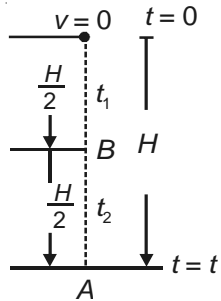


ANSWERS

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

[PHYSICS & CHEMISTRY]

1. Answer (1)
2. Answer (1)



For full path

$$T = \sqrt{2\frac{H}{g}}$$

For first half

$$t_1 = \sqrt{H/g}$$

For second half

$$t_2 = T - t_1 = \sqrt{\frac{H}{g}}(\sqrt{2} - 1)$$

$$\Rightarrow \frac{t_2}{t_1} = \sqrt{2} - 1$$

3. Answer (2)

Using equation

$$t_{\text{ascent}} = \frac{u}{g} \quad \dots(1)$$

$$\text{and } H_{\text{max}} = \frac{u^2}{2g} \quad \dots(2)$$

4. Answer (1)
5. Answer (2)

$$p = \frac{W}{t} = \frac{\Delta K}{t}$$

6. Answer (4)
7. Answer (2)

8. Answer (1)

$$x_{cm} = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$$

$$x_{cm} = \frac{m_1 y_1 + m_2 y_2}{m_1 + m_2}$$

9. Answer (3)

Point is on same line

10. Answer (2)

$$I = \mu r^2$$

$$\text{where } M = \frac{m_1 m_2}{m_1 + m_2}$$

11. Answer (2)

$$\omega_{BA} = \frac{(V_{BA})_{\perp} r}{r}$$

12. Answer (2)

Using conservation of angular momentum.

$$I_1 \omega_1 = I_2 \omega_2$$

$$\Rightarrow \frac{1}{2}(22m)R^2 \left(\frac{\theta}{t}\right) = mR^2 \left(\frac{2\pi - \theta}{t}\right)$$

$$\Rightarrow \text{Solving } \theta = \frac{\pi}{6} = 30^\circ$$

13. Answer (4)

14. Answer (2)

15. Answer (1)

16. Answer (3)

$$\Delta\phi = \frac{\pi}{2} - \frac{\pi}{6} = \frac{\pi}{3}$$

$$\Delta\phi = \frac{2\pi}{7} \cdot \Delta t$$

$$\text{and } \Delta t = \frac{\frac{\pi}{3}}{2\pi} T = \frac{T}{6}$$

17. Answer (2)

Independent of length.

$$\text{Use } \frac{L}{M} = \frac{q}{2m}$$

18. Answer (3)

35. Answer (3)

19. Answer (3)

$$\text{Use } y = \frac{1}{1 + (x - vt)^2}$$

$$|e_{av}| = \frac{\Delta\phi}{\Delta t}$$

at $t = 0.2$ second

36. Answer (1)

$$1 + [x - (0.2v)]^2 = x^2 + 2x + 1$$

37. Answer (4)

$$Q = Q_0 \cos \omega t \text{ and } I = I_0 \sin \omega t$$

$$\Rightarrow v = -5 \text{ m/s}$$

38. Answer (4)

With the help of vision cone of fish or observer inside water.

20. Answer (4)

21. Answer (2)

39. Answer (1)

22. Answer (2)

$$\frac{n_1 + n_2}{\gamma_{mix} - 1} = \frac{n_1}{\gamma_1 - 1} + \frac{n_2}{\gamma_2 - 1}$$

$$B = \frac{\lambda D}{d}$$

23. Answer (2)

40. Answer (3)

24. Answer (2)

$$\lambda = \frac{h}{P} = \frac{h}{\sqrt{2mE}}$$

25. Answer (3)

41. Answer (3)

26. Answer (4)

$$ev_0 = \frac{hc}{\lambda} - \phi \quad \dots(1)$$

27. Answer (3)

$$\frac{ev_0}{3} = \frac{hc}{2\lambda} - \phi \quad \dots(2)$$

28. Answer (1)

$$R_2 = R_1 [1 + \alpha \Delta t]$$

Solving (1) and (2), we get

29. Answer (1)

Total resistance across battery

$$= \frac{8}{6} + \frac{8}{6} = \frac{8}{3}$$

$$\phi = \frac{hc}{4\lambda} \rightarrow \frac{hc}{\lambda_0}$$

$$\Rightarrow \lambda_0 = 4\lambda$$

$$\text{Total current} = \frac{40}{\frac{8}{3}} = 15 \text{ A}$$

42. Answer (2)

43. Answer (3)

Divide it into inverse ratio of resistance $I_2 = 10$

$$I_4 = 5$$

44. Answer (4)

$$\beta = \frac{\alpha}{1 - \alpha} = \frac{0.9}{1 - 0.9}$$

$$= 9$$

$$\Delta I_C = \beta \Delta I_B = 9 \times 2$$

$$= 18 \mu\text{A}$$

30. Answer (3)

31. Answer (1)

32. Answer (3)

33. Answer (1)

34. Answer (2)

45. Answer (2)

46. Answer (3)

Isotones have same number of neutrons

$${}_{32}\text{Ge}^{76}, n = 76 - 32 = 44$$

47. Answer (2)

If Hund's rule is not followed:



48. Answer (4)

Molar ratio of N_2 and CO is 3 : 2

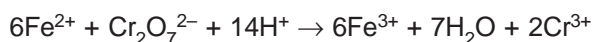
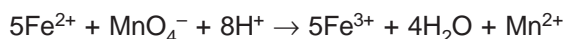
i.e. 300 bar and 200 bar respectively [$L_T = 500$ bar]

$$\frac{n_{\text{N}_2}}{n_{\text{CO}}} = \sqrt{\frac{m_{\text{CO}}}{m_{\text{N}_2}}} \times \frac{P_{\text{N}_2}}{P_{\text{CO}}} = \frac{300}{200} = \frac{3}{2}$$

49. Answer (3)

Fact

50. Answer (2)



51. Answer (4)

In C_2H_6 there is a single bond.

52. Answer (1)

$$V_S = 5.6 \times N$$

$$N = \frac{\text{wt.} \times 1000}{E_{\text{wt.}} \times V_{\text{ml}}} = \frac{34 \times 1000}{17 \times 1120} = \frac{200}{112}$$

$$\therefore V_S = 5.6 \times \frac{200}{112} = 10\text{V}$$

53. Answer (4)

$$9.1 \times 10^{-31} \text{ kg of electrons contain} = \frac{1}{6.023 \times 10^{23}} \text{ mol}$$

$$\therefore 1 \text{ kg of } e^{-1}\text{s contain} = \frac{1}{6.023 \times 10^{23} \times 9.1 \times 10^{-31}}$$

$$= \frac{1}{6.023 \times 9.1} \times 10^8 \text{ mol}$$

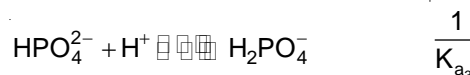
54. Answer (3)

During crystalization entropy decreases.

55. Answer (3)

Rate of reaction is equal.

56. Answer (3)

Being amphiprotic HPO_4^{2-} involves pK_{a_2} and pK_{a_3} 

For such cases,

$$\text{pH} = \frac{\text{pK}_{a_2} + \text{pK}_{a_3}}{2} = \frac{y+2}{2}$$

57. Answer (2)

From graph

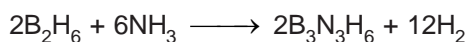
$$\log K \propto \frac{1}{T}$$

\therefore Reaction is exothermic *i.e.*, $\Delta H^\circ < 0$

58. Answer (2)

C is a better reducing agent above 1123 K

59. Answer (3)



60. Answer (3)

Fact.

61. Answer (4)

Fact.

62. Answer (4)

Back-bonding from M to CO.

63. Answer (1)

Conducting ions are Cl^- .

64. Answer (2)

Nessler's reagent is K_2HgI_4

\therefore It has HgI_4^{2-} ions.

65. Answer (1)

Ozone oxidises MnO_4^{2-} (green) to MnO_4^- (pink).

66. Answer (2)

 PCl_5 exists as $[\text{PCl}_6]^-$ & $[\text{PCl}_4]^+$.

67. Answer (1)

Fact

68. Answer (3)

Strongest oxidising agent is the one having maximum E° value.

69. Answer (3)

$$E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0.0591}{n} \log \left[\frac{\text{Zn}^{2+}}{\text{Cu}^{2+}} \right]$$

$$[E_{\text{cell}} = 0]$$

$$\therefore E^\circ_{\text{cell}} = \frac{0.0591}{2} \log \left[\frac{\text{Zn}^{2+}}{\text{Cu}^{2+}} \right]$$

$$\Rightarrow \frac{1.10 \times 2}{0.0591} = \log \left[\frac{\text{Zn}^{2+}}{\text{Cu}^{2+}} \right]$$

$$\Rightarrow \left[\frac{\text{Zn}^{2+}}{\text{Cu}^{2+}} \right] = 10^{37.3}$$

70. Answer (1)

$$r_1 = K_1[A]$$

$$r_2 = K_2[A]^2 \quad [A = \text{mol L}^{-1}]$$

$$r_3 = K_3[A]^3$$

$$\Rightarrow r_1 = K_1[A \times 10^3] = K_1'[A] \quad [A = \text{mol ml}^{-1}]$$

$$r_2 = K_2[A \times 10^3]^2 = K_2'[A]^2$$

$$r_3 = K_3[A \times 10^3]^3 = K_3'[A]^3$$

$$\therefore K_1 = K_2 = K_3$$

$$\therefore \frac{K_1'}{10^3} = \frac{K_2'}{10^6} = \frac{K_3'}{10^9}$$

71. Answer (2)

Micelle formation takes place above Kraft temperature.

