

## **S** ANSWER KEY & SOLUTION KEY FINAL ROUND - 01 (PCB) Dt.01.04.2024

### **BOTANY**

#### **SECTION - A (35 Questions)**

01. (1) (11<sup>th</sup> NCERT Page No.32)
02. (3) (NCERT XII, Pg 106, 6.4.2)
03. (2) (NCERT XI; sub-topic 5.1.2, 5.2.1 & 5.6)
04. (1) (11<sup>th</sup>, para 10.4, page no. 168/bot.)
05. (3) (NCERT XI Page No. 77, sub-topic 5.7.2)
06. (3) (11<sup>th</sup>, para 10.4.2, page no. 169/bot.)
07. (2) (NCERT XI Page No. 78, sub-topic 5.8)
08. (3) [NCERT XI Pg. No. 209, 13.3, 3<sup>rd</sup> paragraph and Pg. No 215, 13.7]
09. (2) [NCERT XI Pg. No. 209, 13.3, 3<sup>rd</sup> paragraph]
10. (3) (NCERT 11<sup>th</sup>, Page no- 22, Paragraph- 2.3, Line no-2)
11. (2) (NCERT 11<sup>th</sup>, Page no- 24, Paragraph- 2.3.4, Line no- 31, 32, 33)
12. (3) [NCERT class XI, Page no. 90, First paragraph, Point no. 6.2.3]
13. (1) (NCERT 12<sup>th</sup>, Page no- 37, Last paragraph, Line no- 1 and 2  
NCERT 12<sup>th</sup>, Page no- 38, Last paragraph, Line no- 1 to 8)
14. (3) [NCERT XI, Page 250, point 15.4.3.4]
15. (2) (NCERT XI Pg.227 Introduction part)
16. (2) (NCERT XI Pg.229 Introduction part)
17. (2) (NCERT 11<sup>th</sup>, Page no- 18, 1<sup>st</sup> Paragraph, Line no- 6 and 7)
18. (4) (NCERT 11<sup>th</sup>, Page no- 8, 3<sup>rd</sup> Paragraph, Line no- 16-18)
19. (1) (NCERT XII, Pg 83, 5.3.3)
20. (3) (NCERT XII, Pg 112, Para 1)
21. (2) (NCERT 12<sup>th</sup>, Page no- 35, Last Paragraph, Line no- 30, 31)
22. (3) (NCERT 12<sup>th</sup>, Page no- 34, 1<sup>st</sup> paragraph, Line no- 8, 9, 10)
23. (1) (12<sup>th</sup> NCERT page no.243 1<sup>st</sup> para)
24. (3) (11<sup>th</sup>, para 8.3, page no. 126/ bot.)
25. (4) [NCERT class XI, Page no. 94, Third paragraph]
26. (3) (11<sup>th</sup> NCERT PK, Page no.31 to 32 conceptual)
27. (3) (NCERT XII, Pg 113, 6.6.1)

28. (1) (NCERT XII, Pg 80, 5.3.1)
29. (2) (NCERT XII: Page No: 79, Fig. 5.7, Independent assortment based)
30. (4) (NCERT XII, Pg. 92, Para 2, Down's syndrome based)
31. (3) (11<sup>th</sup> NCERT Page no.25 to 31)
32. (3) (NCERT XII, Pg 102, Figure 6.5)
33. (1) (11<sup>th</sup>, para 8.5.10, page no. 138/bot.)
34. (4) (11<sup>th</sup>, para 8.5.10, page no. 138/bot)
35. (2) (NCERT XII, Pg 98, Point iv)

#### **SECTION - B (Attempt Any 10 Questions)**

36. (1) (NCERT XII: Page No: 119, Para 2, Line 3, 15, Para 3- line 1)
37. (2) (NCERT XII, Pg 92, Para 3)
38. (2) (NCERT 11<sup>th</sup>, Page no- 21, Paragraph- 2.2.3, Line no- 15)
39. (3) [NCERT XI Pg. No. 211 and 212, 13.6 and 13.6.1]
40. (2) [ NCERT class XI, Page no.91, 92, 93, Point no. 6.3.3]
41. (4) (11<sup>th</sup>, para 8.2, page no. 126/bot.)
42. (3) (NCERT XII, Pg 87, Para 3, Line 16)
43. (3) (NCERT 11<sup>th</sup>, Page no- 8, Paragraph- 1.3, Line no- 1 and 2)
44. (2) (NCERT XI Page No. 69, sub-topic 5.3, 1<sup>st</sup> para)
45. (1) (NCERT 12<sup>th</sup>, Page no- 31, 3<sup>rd</sup> paragraph, Line no- 17- 20)
46. (2) (11<sup>th</sup>, para 8.5.10, page no. 138, 139/bot.)
47. (1) (12<sup>th</sup> NCERT Page no.247, fig.14.3, CONCEPT)
48. (1) [NCERT XI, Page 250, Line no. 01-02]
49. (3) (11<sup>th</sup> NCERT PK. Page no.23 to 24)
50. (3) (NCERT XI Pg.235-14.6, 7<sup>th</sup> line 2nd para)

