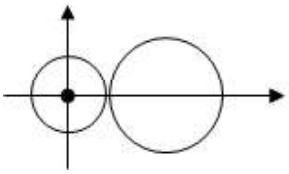
$$\frac{1}{2}Kx^2 + \mu mgx = \frac{1}{2}mu^2$$

$100\,x^2 + 2(0.1)(50)(10)\,x = 50 \times 4$

$x^2 + x - 2 = 0$

$x = 1$ m.

25. **(2)**



$$X_{com} = \frac{m \times 0 + 2m \times (3a)}{m + 2m} = 2a.$$

26. **(2)** $a = bt$

$$\frac{dv}{dt} = bt$$

$$\int_u^v dv = \int_0^t bt\,dt$$

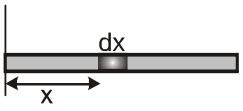
$$V = u + \frac{bt^2}{2}$$

$$[V = u + \frac{bt^2}{2}]$$

27. **(1)** $W = \vec{F}.\vec{s} = (-2\hat{i} + 15\hat{j} + 6\hat{k}).10\hat{j}$

$= 150$ J.

28. **(2)**

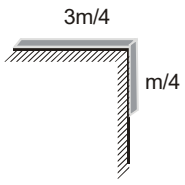


$$x_{cm} = \frac{\int dmx}{\int dm} = \frac{\int (\lambda_0 x dx)x}{\int \lambda dx} = \frac{\int_0^L \lambda_0 x^2 dx}{\int_0^L \lambda_0 x dx} = \frac{2L}{3}.$$

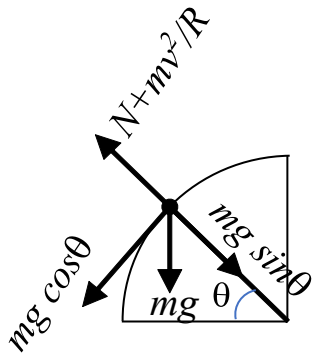
29. **(1)** Apply system equation

$$\frac{m}{4}g = \frac{3m}{4}g \times \mu$$

$$\Rightarrow \mu = \frac{1}{3} = 0.33$$



30. **(1)**

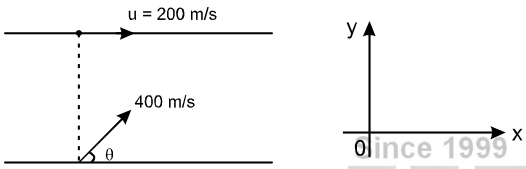


$$N + \frac{mv^2}{R} = mg\sin\theta$$

$$N = mg\sin\theta - \frac{mv^2}{R}$$

as $\theta \uparrow \Rightarrow N \uparrow$

31. **(2)**



To hit, $400\cos\theta = 200$

{$\because$ Both travel equal distance along horizontal, of their start and coordinates an x axis are same}

$\Rightarrow \theta = 60°$.

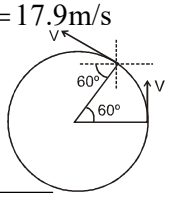
32. **(3)** $V_{com} = \dfrac{200\times 10\hat{i} + 500(3\hat{i} + 5\hat{j})}{200+500}$

$$= \frac{20\hat{i} + 15\hat{i} + 25\hat{j}}{7} = 5\hat{i} + \frac{25}{7}\hat{j}.$$

33. **(1)** $V = \sqrt{5lg} = \sqrt{5\times 6.4\times 10} = 17.9\text{m/s}$

34. **(4)** $\Delta V = V_2 - V_1$

$= 0$

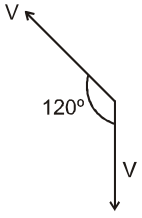


$\Delta\vec{V} = \vec{V_2} - \vec{V_1}$

$|\Delta\vec{V}| = \sqrt{V_2^2 + V_1^2 + 2V_1V_2\cos 120°}$

$= \sqrt{V^2 + V^2 + 2V^2\cos 120°}$

$= \sqrt{2V^2 + 2V^2\left(\frac{-1}{2}\right)}$



$|\Delta\vec{V}| = V$

35. **(2)** $X_{CM} = \dfrac{0\times m + m\times a + m\times\frac{a}{2}}{m+m+m} = \dfrac{a}{2}$,

$$Y_{CM} = \frac{0\times m + 0\times m + m\times\frac{a\sqrt{3}}{2}}{m+m+m} = \frac{a\sqrt{3}}{6},$$