72. Answer (4)

73. Answer (4)

74. Answer (4)

3° carbocation is the most stable.

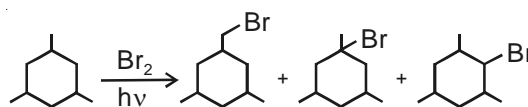
75. Answer (2)

S is most basic because of steric inhibition of resonance. Q is least basic because of presence of electron withdrawing in group.

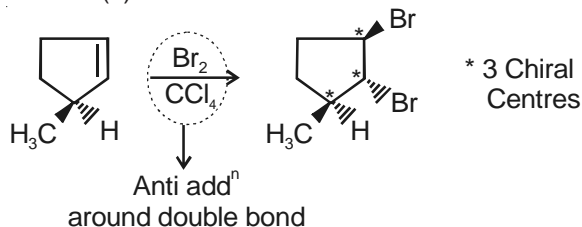
76. Answer (3)

The two isomers have different orientation.

77. Answer (2)



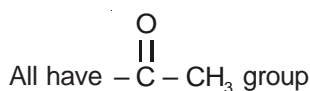
78. Answer (3)



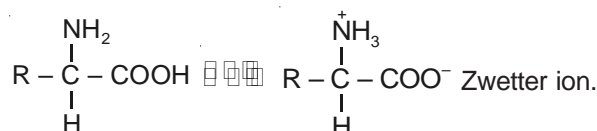
79. Answer (2)

Its intramolecular single step reaction *i.e.* S_N2 which always proceeds through inversion of configuration.

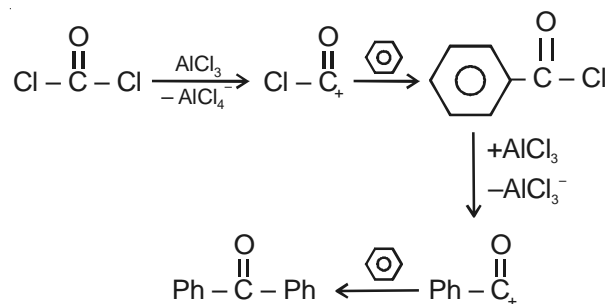
80. Answer (4)



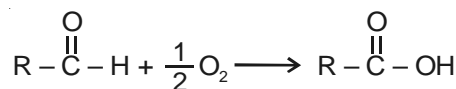
81. Answer (3)



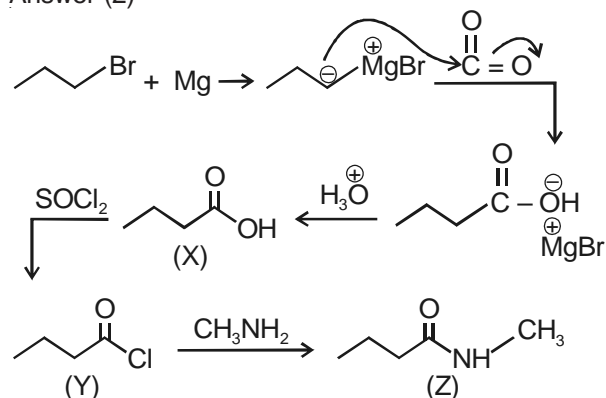
82. Answer (1)



83. Answer (4)



84. Answer (2)



85. Answer (1)

Perkin condensation is given by aromatic aldehydes. Cannizzaro reaction : by carbonyl compounds without α -H.

Aldol condensation : by carbonyl compounds with α -H.

Halogen reaction : $-\overset{\text{O}}{\underset{\text{O}}{\parallel}}\text{C}-\text{CH}_3$ group.

86. Answer (3)

87. Answer (1)

Terminal alkynes can decolourises Br_2 water.

88. Answer (1)

$$\pi_{\text{NaCl}} = \pi_{\text{urea}}$$

$$\therefore i = 1.83$$

$$\alpha = \frac{i-1}{n-1} = 0.83$$

89. Answer (3)

118 \rightarrow p-block119 & 120 \rightarrow s-block121 \rightarrow g-block

90. Answer (4)

Atomic radius of Al > Ga

But ionic radius of $\text{Ga}^{3+} > \text{Al}^{3+}$

A cation is always smaller than its parent atom.

[BOTANY & ZOOLOGY]

91. Answer (2)

92. Answer (4)

93. Answer (2)

94. Answer (3)

95. Answer (3)

96. Answer (2)

97. Answer (2)

98. Answer (1)

99. Answer (2)

100. Answer (1)

101. Answer (3)

102. Answer (4)

103. Answer (1)

104. Answer (4)

105. Answer (4)

106. Answer (1)

107. Answer (3)

108. Answer (3)

109. Answer (4)

110. Answer (4)

111. Answer (2)

112. Answer (4)

113. Answer (3)

114. Answer (1)

115. Answer (2)

116. Answer (1)

117. Answer (3)

118. Answer (2)

119. Answer (2)

120. Answer (2)

121. Answer (2)

122. Answer (3)

123. Answer (1)

124. Answer (4)

125. Answer (3)

126. Answer (4)

127. Answer (1)

128. Answer (4)

129. Answer (3)

130. Answer (4)

131. Answer (3)

132. Answer (2)

133. Answer (3)

134. Answer (1)

135. Answer (2)

136. Answer (4)

- | | |
|-----------------|-----------------|
| 137. Answer (3) | 159. Answer (3) |
| 138. Answer (2) | 160. Answer (4) |
| 139. Answer (2) | 161. Answer (4) |
| 140. Answer (4) | 162. Answer (2) |
| 141. Answer (2) | 163. Answer (3) |
| 142. Answer (2) | 164. Answer (1) |
| 143. Answer (1) | 165. Answer (3) |
| 144. Answer (3) | 166. Answer (4) |
| 145. Answer (4) | 167. Answer (3) |
| 146. Answer (3) | 168. Answer (3) |
| 147. Answer (2) | 169. Answer (2) |
| 148. Answer (3) | 170. Answer (3) |
| 149. Answer (2) | 171. Answer (3) |
| 150. Answer (1) | 172. Answer (4) |
| 151. Answer (4) | 173. Answer (3) |
| 152. Answer (4) | 174. Answer (3) |
| 153. Answer (3) | 175. Answer (4) |
| 154. Answer (2) | 176. Answer (4) |
| 155. Answer (3) | 177. Answer (4) |
| 156. Answer (3) | 178. Answer (2) |
| 157. Answer (4) | 179. Answer (2) |
| 158. Answer (2) | 180. Answer (3) |



Topics Covered

Complete Syllabus of Class XI & XII

INSTRUCTIONS FOR CANDIDATES:

1. Read each question carefully.
2. Each question carries **4 marks**. **1 mark** will be deducted for every incorrect answer.

[PHYSICS & CHEMISTRY]**Choose the correct answer :**

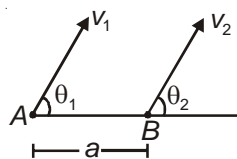
1. The difference in length of a mean solar day and sidereal day is about
 - (1) 4 minute
 - (2) 1 minute
 - (3) 15 minute
 - (4) 56 minute
2. A stone is dropped from top of a tower. If the time taken to cover first half of journey is t_1 and second half of the journey is t_2 then $\frac{t_2}{t_1}$ is
 - (1) $\sqrt{2} - 1$
 - (2) $1 - \frac{1}{\sqrt{2}}$
 - (3) $\frac{1}{\sqrt{2}}$
 - (4) $\frac{1}{2}$
3. A ball is shot vertically upward from planet surface. A graph between height (y) Vs time (t) is shown in figure. Magnitude of acceleration due to gravity (free fall) on planet is