### **ZOOLOGY**

#### **SECTION - A (35 Questions)**

51. (2) (12<sup>th</sup>, para 10.4, page no.185/zoology.)
52. (3) (NCERT Pg. No. 278)
53. (2) (Body fluid and Human health mixed question)

54. (3) (NCERT 12<sup>th</sup>, Page no-141, 1<sup>st</sup> paragraph, Line no- 2)
55. (3) [NCERT P.No.321 Midbrain Para]
56. (1) [NCERT P. No.195, Last Para]
57. (4) (NCERT 12<sup>th</sup>, Page no- 135, Last paragraph, Line no- 7,8)
58. (1) (NCERT 11<sup>th</sup>, Page no- 158, Paragraph- 9.12.5, Line no- 3 and 4)
59. (3) (NCERT -Pg.No-286)
60. (2) (12<sup>th</sup> NCERT Page no.232, table 13.1)
61. (2) (12<sup>th</sup> Old NCERT, page no.263 4<sup>th</sup> line )
62. (4) (NCERT 11<sup>th</sup> p.no. 101 para3)
63. (2) (NCERT 11<sup>th</sup> p.no. 103, FIG 7.4 a)
64. (2) (NCERT -Pg.No. 270-271)
65. (3) (NCERT12th page no.62, 4.3 MTP)
66. (4) (NCERT P.No. 149-150)
67. (2) (NCERT Pg. No. 287 - Disorder of circulatory system)
68. (2) [NCERT P. No.318, Para Below Diagram]
69. (3) [NCERT P. No.316, ANS Para]
70. (3) (12<sup>th</sup> NCERT, Page no.228, 13.2.2)
71. (2) (NCERT 12<sup>th</sup>, Page no- 127, 3<sup>rd</sup> paragraph, Line no- 6)
72. (1) (NCERT XI Page No. 55, Last paragraph)
73. (4) [NCERT P. No.312 3<sup>rd</sup> & 4<sup>th</sup> para]
74. (4) (NCERT XIIth Page No. 55 , Para 2 line 4)
75. (4) (NCERT XI Page No. 291, Last line of first paragraph)
76. (3) (NCERT XI Page No. 55, Last line of 3rd paragraph)
77. (2) (NCERT XI Page No. 290, 3rd line of 2nd paragraph)
78. (4) (NCERT XI Page No. 332 fig. 22.1)
79. (2) (12th, para10.2., , page no. 181, 182/ zoology)
80. (4) [NCERT P. No.208, 5<sup>th</sup> GMO Point ]
81. (2) [NCERT P. No.307 5<sup>th</sup> line]
82. (1) [NCERT Practical Syllabus P. No.124 Point No. 7<sup>th</sup>]
83. (3) (NCERT12th, 4.4 STD, Page No. 63)
84. (4) (NCERT 11<sup>th</sup>, Page no- 148, 1<sup>st</sup> Paragraph, Line no-6)
85. (4) (NCERT11th, Page No.116, frog)

### SECTION - B (Attempt Any 10 Questions)

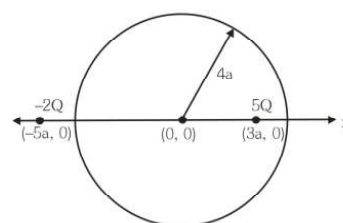
86. (3) (NCERT 12<sup>th</sup>, Page no- 127, 3<sup>rd</sup> paragraph, Line no- 9, 10)
87. (2) (12<sup>th</sup> Old NCERT Page no.266 ,15.2.2)
88. (3) (NCERT12<sup>th</sup> page no 53, para2, line-3)
89. (4) (NCERT 12<sup>th</sup>, page no 45, Fig. 3.3. b)
90. (3) (NCERT P.No. 272 - Exchange of gases)
91. (1) (NCERT 11<sup>th</sup> p.no. 115, para 2 line3)
92. (2) (12th, para 10.4, page no. 185/zoology.)

93. (3) [NCERT P. No.302 11<sup>th</sup> line]
94. (1) (NCERT Pg. No. 158 )
95. (2) (NCERT - Pg. No. 282)
96. (3) [NCERT P. No.200, Vectros for Cloning gene 9<sup>th</sup> Line]
97. (3) (NCERT XI Page No. 290, 1st paragraph)
98. (4) (NCERT 11<sup>th</sup>, Page no- 158, 1<sup>st</sup> Paragraph, Line no-11-13)
99. (4) [NCERT P. No.321, Forebrain para Line 18 ]
100. (1) (NCERT XI Page No. 332, last line)

## PHYSICS

### SECTION - A (35 Questions)

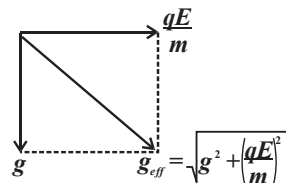
101. (2)