SECTION - B (Attempt Any 10 Questions)

36. **(1)** As block is shifted slowly $\Delta K.E. = 0$

$\therefore W_g + W_f + W_F = 0$

Work done :

$= Mgh_1 + Mgh_2 + Mgh_3 + \mu_1 Mgl_1 + \mu_2 Mgl_2 + \mu_3 Mgl_3$

$= Mg(h_1 + h_2 + h_3) + Mg(\mu_1 l_1 + \mu_2 l_2 + \mu_3 l_3)$

$= Mg(8 + 0.2 + 0.4 + 0.4) = 90$ J.

37. **(2)** $W = \int \vec{F}.d\vec{s} = \int (3t\hat{i} + 5\hat{j}).(4t\ dt\ \hat{i})$

$$= \int_0^2 12t^2 dt = \frac{12\left[t^3\right]_0^2}{3} = 32J.$$

38. **(1)** $m\vec{V}_m = -M\vec{V}_b$

$m(\vec{V}_{rel} + \vec{V}_b) = -M\vec{V}_b$

$\vec{V}_b = \dfrac{-m\vec{V}_{rel}}{M+m}$

$\Rightarrow \vec{V}_b$ will be opposite to V_{rel}.

39. **(1)** $\Delta U = \dfrac{1}{2}\dfrac{m_1m_2}{(m_1+m_2)}(V_1 - V_2)^2 = \dfrac{100}{3}$

$(V_1 - V_2)^2 \times \dfrac{2m.m}{2(m+2m)} = \dfrac{100}{3}$

putting $m = 1$ kg

$(V_1 - V_2) = 10$ m/sec.

40. **(2)** Case (1) :

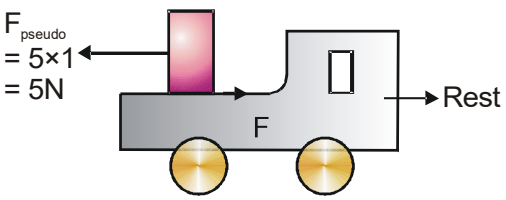
$a = \dfrac{F}{3m}$

$N_1 = m\times a$

Similarly in case (2)

$N_2 = 2m\times a \Rightarrow \dfrac{N_1}{N_2} = \dfrac{1}{2}$.

41. **(1)** Solving from the frame of truck



$f \le \mu mg = 6$

$\Rightarrow$ $f = 5$N.

42. **(4)** $0.2 \times 100\ g$ ← B → F
$0.3 \times 300\ g$ ←

for motion to start

$F \geq 0.2 \times 100\ g + 0.3 \times 300\ g = 1100\ N$

$F_{min} = 1100\ N.$

43. **(1)** $N = mg + Q\cos\theta$

frictional force $f = \mu(mg + Q\cos\theta)$

$P + Q\sin\theta = \mu(mg + Q\cos\theta)$

$$\mu = \frac{P + Q\sin\theta}{mg + Q\cos\theta}$$

44. **(1)** From given conditions :

$$V_A = V_B\cos 37^0 = 15.\frac{4}{5} = 12\ \text{m/sec.}$$

$$\therefore \text{ time of flight of A (t)} = \sqrt{\frac{2\times 20}{10}} = 2\ \text{sec.}$$

$\Rightarrow$ Range $= V_A t = 24$ m.