 - (1) $\frac{10}{3} \text{ m/s}^2$
 - (2) $\frac{20}{3} \text{ m/s}^2$
 - (3) $\frac{25}{3} \text{ m/s}^2$
 - (4) $\frac{40}{3} \text{ m/s}^2$
4. A body rests on a rough horizontal plane. A force is applied on the body directed towards the plane at an angle ϕ with vertical. The body can be moved along the plane only if
 - (1) ϕ is more than the angle of friction
 - (2) ϕ is less than the angle of friction
 - (3) ϕ is equal to the angle of friction
 - (4) All of these
5. A car weighing 500 kg is travelling at 72 km/h. The brakes are applied suddenly and it comes to stop in 10 s. The braking power is
 - (1) 13 kW
 - (2) 10 kW
 - (3) 1 kW
 - (4) 130 kW
6. Mark the correct option
 - (1) Potential energy is defined only in conservative fields
 - (2) Work done by an external force on a system equal to change in its kinetic energy
 - (3) The momentum of a ball colliding elastically with the floor is conserved
 - (4) All of these
7. Internal forces acting within a system can change its
 - (1) Linear momentum as well as kinetic energy
 - (2) Linear momentum but not kinetic energy
 - (3) Kinetic energy but not linear momentum
 - (4) Neither linear momentum nor kinetic energy
8. Position co-ordinates of two particles are A(1, 2) and B(3, 2) and their masses are $m_A = 1$ kg and $m_B = 2$ kg. Position co-ordinate of centre of mass of this two particle system is
 - (1) $\left(\frac{7}{3}, 2\right)$
 - (2) $\left(\frac{5}{3}, 2\right)$
 - (3) (1, 2)
 - (4) (2, 1)
9. A particle of mass m is moving along the line $y = 2x$, with constant speed v . Its angular momentum about origin will be
 - (1) mv
 - (2) $2mv$
 - (3) Zero
 - (4) $2v$

10. Two point masses m and $3m$ are placed at distance r . The moment of inertia of the system about an axis passing through centre of mass of system and perpendicular to the line of joining the point masses is

- (1) $\frac{3}{5}mr^2$ (2) $\frac{3}{4}mr^2$
 (3) $\frac{3}{2}mr^2$ (4) $\frac{6}{7}mr^2$

11. Two particles A and B are moving with velocities \vec{v}_1 and \vec{v}_2 respectively. At certain instant the situation is as shown in figure, at this instant angular velocity of B with respect to A is



- (1) $\frac{v_2 \cos \theta_2 - v_1 \cos \theta_1}{a}$ (2) $\frac{v_2 \sin \theta_2 - v_1 \sin \theta_1}{a}$
 (3) $\frac{v_2 \sin \theta_2 + v_1 \sin \theta_1}{a}$ (4) $\frac{v_2 \cos \theta_2 + v_1 \cos \theta_1}{a}$

12. A horizontal uniform disc (platform) can rotate freely on a rigid vertical axis passing through its centre 'O'. A man stands at rest at edge of the disc at a point A . The mass of disc is '22' times the mass of man. The man starts walking along the edge of the disc anticlockwise. When he reaches A after completing one rotation relative to the disc, the disc has rotated through

- (1) 45° (2) 30°
 (3) 60° (4) 90°

13. A cylinder is rolling down without slipping on a rough inclined plane, then

- (1) Its total mechanical energy is conserved
 (2) Frictional force on it is non-zero
 (3) Frictional force is in upward direction
 (4) All of these

14. A particle of mass m is fired with velocity v from ground at an angle of 45° with horizontal. If the time taken to reach the highest point is ' t '. What is change in its velocity from its point of projection to its maximum height?

- (1) $\frac{1}{2}gt^2$ (2) gt
 (3) $\sqrt{2}v$ (4) $\frac{v}{\sqrt{2}}$

15. A small satellite is revolving near earth surface. Its orbital velocity will be nearly

- (1) 8 km/s (2) 11.2 km/s
 (3) 4 km/s (4) 6 km/s

16. Two SHM's are described by

$y_A = A \sin\left(\omega t + \frac{\pi}{6}\right)$ and $y_B = A \sin\left(\omega t + \frac{\pi}{2}\right)$ The maximum displacement of A will be [T is time period]

- (1) At the same time as for B
 (2) Earlier than that of B by $\frac{T}{6}$
 (3) Later than that for B by $\frac{T}{6}$
 (4) Later than that for B by $\frac{T}{3}$

17. A cable capable of supporting a load W is cut to half of its original length. The maximum load, it can support now is

- (1) $\frac{W}{2}$ (2) W
 (3) $2W$ (4) $4W$

18. If angle of contact between liquid and capillary tube is 0° , then nature of meniscus of liquid in tube is

- (1) Plane (2) Parabolic
 (3) Spherical (4) Hyperbolic

19. The equation of a travelling wave at $t = 0$ is

$y = \frac{1}{1+x^2}$. After 0.2 s the equation takes the form

$y = \frac{1}{x^2 + (2x+1)}$. The velocity of wave is

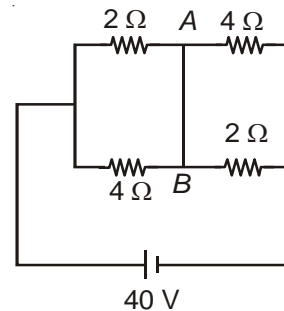
- (1) 5 m/s, towards $+x$ -axis
 (2) 1 m/s, towards $+x$ -axis
 (3) 5 m/s, towards $-x$ -axis
 (4) 1 m/s, towards $-x$ -axis

20. When a wave propagates in ideal medium (non energy absorbing)

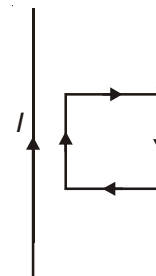
- (1) The wave intensity remains constant for a plane wave
 (2) The wave intensity decreases as the inverse square of the distance from the source for a spherical wave
 (3) Power of the spherical wave over the spherical surfaces central at source remains same at all times
 (4) All of these

21. The coefficient of cubical expansion of water is zero at
 (1) 1°C (2) 4°C
 (3) 15° (4) 100°C
22. If one mole of a monoatomic gas is mixed with one mole of diatomic gas, the value of $\gamma \left(= \frac{C_P}{C_V} \right)$ for the mixture is
 (1) 1.40 (2) 1.50
 (3) 1.53 (4) 3.07
23. If the emissive power and absorptivity of a body at temperature T is E and A respectively, then the emissive power of black body at temperature T will be
 (1) EA (2) $\frac{E}{A}$
 (3) $\frac{E}{A} \cdot T$ (4) $\frac{EA}{T}$
24. The radius R of a spherical shell having charge Q is changing periodically so that at any instant $R = R_0 + R_1 \cos \omega t$ where $R_1 < R_0$. The field at distance $r (> R)$ from centre of shell is
 (1) $\frac{KQ}{r^2} \cos \omega t$ (2) $\frac{KQ}{r^2}$
 (3) $\frac{KQ}{R^2} \sin \omega t$ (4) $\frac{KQ}{(r - R)^2} \cos \omega t$
25. A spherical charged conductor has surface charge density σ . It is placed in free space. Electrical stress at its surface is
 (1) $\frac{\sigma^2}{3\epsilon_0}$ (2) $\frac{\sigma^2}{4\epsilon_0}$
 (3) $\frac{\sigma^2}{2\epsilon_0}$ (4) $\frac{\sigma}{2\epsilon_0}$
26. Two point charges q_1 and q_2 are placed in external electric field (E) where electric potentials are v_1 and v_2 respectively. If separation between these charges is r then total electrostatic potential energy of the system will be
 (1) $\frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$
 (2) $q_1 v_1 + q_2 v_2$
 (3) $q_1 v_1 - q_2 v_2 + \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r}$
 (4) $q_1 v_1 + q_2 v_2 + \frac{1}{4\pi\epsilon} \frac{q_1 q_2}{r}$

27. The inner sphere, of radius R_1 of two concentric spheres is given charge $(-q)$ and outer sphere of radius R_2 is given $(+q)$ charge. Now these are connected by a copper wire, capacitance of this system will be
 (1) $4\pi\epsilon_0 R_1$ (2) $4\pi\epsilon_0 R_2$
 (3) $\frac{4\pi\epsilon_0 R_1 R_2}{(R_2 - R_1)}$ (4) Infinite
28. At room temperature (27°C) the resistance of heating element is 100 Ω. What is the temperature of element if resistance is found to be 117Ω? (Temperature coefficient of resistance = $1.7 \times 10^{-4}/^\circ\text{C}$)
 (1) 1027°C (2) 2027°C
 (3) 927°C (4) 827°C
29. Find current through wire AB shown in network

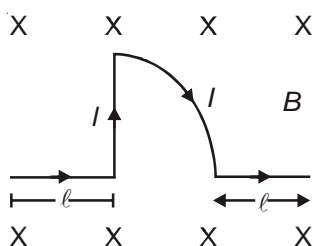


- (1) 5 Ampere A to B
 (2) 5 Ampere B to A
 (3) 3 Ampere A to B
 (4) 3 Ampere B to A
30. A rectangular loop carrying current i is placed near a long straight wire as shown in figure. Wire and loop are in same plane. If I is the current flowing in wire then loop will

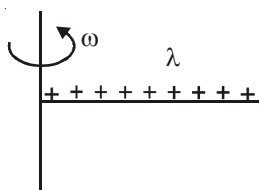


- (1) Rotate about an axis parallel to wire
 (2) Move away from wire
 (3) Move towards the wire
 (4) Both (1) and (3)