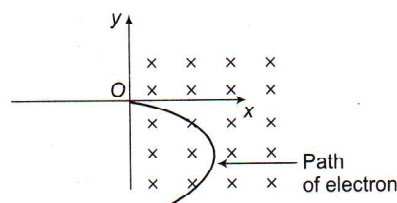
5Q charge is inside the spherical region flux through

$$\text{sphere} = \frac{5Q}{\epsilon_0}$$

102. (2) The rate of decrease of electric field is different in the two cases. In case of a point charge, it decreases as  $1/r^2$  but in the case of electric dipole it decreases more rapidly, as  $E \propto 1/r^3$ .
103. (4) As electric force  $qE$  is constants in magnitude and direction both so we can replace  $g \rightarrow g_{eff}$



104. (4) Potential difference between A and B,  
 $V_A - V_B = 1 \times 1.5$   
 $\Rightarrow V_A - 0 = 1.5 \text{ V} \Rightarrow V_A = 1.5 \text{ V}$   
 Potential difference between B and C,  
 $V_B - V_C = 1 \times 2.5 = 2.5 \text{ V} \Rightarrow V_C = -2.5 \text{ V}$   
 Now,  $V_D - V_C = 2 \text{ volt}$
105. (4)  $y$  will be less than zero.  
 The trajectory will be as (use Fleming's left hand rule)



106. (4) As is known from theory, induced emf,

$$e = e_0 \sin \theta = NBA\omega \sin \omega t.$$

107. (3)  $\omega' = \omega$

$$\frac{1}{\sqrt{L'C'}} = \frac{1}{\sqrt{LC}}$$

$$\therefore L'C' = LC$$

$$4LC' = LC$$

$$C' = \frac{C}{4}$$

$\therefore$  capacitance must be decreased by  $\frac{3C}{4}$

108. (3)  $\lambda_m > \lambda_v > \lambda_x$

109. (1)  $E_k = h\nu - \phi$

Compare with  $y = mx - c$

Slope =  $h$

110. (1)  $\frac{1}{\lambda_{\text{Balmer}}} = R \left( \frac{1}{2^2} - \frac{1}{3^2} \right) = \frac{5R}{36}$ ,

$$\frac{1}{\lambda_{\text{Lyman}}} = R \left( \frac{1}{1^2} - \frac{1}{2^2} \right) = \frac{3R}{4}$$

$$\therefore \lambda_{\text{Lyman}} = \lambda_{\text{Balmer}} \times \frac{5}{27} = 1215.4 \text{ \AA}.$$

111. (2) For freely falling body

$$H = \frac{1}{2}gt^2 (U = 0)$$

$$\Rightarrow g = \frac{2H}{t^2} \Rightarrow \frac{\Delta g}{g} = \frac{\Delta H}{H} + \frac{2\Delta t}{t}$$

$$\% \text{ Error} = \frac{\Delta g}{g} \times 100 = c_1 + 2c_2$$

112. (2)  $\frac{PV}{T} = \text{constant}$  (for given mass of ideal gas)

$AB$  : isochoric process,  $V$  : constant,  $T$  is increasing

hence,  $P$  is increasing.

$BC$  : isobaric process,  $P$  : constant,  $T$  is decreasing  
hence,  $V$  is decreasing.

$CA$  : isothermal process,  $P$  is decreasing, hence,  $V$  is increasing, P-V diagram is rectangular hyperbola.

113. (1) Isotones means equal number of neutrons

$$\text{i.e., } (A - Z) = 74 - 34 = 71 - 31 = 40.$$

114. (4) The  $(x-t)$  graph shown by option (4) is not periodic as it is not identically repeated in a definite interval of time.

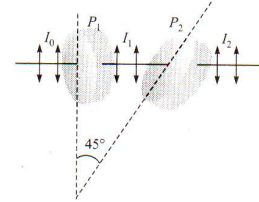
115. (1)  $y = a \sin((\omega t + kx))$

$\Rightarrow$  Wave is moving along  $-ve$   $x$ -axis with speed

$$v = \frac{\omega}{K} \Rightarrow v = \frac{50}{2} = 25 \text{ m/sec}$$

116. (2) Intensity of light after passing polaroid  $P_1$  is  $I_1$

$$= \frac{I_0}{2}$$



Now this light pass through the second polaroid  $P_2$  whose axis is inclined at an angle of  $45^\circ$  to the axis of polaroid  $P_1$ . So in accordance with Malus law, the intensity of light emerging from polaroid B is

$$I_2 = I_1 \cos^2 45^\circ = \left( \frac{I_0}{2} \right) \left( \frac{1}{\sqrt{2}} \right)^2 = \frac{I_0}{4}$$

117. (3)  $\frac{V_1}{V_2} = \frac{N_1}{N_2}$

$$\frac{230}{V_2} = \frac{1000}{100}$$

$$V_2 = 23V$$

$$\text{Power consumed} = \frac{V_2^2}{R}$$

$$= \frac{23 \times 23}{46} = 11.5 \text{ W}$$

118. (4) For telescope

$$\text{Tube length } (L) = f_o + f_e = 60$$

$$\text{and magnification } (m) = \frac{f_o}{f_e} = 5 \Rightarrow f_o = 5f_e$$

$$\therefore f_o = 50 \text{ cm and } f_e = 10 \text{ cm}$$

Hence focal length of eye-piece,  $f_e = 10 \text{ cm}$ .