45. **(3)**

46. **(3)** Density, $\rho = \frac{m}{V}$

$$\Rightarrow \left|\frac{\Delta\rho}{\rho}\right|_{max} = \frac{m}{\pi r^2 l} = \left|\frac{\Delta m}{m}\right| + 2\left|\frac{\Delta r}{r}\right| + \left|\frac{\Delta l}{l}\right|$$

$$= \frac{0.01}{0.4} + \frac{2(0.03)}{6} + \frac{0.04}{8}$$

$$\%\text{ error in density} = \left(\frac{\Delta\rho}{\rho}\right)\times 100\%$$

$$= \left(\frac{1}{0.4} + \frac{6}{6} + \frac{4}{8}\right)\% = (2.5 + 1 + 0.5)\% = 4\%$$

47. **(3)** MSR = 2.5 mm

$$CSR = 45 \times \frac{0.5}{50}\,mm = 0.45\ mm$$

Diameter reading = Reading of crew gauge
= 2.5 + 0.45 – (–0.03) = 2.98 mm.

48. **(1)** $\frac{dx}{dt}$ = slope ≥ 0 always increasing

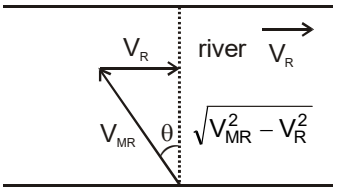
$\frac{dx}{dt} < 0$; and at $t \to \infty \frac{dx}{dt} \to 0$

$\frac{dx}{dt} > 0$ for first half $\frac{dx}{dt} < 0$ for second half.

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

49. **(1)** Work done by a force is positive if displacement is in direction of force and work done by a force is negative if displacement is in direction opposite to that of force.

50. **(2)** 15 min = 1/4 hr.



$$t = \frac{d}{V_y}$$

$$\Rightarrow \frac{1}{4} = \frac{1}{\sqrt{V_{MR}^2 - V_R^2}} = \frac{1}{4} = \frac{1}{\sqrt{5^2 - V_R^2}}$$

$\Rightarrow V_R = 3$ km/h

CHEMISTRY

SECTION - A (35 Questions)

51. **(4)**
Number of moles of oxygen = 2 × number of moles of given compounds.

52. **(1)** 1

53. **(4)** If both assertion and reason are false.

54. **(4)** E^+ attacks on ring which has more e^- density.

55. **(2)** 1 is staggered and 2 is eclipsed.

56. **(2)** 2s

57. **(2)** As values of m is from –1 to +1 including zero.

58. **(4)** All the above

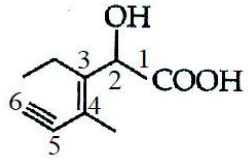
59. **(2)** Higher are number of $\alpha - H$, more the hyperconjugating structures, more the stability of the compound.

60. **(1)** 1, 2 and 3

61. **(4)** Helium nuclei, which impinged on a metal foil and got scattered.

62. **(1)** 1

63. **(4)**



64. **(4)**
(A) is elimination, (B) is substitution and (C) is addition reaction.

65. **(4)** (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i)

66. **(4)**

$$X_3 = \frac{X_1 X_2}{X_1 + X_2}$$

67. **(3)**
(1)-(iv), (2)-(ii), (3)-(i), (4)-(iii)

68. **(3)**
Four primary amines are possible. These are: $CH_3CH_2CH_2CH_2NH_2$, $(CH_3)_2CH–CH_2NH_2$, $CH_3CH(NH_2)CH_2CH_3$ and $(CH_3)_3CNH_2$.