31. A superconductor when placed in a magnetic field expels all magnetic field lines. This means that superconductor is
- (1) Perfect diamagnetic
 - (2) A paramagnetic
 - (3) A ferromagnetic
 - (4) Partly paramagnetic and partly diamagnetic
32. A ferromagnetic substance used for making a permanent magnet should have
- (1) High retentivity and low coercivity
 - (2) Low retentivity and low coercivity
 - (3) High retentivity and high coercivity
 - (4) All of these
33. The force acting on a current carrying conductor (shown in figure) when placed in a magnetic field B perpendicular to the plane of loop is



- (1) $3BI\ell$
 - (2) $2BI\ell$
 - (3) $BI\ell$
 - (4) Zero
34. A thin rod having charge density λ , mass- m and length l is rotating about its one end. Its magnetic moment will be [ω -angular velocity of rod]



- (1) $\frac{\lambda l^2 \omega}{6}$
 - (2) $\frac{\lambda l^3 \omega}{6}$
 - (3) $\frac{\lambda \omega^2 l}{6}$
 - (4) $\frac{\lambda l}{6\omega^2}$
35. Magnetic flux links to a loop is changing with time t as $\phi = t^2 - 2t + 1$; find average induced emf in fourth second
- (1) 7 unit
 - (2) 6 unit
 - (3) 5 unit
 - (4) Zero

36. When current in an inductor increases from zero to I , then magnetic flux linked with inductor changes from zero to ϕ . The energy stored in inductor is
- (1) $\frac{1}{2}\phi I$
 - (2) ϕI
 - (3) $\frac{1}{2}I\phi^2$
 - (4) $\frac{1}{2}\phi I^2$
37. An L-C circuit oscillates with frequency f . When current through inductor is $\frac{I_{\max}}{2}$ then charge (q) on capacitor in term of Q_{\max} will be
- (1) $\frac{Q_{\max}}{2}$
 - (2) $\frac{Q_{\max}}{\sqrt{2}}$
 - (3) Q_{\max}
 - (4) $\frac{\sqrt{3}}{2}Q_{\max}$
38. For an observer under the surface of water, sunset would [$\theta_{\text{Critical}} = 49^\circ$] appear to have taken place
- (1) Below the horizon
 - (2) Along the horizon
 - (3) At an angle less than 30° above horizon
 - (4) At an angle more than 30° above horizon
39. In the Young's double slit experiment, if the distance between the slits is made equal to the wavelength of light used, then
- (1) No fringes are seen on the screen
 - (2) Fringes will become narrower
 - (3) Fringe width will become λ
 - (4) Fringe width will become 2λ
40. For slow moving electron, having kinetic energy E , de Broglie wavelength is proportional to,
- (1) $E^{1/2}$
 - (2) E
 - (3) $E^{-1/2}$
 - (4) E^{-2}
41. When a photosensitive surface is illuminated with light of wavelength λ , stopping potential is V . When same surface is illuminated with light of wavelength 2λ , stopping potential is $\frac{V}{3}$. Threshold wavelength for surface is
- (1) 6λ
 - (2) $\frac{8\lambda}{3}$
 - (3) 4λ
 - (4) $\frac{4\lambda}{3}$

42. The energy of an electron in hydrogen atom is -3.4 eV. Its angular momentum is

- (1) $\frac{h}{2\pi}$ (2) $\frac{h}{\pi}$
 (3) $\frac{3h}{2\pi}$ (4) $\frac{3h}{\pi}$

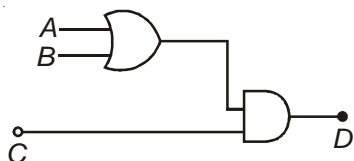
43. Minimum energy for γ -ray photon for pair production is nearly

- (1) 1.1 eV (2) 1.1 keV
 (3) 1.1 MeV (4) 1.1 GeV

44. A transistor is used in common emitter configuration. Given its $\alpha = 0.9$. If base current is changed by $2\mu\text{A}$. Change in collector current will be

- (1) $1\mu\text{A}$ (2) $0.9\mu\text{A}$
 (3) $30\mu\text{A}$ (4) $18\mu\text{A}$

45. For given combination of gates, if the logic states of inputs A, B and C are as follows $A = B = 1$ and $C = 0$, then logic state of output D is



- (1) 0 (2) 1
 (3) Both (1) and (2) (4) Cannot be predicted

46. An isotone of ${}_{32}\text{Ge}^{76}$ is

- (i) ${}_{32}\text{Ge}^{77}$ (ii) ${}_{33}\text{As}^{77}$
 (iii) ${}_{34}\text{Se}^{77}$ (iv) ${}_{34}\text{Se}^{78}$
 (1) Only (i) & (ii) (2) Only (ii) & (iii)
 (3) Only (ii) & (iv) (4) (ii), (iii) & (iv)

47. If Hund's rule is not followed, magnetic moment of Fe^{2+} , Mn^+ & Cr^{3+} will be in the order

- (1) $\text{Fe}^{2+} < \text{Mn}^+ < \text{Cr}^{3+}$ (2) $\text{Fe}^{2+} < \text{Cr}^{3+} < \text{Mn}^+$
 (3) $\text{Fe}^{2+} = \text{Mn}^+ < \text{Cr}^{3+}$ (4) $\text{Mn}^+ = \text{Cr}^{3+} < \text{Fe}^{2+}$

48. A 3 : 2 molar mixture of N_2 and CO is present in a vessel at 500 bar pressure. Due to hole in the vessel, the gas mixture leaks out. The composition of mixture effusing out initially is

- (1) $n_{\text{N}_2} : n_{\text{CO}} :: 1:2$ (2) $n_{\text{N}_2} : n_{\text{CO}} :: 6:1$
 (3) $n_{\text{CO}} : n_{\text{N}_2} :: 1:2$ (4) $n_{\text{CO}} : n_{\text{N}_2} :: 2:3$

49. Which of the following fact is **incorrect**?

- (1) Ionisation energy of nitrogen is greater than carbon and oxygen
 (2) LiCl has lesser m.p. than CsCl
 (3) Electron affinity of oxygen is more than sulphur
 (4) Radius of K^{\oplus} is lesser than K atom

50. If equal volumes of 1M KMnO_4 and 1M $\text{K}_2\text{Cr}_2\text{O}_7$ solutions are allowed to oxidise Fe(II) to Fe(III) in acidic medium, then Fe(II) oxidised will be

- (1) More by KMnO_4
 (2) More by $\text{K}_2\text{Cr}_2\text{O}_7$
 (3) Equal in both cases
 (4) Cannot be determined

51. Which of the following has maximum distance between carbon and oxygen?

- (1) Carbonate ion (2) CO
 (3) CO_2 (4) C_2H_6

52. 34 g of H_2O_2 is present in 1120 ml of solution. This solution is called

- (1) 10 vol solution (2) 20 vol solution
 (3) 34 vol solution (4) 32 vol solution

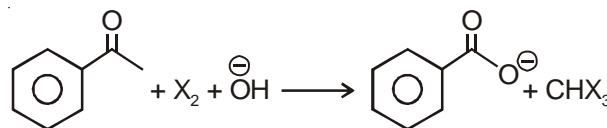
53. How many mole of electrons will weigh 1 kg?

- (1) 6.023×10^{23} (2) $\frac{1}{9.1} \times 10^{31}$
 (3) $\frac{6.023}{9.1} \times 10^{54}$ (4) $\frac{1}{9.1 \times 6.023} \times 10^8$

54. Which of the following is always a negative value?

- (1) Enthalpy of solution
 (2) Enthalpy of fusion
 (3) Entropy of crystallization
 (4) Entropy of formation

55.



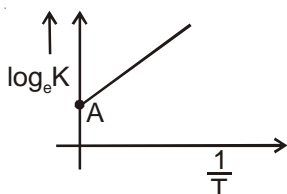
The correct comparison of rate of haloform reaction with various halogens is

- (1) $r_{\text{Cl}_2} > r_{\text{Br}_2} > r_{\text{I}_2}$
 (2) $r_{\text{I}_2} > r_{\text{Br}_2} > r_{\text{Cl}_2}$
 (3) $r_{\text{Cl}_2} = r_{\text{Br}_2} = r_{\text{I}_2}$
 (4) $r_{\text{Br}_2} = r_{\text{Cl}_2} = r_{\text{I}_2}$

56. pK_{a_1} , pK_{a_2} and pK_{a_3} of H_3PO_4 are respectively x , y and z . pH of 0.01 M Na_2HPO_4 solution is

- (1) 2 (2) $\frac{x+y}{2}$
 (3) $\frac{y+z}{2}$ (4) $\frac{x+y+z}{2}$

57. A graph between $\log_e K$ and $\frac{1}{T}$ is of the type



Thus,

- (1) $\Delta H^\circ > 0$ (2) $\Delta H^\circ < 0$
 (3) $\Delta H^\circ = 0$ (4) Data irrelevant

58. Direct reduction of Fe_2O_3 by carbon is possible at temperature

- (1) < 1123 K (2) > 1123 K
 (3) ≤ 1123 K (4) At any temperature

59. During formation of borazine, the ratio of diborane and ammonia is

- (1) 1 : 2 (2) 2 : 3
 (3) 1 : 3 (4) 2 : 1

60. Which metal out of the following does not form alum?

- (1) K (2) Na
 (3) Li (4) Fe

61. Out of the following, which statements are correct?

- (i) BeO is almost insoluble in water
 (ii) BaO is soluble in water
 (iii) $BeSO_4$ is soluble in water
 (iv) $BaSO_4$ is insoluble in water
- (1) (i) & (ii) (2) (i), (ii) & (iii)
 (3) (iii) & (iv) (4) (i), (ii), (iii) & (iv)