119. (4) From law of conservation of momentum,

$$\vec{p}_i = \vec{p}_f$$

$$m_1 u_1 + m_2 u_2 = MV_f$$

$$V_f = \frac{\left( mv + \frac{mv}{4} \right)}{3m/2} = \frac{5v}{6}.$$

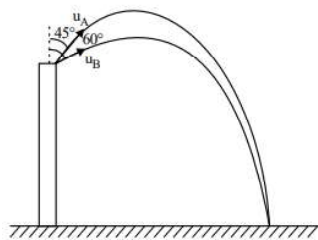
$\Rightarrow$  Body will move in elliptical path

120. (3) Due to acceleration towards right, there will be a pseudo force in a left direction. So the

pressure will be more on rear side (Points A and B) in comparison with front side (points D and C) Also due to height of liquid column, pressure will be more at the bottom (points B and D) in comparison with top (points A and C). So overall maximum pressure will be at point B and minimum pressure will be at point C.

121. (1) Density of wood =  $0.5 \frac{\text{gm}}{\text{cc}}$   
 $= 0.5 \times \frac{10^{-3} \text{ kg}}{10^{-6} \text{ cubic meter}}$   
 $= 500 \text{ kg/m}^3$

122. (3) The number of significant figure is 5 as  $10^{-6}$  does not affect this number.



123. (3)

For  $v_A$  &  $v_B$  at different angles, time of flight and range can not be same. So options (3) is correct.

124. (2) Impulse is defined as change of momentum. For change in momentum to be minimum

$$\frac{d}{dt}(20t^2 - 40t) = 0$$

$$40t - 40 = 0 \Rightarrow t = 1 \text{ s}$$

125. (3)  $K_0 = \frac{p_0^2}{2m} \dots(i)$

$$p' = p_0 + 100\% \text{ of } p_0$$

$$p' = 2p_0$$

$$K' = \frac{p'^2}{2m}$$

$$K' = \frac{(2p_0)^2}{2m} \Rightarrow K'' = 4K_0$$

$$\% \text{ change in K.E.} = \frac{K' - K_0}{K_0} \times 100\%$$

$$= \frac{4K_0 - K_0}{K_0} \times 100\% = 300\%$$

126. (4)  $\Delta PE_g = 100 \text{ m} \dots(i)$

Total energy loss in 1 complete round on horizontal floor

$$w_f = \mu mg(2S) = 0.2 \text{ m} (10) 20$$

$$W_f = (40)m \text{ in 1 round}$$

127. (1) 128. (3) 129. (3)

130. (1)  $I_z = I_1 + I_2 + I_3$   
 $= \frac{ML^2}{3} + \frac{ML^2}{3} + 0 = \frac{2ML^2}{3}$

131. (1) As external torque is zero therefore angular momentum will remain conserved. So  $I_1\omega_1 = I_2\omega_2$ .

So  $\omega \propto \frac{1}{R^2}$  so  $T \propto R^2$ , if radius becomes half then time period becomes  $\frac{1}{4}$  of the previous value

i.e.  $\frac{24}{4} = 6$  hours.

132. (3)

133. (2)  $v_{rms} = \sqrt{\frac{3RT}{M_0}}$

$$v_{rms}^2 = \frac{3RT}{M_0}$$

$$v_{rms}^2 \propto T$$

The graph between  $v_{rms}^2$  v/s T is straight line, through origin.

134. (1)

135. (1) Loss of Energy =  $\frac{C_1 C_2}{2(C_1 + C_2)} (V_1 - V_2)^2$

$$= \frac{1}{2} \left( \frac{C}{2} \right) (3V - 2V)^2$$

$$= \frac{1}{4} CV^2$$

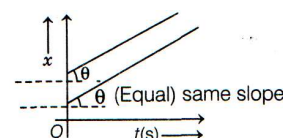
**SECTION - B (Attempt Any 10 Questions)**

136. (4)

$\rho_1 < \rho_2$  as denser liquid acquires lowest position of vesel.  $\rho_3 < \rho_1$  as ball sinks in liquid 1 and  $\rho_3 < \rho_2$  as ball doesn't sink in liquid 2, so  $\rho_1 < \rho_3 < \rho_2$

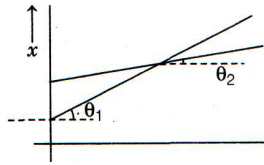
137. (2)

A. For equal velocities, the slope of the straight lines must be same as shown below.



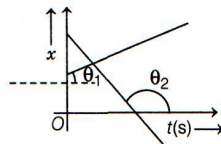
B. For unequal velocity, slope is different, but since,

the object are moving in the same direction, the slope for both the graphs must be of same sign (positive or negative) and they meet at a point as shown below.