69. **(1)** 9σ and 9π

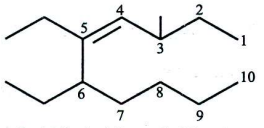
70. **(4)** Statement-I is incorrect and Statement-II is correct
71. **(4)** (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i)
72. **(2)** 3, 3 and 3 respectively
73. **(2)** –COOH, $–SO_3H$, $–CONH_2$, –CHO
74. **(3)** (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)
75. **(3)** Three, that is, $CH_3OCH_2CH_2CH_3$, $CH_3–O–CH(CH_3)_2$ and $CH_3CH_2OCH_2CH_3$.
76. **(3)**
Wt. of solvent = Wt. of solution – Wt. of solute
$= [1000 \times 1.02 – 20.5 \times 60] = 897$ g.

$$m = \frac{\text{Moles of } CH_3COOH}{\text{Wt. of solvent in kg}} = \frac{2.05 \times 1000}{897}$$
$$= 2.285$$

77. **(2)**
Mol. wt. of H_3PO_4 is 98 and change in its valence = 1.

$$\text{Eq. wt. of } H_3PO_4 = \frac{\text{Mol. wt.}}{\text{Change in valency}}$$
$$= 98/1 = 98$$

78. **(2)**



5, 6-Diethyl-3-methyldec-4-ene

79. **(3)**
NO_2^+, $AlCl_3$, SO_3 and $CH_3\overset{+}{C}{=}O$ are electrophiles.
80. **(1)**
Three, that is, d-tartaric acid, l-tartaric acid and meso-tartaric acid.
81. **(1)**

$$2NaHCO_3 \longrightarrow Na_2CO_3 + H_2O + CO_2$$

2 mol of $NaHCO_3$ on complete decomposition gives 1 mol of Na_2CO_3.
So, 0.2 mol of $NaHCO_3$ on complete decomposition gives 0.1 mol of Na_2CO_3.
82. **(4)**
According to stoichiometry, they should react as follows:

$$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(l)$$

4 mol 5 mol 4 mol 6 mol
0.8 mol 1 mol 0.8 mol 1.2 mol

In this reaction 1 mole of O_2 and 0.8 mole of NH_3 are consumed. There by indicating complete consumption of O_2.
83. **(3)**
Order of stability of carbanions is $1^o > 2^o > 3^o$.
84. **(1)** II > I > III
85. **(3)** As both the carbon atoms of each of the three double bonds are differently substituted, therfore, $2^3 = 8$ geometrical isomers are possible.

SECTION - B (Attempt Any 10 Questions)

86. **(3)** Statement-I is correct but Statement - II is incorrect. Zeros at the end or right of a number are significant provided they are on the right side of the decimal point.
87. **(1)** Molecular weight of the metal chloride

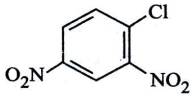
$$= \frac{0.72 \times 22400}{100} = 161.28\,g$$

Weight of chlorine in metal chloride

$$= \frac{65.5 \times 161.28}{100} = 105.64\,g$$

$$\text{So, Mole atoms of chlorine} = \frac{105.64}{35.5} = 3$$

Hence, metal chloride is MCl_3
88. **(4)** 4-chloro-3-ethylcyclohexanol
89. **(3)**

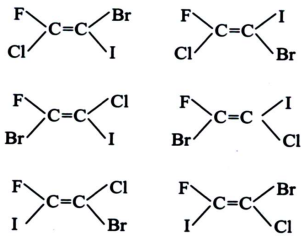


4-chloro-1,3-dinitrobenzene

90. **(3)** Charge of electron
91. **(1)** As halogens are most electronegative so the configuration is $ns^2\,np^5$.
92. **(2)**
Carbanions are stabilised by electron withdrawing groups. $–NO_2$ is stronger electron withdrawing group as compared to – CHO. At ortho-position, the effect is more pronounced.
93. **(3)** $–NO_2$ group is meta-directing, thus will stabilize a electrophile at m-position.
94. **(3)**

$$\lambda = \frac{h}{\sqrt{2m(KE)}} = 0.3328 \text{ nm}$$

95. **(3)** As maximum number of electrons in any orbit, sub-orbit or orbital is decided by Pauli's law.
96. **(1)** Non-superimposable on its mirror image.
97. **(4)** The two stereoisomers are not mirror images and hence, the diastereomers.
98. **(4)** Six isomers are



99. **(3)** 2 and 3
100. **(3)**