62. Among the following metal carbonyls, the C–O bond order is lowest in

- (1) $[Mn(CO)_6]^+$ (2) $[Fe(CO)_5]$
 (3) $[Cr(CO)_6]$ (4) $[V(CO)_6]^-$

63. The molar conductivity of the complex $CoCl_3 \cdot 4NH_3 \cdot 2H_2O$ is found to be same as that of 3 : 1 electrolyte. The structural formula of the complex is

- (1) $[Co(NH_3)_4(H_2O)_2]Cl_3$
 (2) $[CoCl_2(H_2O)_2(NH_3)_2]Cl \cdot 2NH_3$
 (3) $[CoCl(H_2O)_2(NH_3)_3]Cl_2 \cdot NH_3$
 (4) $[CoCl_3(NH_3)_3] \cdot NH_3 \cdot 2H_2O$

64. In Nessler's reagent, the ion present is

- (1) HgI_2^{2-} (2) HgI_4^{2-}
 (3) Hg^+ (4) Hg^{2+}

65. A green coloured solution of same salt changes its colour to light pink on passing ozone through it. Which of the following species represent pink and green colour respectively?

- (1) MnO_4^- & MnO_4^{2-} (2) MnO_4^{2-} & MnO_4^-
 (3) Mn^{2+} & MnO_2 (4) MnO_2 & Mn^{2+}

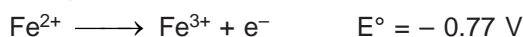
66. How many tetrahedral angles are present in P_2Cl_{10} ?

- (1) 4 (2) 6
 (3) 3 (4) Zero

67. Which can not be oxidised by acidified $KMnO_4$?

- (1) HF (2) HCl
 (3) KI (4) $FeSO_4$

68. On the basis of following E°_{values} depict the strongest oxidising agent.



- (1) Fe^{2+} (2) $[Fe(CN)_6]^{4-}$
 (3) Fe^{3+} (4) $[Fe(CN)_6]^{3-}$

69. The cell, $Zn|Zn^{2+}(1M)||Cu^{2+}(1M)|Cu$ ($E^\circ_{cell} = 1.10 \text{ V}$), was allowed to be completely discharged at 298 K. The relative concentration of Zn^{2+} to Cu^{2+}

i.e., $\left[\frac{Zn^{2+}}{Cu^{2+}} \right]$ is

- (1) Antilog (24.08) (2) 37.3
 (3) $10^{37.3}$ (4) 9.65×10^4

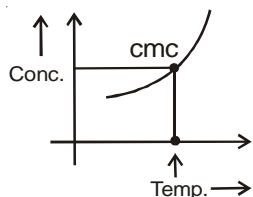
70. For three reactions of I, II and III order respectively, the rate constants K_1 , K_2 and K_3 are equal. If concentration is expressed in mol ml^{-1} , their

relation is $\frac{K_1}{x_1} = \frac{K_2}{x_2} = \frac{K_3}{x_3}$. The values of x_1 , x_2

and x_3 are

- (1) 10^3 , 10^6 , 10^9 (2) 10^9 , 10^6 , 10^3
 (3) 10^{-3} , 10^{-6} , 10^{-9} (4) 3, 6, 9

71. In the following graph, T represents for Micelle formation,



- (1) Boyle's temperature
- (2) Kraft temperature
- (3) Critical temperature
- (4) Inversion temperature

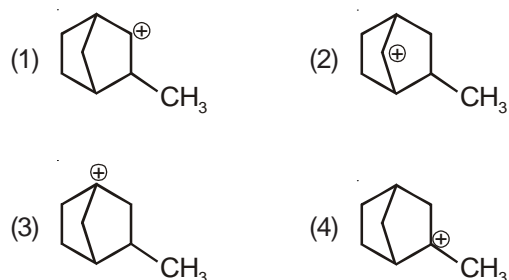
72. Which of the following shows metallic conductivities?

- (1) Ag
- (2) CrO_2
- (3) ReO_3
- (4) All of these

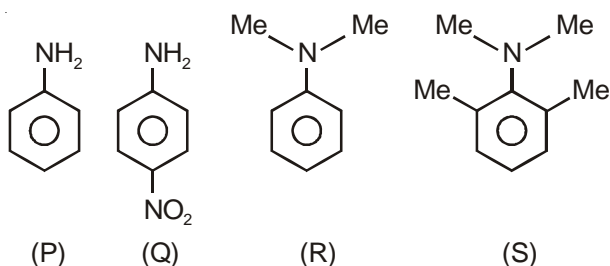
73. The yellow colour of ZnO and conducting nature produced in heating is due to

- (1) Metal excess defects due to interstitial cation
- (2) Extra positive ions present in an interstitial site
- (3) Trapped electrons
- (4) All of these

74. Which of the following cations is most stable?

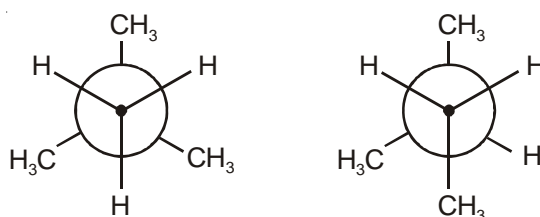


75. Arrange the following compounds in increasing order of basicity

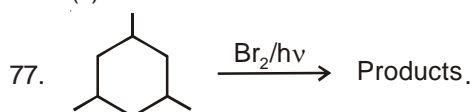


- (1) $S > R > Q > P$
- (2) $S > R > P > Q$
- (3) $P > Q > R > S$
- (4) $R > Q > P > S$

76. The following structures represent



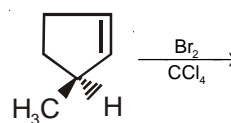
- (1) Conformational isomers
- (2) Stereoisomers
- (3) Constitutional isomers
- (4) Identical



How many monobrominated products will be obtained by above reaction?

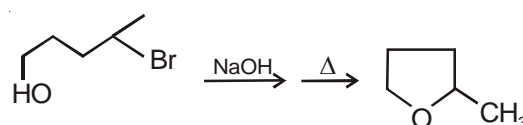
- (1) 6
- (2) 3
- (3) 5
- (4) 1

78. Identify the number of chiral centres present in product obtained by following reaction



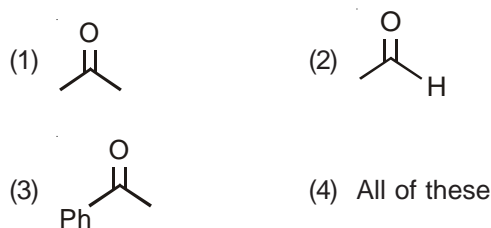
- (1) 2
- (2) 4
- (3) 3
- (4) 5

79. The following reaction can be described as



- (1) $\text{S}_{\text{N}}1$ reaction with racemisation
- (2) Intramolecular $\text{S}_{\text{N}}2$ reaction with Walden inversion
- (3) Intermolecular $\text{S}_{\text{N}}2$ reaction with Walden inversion
- (4) Intramolecular $\text{S}_{\text{N}}1$ reaction with racemisation

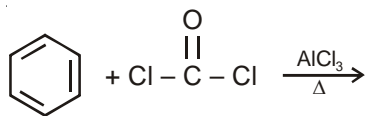
80. A compound X gives positive test with 2, 4-DNP are with I_2/NaOH . Compound (X) may be

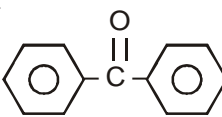
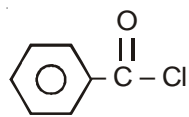
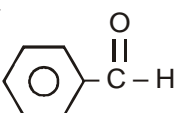


81. Amino acids undergo internal acid base reaction to form

- (1) An amide (2) A lactam
(3) Zwitter ion (4) A peptide

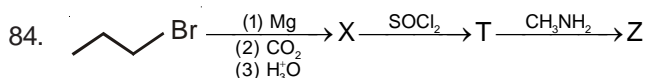
82. Identify correct product of the following reaction



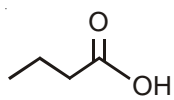
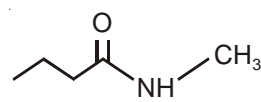
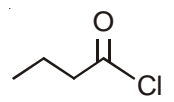
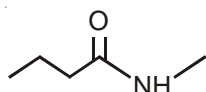
- (1)  (2) 
(3)  (4) None of these

83. One mole of an organic compound requires 0.5 mole of oxygen to produce an acid. The compound may be

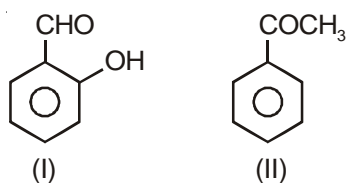
- (1) Alcohol (2) Ether
(3) Ketone (4) Aldehyde



Find out which is incorrect

- (1) X is 
(2) Y is 
(3) Y is 
(4) Z is 

85. The given carbonyl compounds (I & II) can undergo which reactions out of following



(P) Perkin condensation

(Q) Cannizzaro reaction

(R) Aldol condensation

(S) Haloform reaction

(1) (I) → (P) & (Q) both, (II) → (R) & (S) both

(2) (I) → (R) & (S) both, (II) → (P) & (Q) both

(3) (I) → (P) only, (II) → (R) only

(4) (I) → (Q) only, (II) → (S) only

86. Which of the following is not a fat soluble vitamin?

- (1) Vitamin D
(2) Vitamin E
(3) Vitamin B complex
(4) Vitamin A

87. Two hydrocarbons A and B, both on analysis yield the same percentage by mass. A decolorises Br₂ water but B does not. Identify A and B respectively

- (1) C₂H₂, C₆H₆
(2) C₆H₆, C₂H₂
(3) C₂H₄, C₂H₆
(4) C₂H₂, C₃H₈

88. 0.1 molar solution of NaCl is found to be isotonic with 1.10% solution of urea. Calculate the degree of ionisation of NaCl.