C. For velocities in opposite direction, slopes must be of opposite sign. Slope =  $\tan \theta$ , where  $\theta$  is the angle of the straight line with horizontal in anti-clockwise direction. As, we know  $\tan \theta_1 > 0$ ,  $\tan \theta_2 < 0$ .

Hence, slopes are of opposite sign. This condition is shown below.



Hence, A-2, B-1 and C-3

138. (2)  $(5\sqrt{3}N)$

$$f_k = \mu mg \cos \theta$$

$$= 2.5\sqrt{3}N$$

$$= 0.1 \times \frac{50 \times \sqrt{3}}{2}$$

$$F_1 = mg \sin \theta + f_k$$

$$= 25 + 2.5\sqrt{3}$$

$$F_2 = mg \sin \theta - f_k$$

$$= 25 - 2.5\sqrt{3}$$

$$\therefore F_1 - F_2 = 5\sqrt{3}N$$

139. (1)  $\overset{0}{\bullet} \equiv \overset{6 \text{ m/s}}{\bullet} + \overset{v}{\bullet}$

20 kg      2m      3m

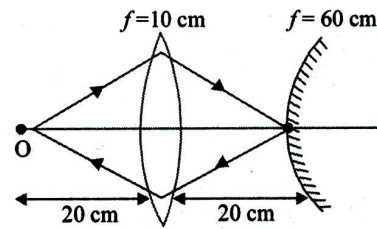
$$0 = 8 \times 6 + 12 \times v$$

$$v = -4 \text{ m/s}$$

$$\text{Kinetic energy} = \frac{1}{2} \times 12 \times 16 = 96 \text{ J}$$

140. (2) Object is at a distance of  $2f_l$  from the lens  
If the mirror is placed co-axially at a distance of

$2f_l = 20\text{cm}$  from the lens then the rays emerging out of lens will fall on the pole of mirror.



These rays will get reflected symmetrically to other side as shown below and therefore final image will coincide with the object.

141. (3)  $I_{net} = I_1 + I_2 + 2\sqrt{I_1 I_2} \cos \phi$

$$= I_0 + I_0 + 2I_0 \cos \frac{\pi}{3}$$

$$= 2I_0 + 2I_0 \times \frac{1}{2} = 3I_0$$

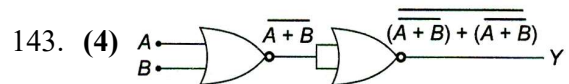
$$I_{net} = I_0 + I_0 + 2I_0 \cos 90^\circ = 2I_0$$

$$\text{Ratio} = \frac{3}{2}$$

142. (4)  $\Delta Q = c.m dt$

$$Q = \int_6^{10} 0.6t^2 \times 10 dt$$

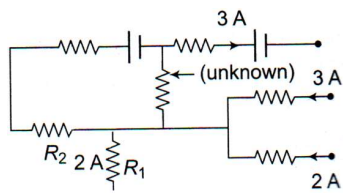
$$Q = 6 \left[ \frac{t^3}{3} \right]_6^{10} = 6 \times \frac{1000}{3} = 2000 \text{ cal.} = 2 \text{ kcal.}$$



A	B	A + B	$\overline{A+B}$	$\overline{(A+B) + (A+B)}$	Y
0	0	0	1	1	0
0	1	1	0	0	1
1	0	1	0	0	1
1	1	1	0	0	1

$$Y = \overline{(A+B) + (A+B)}$$

144. (4) Since 3 A is in upper part of circuit. Therefore out of 5A coming in lower part, 3A has to go to the upper part, out of which some part will flow through  $R_2$  and rest through the unknown resistance.



∴ 2A will go through R<sub>1</sub>.

145. (4)  $\lambda_p = \lambda \alpha$

$$\text{or } \frac{h}{\sqrt{2m_p Q_p V}} = \frac{h}{\sqrt{2m_\alpha Q_\alpha V_\alpha}}$$

$$\therefore m_p Q_p V = m_\alpha Q_\alpha V_\alpha$$

$$\therefore V_\alpha = \left(\frac{m_p}{m_\alpha}\right) \left(\frac{Q_p}{Q_\alpha}\right) V = \left(\frac{1}{4}\right) \left(\frac{1}{2}\right) V = \frac{V}{8}$$

146. (1) Force on wire Q due to wire P is

$$F_p = 10^{-7} \times \frac{2 \times 30 \times 10}{0.01} \times 0.1 = 6 \times 10^{-5} \text{ N}$$

(Towards left)

Force on wire Q due to wire R is

$$F_R = 10^{-7} \times \frac{2 \times 20 \times 10}{0.02} \times 0.1 = 20 \times 10^{-5} \text{ N}$$

(Towards right)

Hence

$$F_{net} = F_R - F_p = 14 \times 10^{-5} \text{ N} = 1.4 \times 10^{-4} \text{ N/m}$$

147. (3) Let linear mass density (mass/length) is  $\mu$ . Consider  $x$  length of the string, the tension at this position is T.

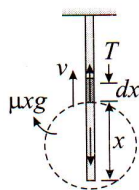
$$T = (x\mu)g$$

The velocity of wave pulse

$$v = \sqrt{\frac{T}{\mu}} = \sqrt{\frac{(x\mu)g}{\mu}} = \sqrt{gx}$$

$$\frac{dx}{dt} = \sqrt{gx} \Rightarrow \frac{dx}{\sqrt{x}} = \sqrt{g} dt$$

$$\Rightarrow \int_0^{20} \frac{dx}{\sqrt{x}} = \sqrt{g} \int_0^t dt$$



On solving we get,  $t = 2\sqrt{2}$ s

148. (4) Let the time for the particle executing SHM be noted when particle is at the extreme position.

Here,  $a = 10$  cm,  $T = 12$ s.

When particle moves from extreme position to a position for which displacement  $y_1 = 5$ cm, then time ( $= t_1$ ) is

$$y_1 = a \cos \frac{2\pi}{T} t_1 \text{ or } 5 = 10 \cos \frac{2\pi}{12} t_1$$

$$\text{or } \cos \frac{2\pi}{12} t_1 = \frac{1}{2} = \cos \frac{\pi}{3} \text{ or } \frac{2\pi}{12} t_1 = \frac{\pi}{3} \text{ or}$$

$$t_1 = 2\text{s}$$

When particle moves from extreme position to a position for which displacement  $y_2 = -5$ cm, then time ( $= t_2$ ) is

$$y_2 = a \cos \frac{2\pi}{T} t_2 \text{ or } -5 = 10 \cos \frac{2\pi}{12} t_2$$

$$\text{or } \cos \frac{2\pi}{12} t_2 = -\frac{1}{2} = \cos \frac{2\pi}{3} \text{ or } \frac{2\pi}{12} t_2 = \frac{2\pi}{3}$$

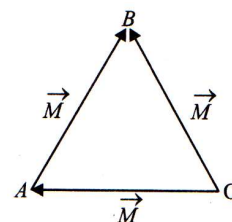
$$\text{or } t_2 = 4\text{s}$$

∴ time taken by particle to go from 5cm to -5cm will be  $= t_2 - t_1 = 4 - 2 = 2$ s.

149. (3) According to triangle law of vectors

$$\vec{OA} + \vec{AB} = \vec{OB}$$

$$\therefore (\vec{OA} + \vec{AB}) + \vec{OB} = \vec{OB} + \vec{OB} = 2\vec{OB} = 2M, \text{ along } \vec{OB}$$



150. (2) Motional e.m.f. across PQ

$$V = Blv = 4(1)(2) = 8\text{volt}$$

This is the potential to which the capacitor is charged.

$$\text{As } q = CV$$

$$\therefore q = (10 \times 10^{-6})8 = 8 \times 10^{-5} \text{ C} = 80 \mu\text{C}$$

As magnetic force on electron in the conducting rod PQ is towards Q, therefore, A is positively charged and B is negatively charged

$$\text{i.e., } q_A = +80 \mu\text{C}$$

$$\text{and } q_B = -80 \mu\text{C}$$

## CHEMISTRY

### SECTION - A (35 Questions)

151. (3) Large size of phosphorus

152. (2) a-ii, b-i, c-iii, d-iv

153. (4) For most soluble salt, solubility should be maximum.

154. (2)  $\text{TiCl}_3 \rightarrow$  Ziegler-Natta polymerization

$\text{PdCl}_2 \rightarrow$  Wacker process

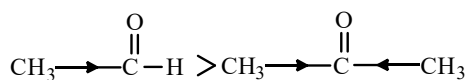
$\text{CuCl}_2 \rightarrow$  Deacon's process

$\text{V}_2\text{O}_5 \rightarrow$  Contact process

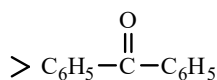
155. (3) Reaction of PhMgBr with carbonyl compounds is an example of nucleophilic addition on carbonyl group which increases with the increase in electron-

deficiency of carbonyl carbon and less steric hindrance on carbonyl carbon.

Thus acetaldehyde is most reactive while  $C_6H_5COC_6H_5$  least



Supplies least electron to group



supplies electrons maximum due to +M effect of  $C_6H_5$

156. (2) 2, 5, 2, 10

157. (3)  $O > F > N > C$

158. (3)  $CH_3 - CH = C = CH - CH_3$

159. (3) As  $Cr^{3+}$ ,  $Fe^{2+}$ ,  $Ni^{2+}$ ,  $Mn^{2+}$  have 3, 4, 2, 5 unpaired electron respectively.