- (1) 0.83 (2) 8.3
(3) 83 (4) 0.083

89. What is the expected atomic number of first g-Block element?

- (1) 119 (2) 120
(3) 121 (4) 122

90. Which of the following is correct about radius?

- (i) Al > Ga (ii) Al³⁺ > Ga³⁺
(iii) Al > Al³⁺ (iv) Ga > Ga³⁺
(1) Both (i) & (ii) (2) Only (i)
(3) (i), (ii) & (iii) (4) (i), (iii) & (iv)

[BOTANY & ZOOLOGY]

91. Select odd one out w.r.t. characteristics of taxonomic hierarchy.
- (1) Each taxonomic category refers a unit of classification and represents a rank in taxonomic hierarchy
 - (2) Family is characterised on the basis of reproductive features of plants only
 - (3) Characters are more general in taxon of higher rank
 - (4) There are seven obligate taxonomic categories to classify an organism
92. Chemosynthetic autotrophic bacteria oxidise various _____ substances and use the released _____ for their ATP production.
- (1) Organic, chemical (2) Organic, energy
 - (3) Inorganic, chemical (4) Inorganic, energy
93. Choose odd one w.r.t. kingdom Fungi
- (1) Fungi grow in warm and humid places
 - (2) The cell walls of fungi is composed of cellulose and glycogen
 - (3) In basidiomycetes karyogamy and meiosis take place in the basidium
 - (4) The deuteromycetes reproduce only by asexual spores known as conidia
94. Consider the following statements and select **correct** set of option
- a. Viruses are non-obligate parasites
 - b. Virus contain genetic material either RNA or DNA
 - c. Viroids have RNA of high molecular weight
 - d. Viroids causes potato spindle tuber disease
- (1) (b), (c) and (d) are correct
 - (2) (a), (c) and (d) are correct
 - (3) (b) and (d) are correct
 - (4) (b) and (c) are correct
95. Match the Column-I with Column-II
- | Column-I | Column-II |
|--|---|
| a. Natural system of classification | (i) Based on information from several sources like ultrastructure, anatomy, embryology and phytochemistry |
| b. Phylogenetic system of classification | (ii) Based on cytological informations like chromosome number, structure and behaviour |
| c. Cytotaxonomy | (iii) Based on evolutionary relationships between the various organisms |
| d. Numerical taxonomy | (iv) Based on all observable characteristics and computers are used to analyse the data |
- (1) a(iv), b(ii), c(i), d(iii) (2) a(iii), b(i), c(ii), d(iv)
 - (3) a(i), b(iii), c(ii), d(iv) (4) a(i), b(iv), c(ii), d(iii)
96. Select correct statements w.r.t. algae possessing two laterally inserted heterokont flagella in zoospores.
- a. Marine habitats is predominant
 - b. Major pigments are chlorophyll a, c fucoxanthin
 - c. Reserve food is mannitol or laminarin
 - d. Cell wall is composed of cellulose, pectin and sulphated phycocolloid.
- (1) All are correct
 - (2) All are correct, except (d)
 - (3) All are incorrect, except (a)
 - (4) All are correct, except (b) & (c)

97. The spread of living pteridophytes is limited and restricted to narrow geographical regions because
- (1) Most of them are homosporous
 - (2) They need water for fertilisation
 - (3) Gametophyte or prothallus is independent of sporophyte
 - (4) Zygote does not divide by meiosis immediately
98. Non-archegoniate spermatophytes
- (1) Possess double fertilisation
 - (2) Have gametophytes independent of sporophytes
 - (3) Are not pollinated by air
 - (4) Exhibit diplo-haplontic life cycle
99. Find the **correct** match (w.r.t. aestivation)
- (1) *Calotropis* – Twisted
 - (2) *Cassia* – Imbricate
 - (3) Pea – Valvate
 - (4) China rose – Vexillary
100. The phyllotaxy in sunflower, guava and *Alstonia* plants are
- (1) Alternate, opposite and whorled
 - (2) Opposite, alternate and whorled
 - (3) Whorled, alternate and opposite
 - (4) Alternate, whorled and opposite
101. Plants of which one of the following sets have actinomorphic flowers?
- (1) Pea and gulmohar
 - (2) Pea and *Cassia*
 - (3) *Datura* and chilli
 - (4) *Datura* and bean
102. Meristematic cells have
- (1) Thick cell wall and large intercellular spaces
 - (2) Thick cell wall and no intercellular spaces
 - (3) Thin cell wall and large intercellular spaces
 - (4) Thin cell wall and no intercellular spaces
103. Bamboo and grass stems elongate by the activity of
- (1) Intercalary meristem
 - (2) Apical meristem
 - (3) Lateral meristem
 - (4) Secondary meristem
104. In grasses, certain adaxial epidermal cells along the veins modify themselves into large empty, colourless cells called
- (1) Guard cells
 - (2) Albuminous cells
 - (3) Companion cells
 - (4) Bulliform cells
105. The inner, darker and harder portion of secondary xylem that cannot conduct water, in an older dicot stem, is called
- (1) Late wood
 - (2) Autumn wood
 - (3) Sapwood
 - (4) Heartwood
106. According to fluid mosaic model of cell membrane, the quasi-fluid nature of lipid
- (1) Enables lateral movement of proteins within the overall bilayer
 - (2) Inhibits lateral movement of proteins within the bilayer
 - (3) Describes the arrangement of lipids in the membrane
 - (4) Describes the arrangement of proteins in the membrane
107. Middle lamella is present
- (1) Inside the secondary wall
 - (2) Inside the primary wall
 - (3) Outside the primary wall
 - (4) In between secondary and tertiary walls
108. The site for steroid synthesis and detoxification of drugs is
- (1) Rough endoplasmic reticulum
 - (2) Ribosomes
 - (3) Smooth endoplasmic reticulum
 - (4) Polyribosomes
109. Choose the wrongly matched pair
- (1) Amyloplasts – Starch
 - (2) Elaioplasts – Oils and fats
 - (3) Aleuroplasts – Proteins
 - (4) Chromoplasts – Colourless
110. Cytoskeleton is made up of
- (1) Calcium phosphate granules
 - (2) Callose deposits
 - (3) Cellulosic microfibrils
 - (4) Proteinaceous filaments
111. Duplication of DNA and centriole in animal cell can be observed in _____ phase of cell cycle
- (1) Pre-mitotic
 - (2) Synthetic
 - (3) Quiescent
 - (4) Post-mitotic