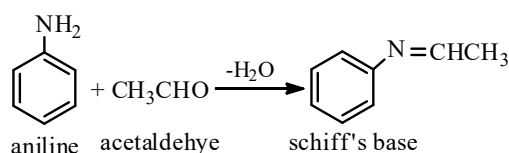
160. (2) Factual statement.

161. (1) This is correct order for acidic nature (ortho effect)

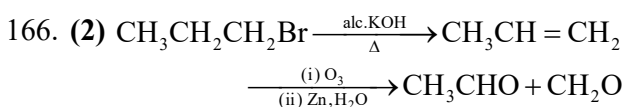
162. (2) In case of first order reaction, rate constant ( $k$ ) =  $s^{-1}$ .

163. (2) Due to  $\ell p - \ell p$  repulsions, bond angle in  $H_2O$  is lower ( $104.5^\circ$ ) than that in  $NH_3$  ( $107^\circ$ ) and  $CH_4$  ( $109^\circ 28'$ ).  $BeF_2$ , on the other hand, has  $sp$ -hybridization and hence has a bond angle of  $180^\circ$ .

164. (1) Aniline or any  $1^\circ$  amine reacts with aldehyde to form Schiff's base or anils.

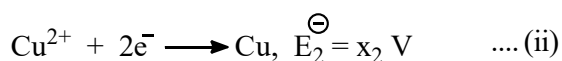


165. (3)  $\Delta H^\circ$  of the reaction is the difference of energy of products and reactants.

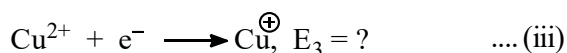


167. (3) If Assertion is True but the Reason is False

168. (4)  $Cu^{\oplus} + e^- \longrightarrow Cu$ ,  $E_1^\ominus = x_1 V$  ... (i)



Net equation



Is obtained by equations (ii) - (i)

$$\therefore E_3 = \frac{n_2 E_2 - n_1 E_1}{n_3}$$

$$= \frac{2 \times x_1 - 1 \times x_1}{1} = 2x_2 - x_1$$

169. (2)  $Zn + Cu^{2+} \longrightarrow Cu + Zn^{2+}$

$$\therefore E_1 = E^\circ + \frac{0.059}{n} \log \frac{[Cu^{2+}]}{[Zn^{2+}]}$$

On substituting the conc. of  $Cu^{2+}$  and  $Zn^{2+}$  in above expression, we get  $E_1 > E_2$ .

170. (1) Boiling point

$$= T_0 (\text{solvent}) + \Delta T_b (\text{elevation in b.p})$$

$$\Delta T_b = m i K_b$$

where,  $m$  is the molality ( $\approx$  molarity  $m$ )

$i$  is the van't Hoff factor =  $[1 + (y - 1)x]$

$K_b$ , molal elevation constant.

Thus,  $\Delta T_b \propto i$

on assuming 100% ionization

(1)  $M_i$  (glucose) = 0.05

(2)  $M_i$  ( $KNO_3$ ) =  $0.01 \times 2 = 0.02$

(3)  $M_i$  (urea) = 0.015

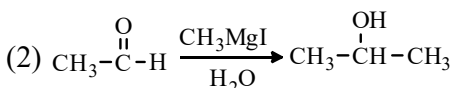
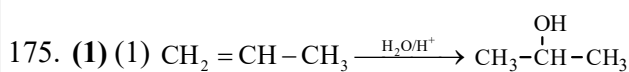
(4)  $M_i$  ( $Na_2SO_4$ ) =  $0.01 [1 + (y - 1)x] = 0.03$

171. (2) In  $CuF_2$ ,  $Cu^{2+}$  ion has one unpaired electron and is coloured.

172. (2) sulphur only

173. (2) 1 mole of  $CH_4$  contains 4 mole of hydrogen atom i.e. 4g atom of hydrogen.

174. (1) Actinoids form more stable complexes than lanthanoids.

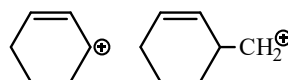


176. (3) As temperature  $\uparrow$ ,  $[H^+]$  and  $[OH^-]$  both  $\uparrow$

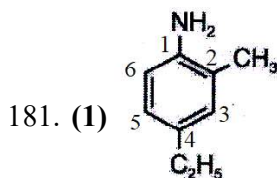
177. (4) There are certain ligands which have two or more donor atoms but in forming complexes only one donor atom is attached to metal ion, such ligands are called ambidentate ligands.



178. (4) With  $AgNO_3$   $SN_1$  reaction takes place when stable carbocation is formed.