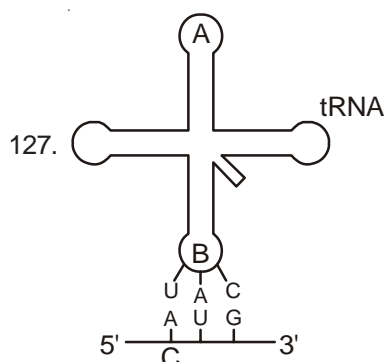
112. Select the unrelated statement w.r.t. specific events and phase of prophase I
- (1) Pairing of homologous chromosomes – Zygotene
 - (2) Appearance of recombination nodules – Pachytene
 - (3) Transition to metaphase I – Diakinesis
 - (4) Terminalisation of chiasmata – Diplotene
113. A : Transport over short distances proceeds through diffusion and by cytoplasmic streaming supplemented by active transport.
B : Facilitated diffusion is very specific and is sensitive to inhibitors which react with protein side chains.
- (1) Only A is correct
 - (2) Only B is correct
 - (3) Both A & B are correct
 - (4) Both A & B are incorrect
114. The major role of phosphorus in plant metabolism is to
- (1) Generate metabolic energy
 - (2) Maintain anion – cation balance in cell
 - (3) Be a constituent of all proteins
 - (4) Act as activator of nitrogenase
115. Under anaerobic conditions, denitrifying bacteria such as *Pseudomonas* could convert
- (1) Ammonia to nitrates
 - (2) Nitrates to molecular nitrogen
 - (3) Nitrite to nitrates
 - (4) Nitrates to ammonia
116. RuBP carboxylase enzyme catalyses the carboxylation reaction between
- (1) CO₂ and ribulose 1,5-diphosphate
 - (2) 3-PEP and CO₂
 - (3) PGA and PGAL
 - (4) Ribulose diphosphate and phosphoglyceraldehyde
117. Conversion of pyruvic acid into ethyl alcohol is facilitated by the enzymes
- (1) Decarboxylase
 - (2) Dehydrogenase
 - (3) Both (1) & (2)
 - (4) Synthetase
118. FAD is H-acceptor during oxidation of which step of TCA cycle?
- (1) α -ketoglutaric acid → Succinyl Co-A
 - (2) Succinic acid → Fumaric acid
 - (3) Succinyl Co-A → Succinic acid
 - (4) Fumaric acid → Malic acid
119. Bolting phenomenon is induced by applying
- (1) Auxins
 - (2) Gibberellins
 - (3) Ethylene
 - (4) Cytokinin
120. The perception of stimulus of cold treatment i.e., vernalization is received by
- (1) Mature leaves
 - (2) Shoot apex
 - (3) Decapitated coleoptile of *Avena*
 - (4) Stem
121. Select **incorrect** statement for embryogenesis
- (1) Process of development of embryo from the zygote
 - (2) During embryogenesis zygote undergoes cell differentiation and mitosis
 - (3) Mitosis helps in increase of number of cells
 - (4) Cell differentiation helps the group of cells to undergo certain modifications to form tissues and organs
122. Find out the **incorrect** life spans of an organism
- (1) Dog – 20-30 years
 - (2) Crocodile – 60 years
 - (3) Horse – 40 years
 - (4) Banyan tree – 200-300 years
123. Endosperm is completely consumed by the developing embryos in
- (1) Pea and groundnut
 - (2) Maize and castor
 - (3) Castor and groundnut
 - (4) Maize and pea
124. Morgan gave the term linkage to describe
- (1) Generation of non-parental gene combinations
 - (2) Generation of new characters by mutation
 - (3) Crossing over between two chromosomes
 - (4) Physical association of genes on a chromosome

125. ABO blood group is controlled by _____ alleles and a total of _____ genotypes are possible

- (1) Three, four (2) Two, six
(3) Three, six (4) Two, four

126. Example of chromosomal disorder is/are

- a. Haemophilia b. Down's syndrome
c. Turner's syndrome d. Albinism
(1) Only (a) (2) Only (d)
(3) Both (a) & (d) (4) Both (b) & (c)



Mark A, B and C

- (1) A - Met, B - Anticodon, C - Codon
(2) A - Ser, B - Anticodon, C - Codon
(3) A - Ser, B - Codon, C - Anticodon
(4) A - Met, B - Codon, C - Anticodon

128. Some of the salient observations drawn from human genome project are given below. Choose the **incorrect** one for this.

- (1) The human genome contains 3164.7 million nucleotides
(2) Largest human gene is dystrophin
(3) Most of the genes are located on chromosome 1
(4) Repeated sequences shows a very limited distribution in human genome

129. Prabhani Kranti is a

- (1) Bacterial resistant, rice variety
(2) Fungal resistant, cowpea variety
(3) Viral resistant, bhindi variety
(4) Insect resistant, wheat variety

130. Explant used for producing healthy plants from diseased plant is obtained from

- (1) Anther (2) Protoplast
(3) Embryo (4) Meristem

131. Match the Column-I with Column-II

Column-I

(Pests)

- a. Aphids
b. Mosquitoes
c. Plant pathogens
d. Arthropods

Column-II

(Control)

- (i) *Trichoderma*
(ii) Lady bird
(iii) Dragon flies
(iv) Baculoviruses

- (1) a(iii), b(i), c(iv), d(ii)
(2) a(iii), b(iv), c(i), d(ii)
(3) a(ii), b(iii), c(i), d(iv)
(4) a(iii), b(i), c(ii), d(iv)

132. Select **incorrect** statement for competition

- (1) Totally unrelated species could also compete for the same resource
(2) Resources must be limiting for competition to occur
(3) Reduction in the fitness of one species as measured in terms of 'r' or intrinsic rate of increase due to presence of the another species
(4) Intraspecific competition is contest amongst individual of same species for one or more common resources

133. Pyramid of biomass in an aquatic ecosystem is

- (1) Upright
(2) Spindle shaped
(3) Inverted
(4) Urn shaped

134. Exploring molecular, genetic and species-level diversity for products of economic importance is

- (1) Bioprospecting
(2) Biofortification
(3) Biomagnification
(4) Biodiversification

135. Phenomenon in which there occurs radically acceleration in ageing process of a lake due to cultural practices by man is known as

- (1) Organic farming
(2) Accelerated eutrophication
(3) Biomagnification
(4) Eutrophication

136. Compare the animals illustrated in the figure given below and choose the **correct** option representing the character(s) common to both



- a. Diploblastic
 - b. Radially symmetrical
 - c. Tissue level of organisation
 - d. Intracellular and extracellular digestion
- (1) a and b only (2) a and c only
 (3) a, b and c only (4) a,b,c and d

137. Mark the **incorrect** option

- (1) Cyclostomes are devoid of scales and paired fins
- (2) Notochord is persistent throughout life in chondrichthyes
- (3) Cobras, vipers, garden lizards, frog and alligators shed their scales as skin cast
- (4) Air sacs connected to the lungs of parrots and pigeons supplement respiration

138. Which of the following is the secretion of a unicellular gland?

- (1) Saliva (2) Mucus
- (3) Sebum (4) Ear wax

139. Examine the figure given below



Which of the following is **incorrect** w.r.t. the tissue shown in the figure?

- (1) Resists compression
- (2) Solid and non-pliable
- (3) Cells are enclosed within lacunae
- (4) Present in the tip of nose and outer ear joints

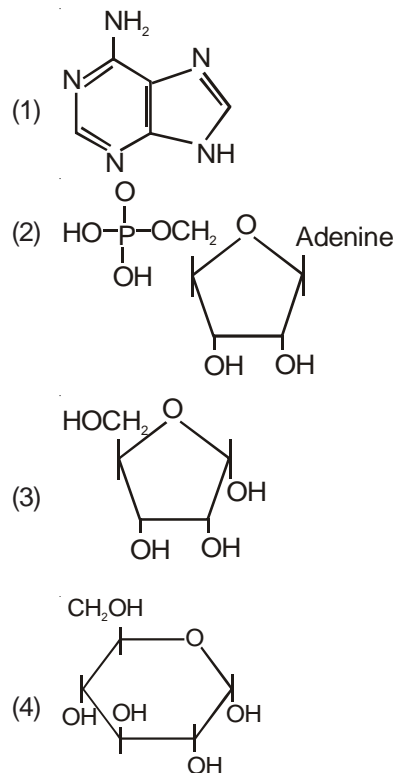
140. Mark the **mismatched** pair w.r.t. *Periplaneta*

- (1) Ommatidia in each eye - 2000
- (2) Egg in each ootheca - 14-16
- (3) Abdominal segments in male - 10
- (4) Abdominal segments in female - 9

141. Monoglycerides, diglycerides and triglycerides are also called fats and oils on the basis of

- (1) Boiling point
- (2) Melting point
- (3) Number of double bonds
- (4) Number of carbon atoms including the carboxyl carbon

142. Mark the odd one out w.r.t. molecular weight



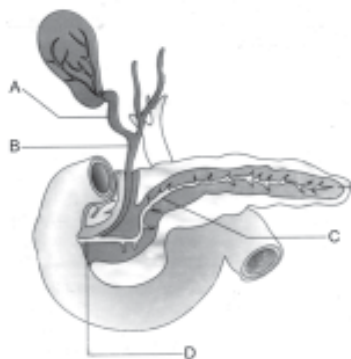
143. In nucleotide, the bond between the phosphate and hydroxyl group of sugar is

- (1) Ester bond (2) Hydrogen bond
- (3) Glycosidic bond (4) Peptide bond

144. Which of the following reactions is catalysed by a lyase enzyme?

- (1) $S_{(reduced)} + S'_{(oxidised)} \rightarrow S_{(oxidised)} + S'_{(reduced)}$
- (2) $S - G + S' \rightarrow S + S' - G$
- (3) $\begin{matrix} X & Y \\ | & | \\ C & - C \end{matrix} \rightarrow X - Y + C = C$
- (4) $S + G + ATP \rightarrow S - G + ADP + P_i$

145. Which of the following ducts is guarded by the sphincter of oddi?



- (1) A (2) B
(3) C (4) D

146. Some substances like fructose and some amino acids are absorbed with the help of carrier ions like Na^+ . This mechanism is called

- (1) Simple diffusion
(2) Passive transport
(3) Facilitated transport
(4) Both (1) & (2)