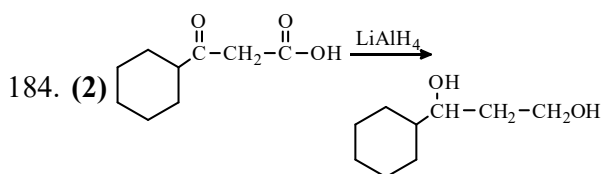
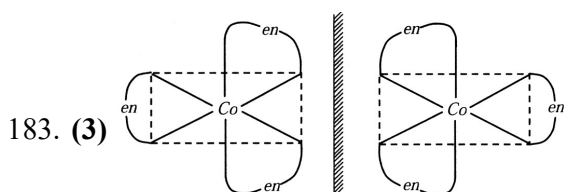


179. (1) Mass independent properties (molar conductivity and electromotive force) are intensive properties. Resistance and heat capacity are mass dependent, hence extensive properties.
180. (1) Tetraammine dichloro platinum (iv) tetrachloro platinate (ii)



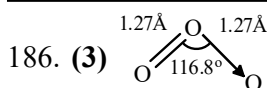
4-Ethyl-2-methylaniline

182. (4)  $n = 2, l = 1, m = 0, s = +\frac{1}{2}$



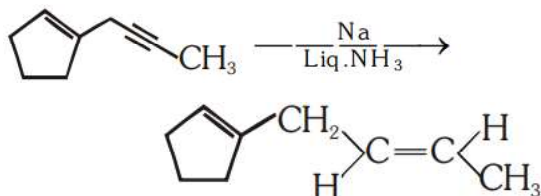
185. (4) Since the process is at equilibrium  $\Delta G = 0$  for  $\Delta G = 0$ , the should be  $\Delta H > 0, \Delta S > 0$ .

### SECTION - B (Attempt Any 10 Questions)



The bond length is intermediate between that for a single bond (1.48 Å as in  $H_2O_2$ ) and for a double bond (1.21 Å as in  $O_2$ )

187. (2)

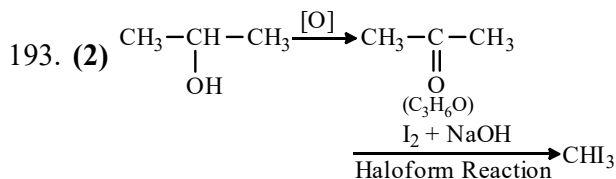
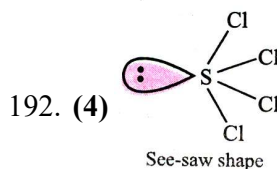


188. (4) C = 24 gm, H = 4 gm, O = 32 gm  
So, Molecular formula =  $C_2H_4O_2$   
So, Empirical formula =  $CH_2O$   
(Simplest formula).

189. (2) Total no. of electrons in CO =  $6 + 8 = 14$   
in NO =  $7 + 8 = 15$  in  $O_2^{2-} = 2 \times 8 + 2 = 18$   
in  $CN^- = 6 + 7 + 1 = 14$ .

Only NO has odd number of electrons and hence is paramagnetic.

190. (1)  $\alpha$ -D-glucose and  $\beta$ -D-glucose are enantiomers
191. (1) TTFTT



194. (1) Applying  $N_1 V_1 = N_2 V_2$   
(NaOH) ( $H_2SO_4$ )

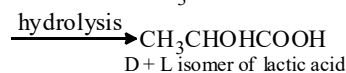
$$\frac{1}{10} \times 15 = N_2 \times 12$$

$$N_2 = \frac{15}{10 \times 12} = 0.125$$

Normality  $\times$  Eq. mass = Strength (g/L)

$$\text{Strength} = 0.125 \times 49 = 6.125 \text{ g/L}$$

195. (4)  $CH_3CHO + HCN \rightarrow CH_3CHOHCN$



196. (3) Torsional strain in ethane is minimum at dihedral angles  $60^\circ, 180^\circ$  and  $300^\circ$

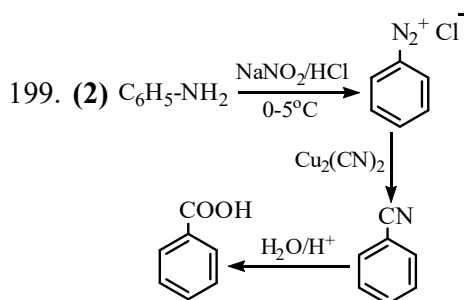
197. (1) Statement I and Statement II both are correct

198. (4) X for  $AlCl_3 = \frac{1}{2} [Ve + MA - c + a]$

$$= \frac{1}{2} [3 + 3 - 0 + 0] = 3.$$

$\therefore$  State of hybridization of Al in  $AlCl_3 = sp^2$

$\therefore$   $AlCl_3$  is a planar trigonal molecule. Similarly, it can be  $sp^3$  while that of Cl in  $ClF_3$  is  $sp^3d$ .



200. (3)  $PbSO_4 + 2e^- \rightarrow Pb + SO_4^{2-}$