147. Which of the following best describes vital capacity?

- (1) The maximum volume of air a person can breathe in after normal expiration
(2) The maximum volume of air a person can breathe in after forced expiration
(3) The maximum volume of air a person can breathe out after normal inspiration
(4) Both (1) & (3)

148. Binding of oxygen with haemoglobin is primarily related to

- (1) Temperature
(2) Hydrogen ion concentration
(3) Partial pressure of O_2
(4) Partial pressure of CO_2

149. Which of the following are the most abundant white blood cells in the human body?

- (1) Basophils
(2) Neutrophils
(3) Monocyte
(4) Eosinophils

150. The heart muscle of a person is suddenly damaged by an inadequate blood supply. The person is suffering from

- (1) Heart attack
(2) Cardiac arrest
(3) Heart failure
(4) Congestive heart failure

151. Which of the following does **not** take place in the collecting duct of a nephron?

- (1) Conditional reabsorption of water
(2) Selective secretion of K^+ and H^+
(3) Passage of urea into the medullary interstitium
(4) Selective secretion of H^+ , K^+ and ammonia

152. On an average, _____ urea is excreted out per day

- (1) 18 - 38 mg (2) 18 - 38 g
(3) 25 - 30 mg (4) 25 - 30 g

153. Consider the following statements and choose the correct option from the choices given below

A : Actin and myosin filaments are arranged parallel to each other

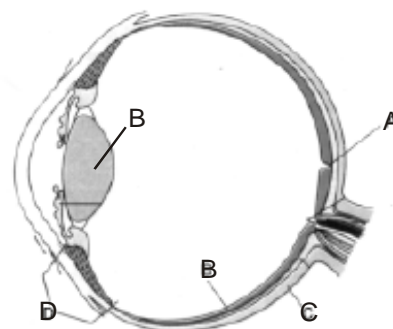
B : Actin and myosin filaments are arranged parallel to the longitudinal axis of the myofibrils

- (1) Only A is correct
(2) Only B is correct
(3) Both A and B are correct
(4) Both A and B are incorrect

154. Which of the following is an example of pivot joint?

- (1) Joint between adjacent carpals
(2) Joint between atlas and axis
(3) Joint between carpal and metacarpal of thumb
(4) Joint between humerus and pectoral girdle

155. Given below is a diagrammatic representation of the human eye



Mark the option which is correct w.r.t. the structures labelled A,B,C and D in the above figure

- (1) A - Thinned out portion of retina, dense packing of rods and cones, greatest visual acuity
- (2) B - Contains photoreceptor cells in its inner most layer
- (3) C - Composed of dense connective tissue, maintains the form and shape of the eyeball
- (4) D - Pigmented, opaque, visible coloured portion of the eye
156. Which of the following is **not** a property of all hormones?
- (1) Non-nutrient chemicals
- (2) Intercellular messengers
- (3) Fast and short-lived effects
- (4) Produced in trace amounts
157. Which of the following function (s) is/are performed by glucocorticoids?
- a. Suppression of an immune response
- b. Stimulation of RBC production
- c. Maintenance of cardiovascular functions
- d. Inhibition of cellular uptake and utilisation of amino acids
- (1) c only
- (2) a and c
- (3) a, c and d
- (4) a, b, c and d
158. The length of each testis is about _____ cm where as that of an ovary is _____ cm.
- (1) 2 – 4, 4 – 5
- (2) 4 – 5, 2 – 4
- (3) 4 – 5, 2 – 3
- (4) 2 – 3, 4 – 6
- 159 The term 'Birth Canal' refers to
- (1) Vagina
- (2) Cervical canal
- (3) Vagina and cervical canal
- (4) Vagina, cervical canal and uterine cavity
160. Given below are the different types of cells formed during spermatogenesis
- a. Spermatids
- b. Spermatozoa
- c. Spermatogonia
- d. Primary spermatocytes
- e. Secondary spermatocytes
- Choose the correct option which includes cells that have the same ploidy level
- (1) a and b (2) d and e
- (3) a, b and c (4) a, b, and e
161. The _____ forms a new membrane called zona pellucida surrounding it.
- (1) Ovum (2) Oogonium
- (3) Primary oocyte (4) Secondary oocyte
162. The limbs and external genital organs of the foetus are well developed by the end of
- (1) First month (2) Third month
- (3) Fifth month (4) Sixth month
163. The Government of India legalised MTP in
- (1) 1951 (2) 1961
- (3) 1971 (4) 1981
164. Which of the following venereal diseases is completely curable if detected early and treated properly?
- (1) Syphilis (2) Hepatitis-B
- (3) Genital herpes (4) AIDS
165. Which of the following represents homology?
- (1) Potato and sweet potato
- (2) Flippers of penguins and dolphins
- (3) Thorn of *Bougainvillea* and tendril of *Cucurbita*
- (4) Eye of Octopus and eye of mammals
166. All the following are the postulates of 'Darwinian Theory of Evolution' **except**
- (1) Evolution for Darwin was gradual and Darwinian variations and small and directional
- (2) Nature selects for fitness which is based on the characteristics which are inherited
- (3) Fitness is the end result of the ability to adapt and get selected by nature
- (4) Evolution is a stochastic process based on chance events in nature and chance mutation
167. The type of natural selection in which more individuals acquire value other than the mean character value is
- (1) Stabilising selection
- (2) Balancing selection
- (3) Directional selection
- (4) Disruptive selection

168. Which of the following does **not** hold true regarding the evolution of man?
- (1) *Australopithecines* lived in the East African grasslands two mya
 - (2) Fossils of *Homo erectus* were discovered in Java in 1891
 - (3) *Homo habilis* had a brain capacity of 900 cc whereas the Neanderthal man had a brain capacity of 1400 cc
 - (4) *Homo sapiens* arose during ice age (between 75000-10000 years ago)
169. A patient exhibits symptoms like fever, anaemia, muscular pain, internal bleeding and blockage of the intestinal passage. He is probably suffering from
- (1) Amoebiasis
 - (2) Ascariasis
 - (3) Filariasis
 - (4) Typhoid
170. Which of the following is **not** a component of innate immunity?
- (1) Monocytes
 - (2) Neutrophils
 - (3) Plasma cells
 - (4) Natural Killer cells
171. The immune response carried out by the action of antibodies is called humoral immune response because
- (1) Antibodies are produced by T-lymphocytes
 - (2) Production of antibodies by B-lymphocytes is stimulated by T-lymphocytes
 - (3) Antibodies are found in blood
 - (4) Each antibody has four peptide chains
172. Which immunity is responsible for the graft rejection?
- (1) Innate immunity
 - (2) Auto-immunity
 - (3) Antibody - Mediated immunity
 - (4) Cell-Mediated immunity
173. The secondary lymphoid organs provide the sites for
- (1) Origin, maturation and proliferation of lymphocytes
 - (2) Differentiation of immature cells into antigen sensitive lymphocytes
 - (3) Proliferation of cells to form effector cells
 - (4) Both (2) & (3)
174. *Hisardale* is a new breed of sheep developed in Punjab by crossing Bikaneri ewes and Marino rams. The approach used is
- (1) Inbreeding
 - (2) Out-crossing
 - (3) Cross-breeding
 - (4) Interspecific hybridisation
175. In MOET (Multiple Ovulation Embryo Transfer Technology), the fertilised eggs at _____ cells stage are recovered non-surgically and transferred to surrogate mothers
- (1) 6 – 8
 - (2) 8 – 16
 - (3) 16 – 32
 - (4) 8 – 32
176. The first restriction endonuclease whose functioning depended on a specific DNA nucleotide sequence was
- (1) *Eco* RI
 - (2) *Sal* I
 - (3) *Pvu* I
 - (4) *Hind* II
177. If a foreign DNA is ligated at the *Bam* HI site of *E. coli* cloning vector pBR322,
- (1) Recombinants will grow in ampicillin containing medium
 - (2) Recombinant will grow in tetrocyclyne containing medium
 - (3) Non-recombinants will grow on the medium containing both ampicillin and tetracycline antibiotics
 - (4) Both (1) & (3)
178. The stirrer used in a simple stirred tank bioreactor facilitates
- (1) Regulation of agitator system and foam control system
 - (2) Even mixing and oxygen availability throughout the bioreactor
 - (3) Provision of optimum growth conditions
 - (4) Sparging of sterile air bubbles
179. From the statements given below, how many are correct w.r.t. Bt toxin?
- a. The toxic protein crystals are formed throughout the life span of *Bacillus thuringiensis*
 - b. Bt toxin protein exists as protoxin which is converted into active form due to the alkaline pH of the gut

- c. The activated toxin binds to the surface of hindgut epithelial cells, creates pores that cause cell swelling and lysis
- d. Most Bt toxins are insect group specific so the choice of genes depends upon the crop and targeted pest

- (1) 1 (2) 2
(3) 3 (4) 4

180. Mark the **correct** option

- (1) 90 percent of all existing transgenic animals are transgenic mice
- (2) The milk obtained from Rosie contains α -1 antitrypsin
- (3) At present, about 30 recombinant therapeutics have been approved for human use all over the world
- (4) Humulin was first synthesised in 1973 by Eli Lilly, an American company

