

All India Aakash Test Series for Medical - 2021

TEST - 7 (Code-C)

Test Date : 08/03/2020

ANSWERS

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

HINTS & SOLUTIONS

[PHYSICS]

1. Answer (3)

Hint & Sol.: Strong nuclear force mediated by the 'π-meson' particle.

2. Answer (2)

Hint: Use dimensional analysis

Sol.: $ML^{-1}T^{-2} = (T)^a(LT^{-1})^b(MLT^{-1})^c$

$$ML^{-1}T^{-2} = M^cL^{b+c}T^{a-b-c}$$

$$c = 1$$

$$b + c = -1$$

$$b = -2$$

$$a - b - c = -2$$

$$a + 2 - 1 = -2$$

$$a = -3$$

Dimensional formula of bulk modulus = $[T^{-3}V^{-2}P]$

3. Answer (4)

Hint & Sol.: Surface tension = $\frac{\text{Force}}{\text{Length}}$

Dimension of force = MLT^{-2}

Dimension of surface tension = ML^0T^{-2}

4. Answer (4)

Hint: $v = \frac{dx}{dt}$

Sol.: $x = \frac{1}{(t+2)^{-3/2}}$

$$x = (t+2)^{3/2}$$

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

$$v = \frac{3}{2}(t+2)^{1/2}$$

$$(t+2)^{1/2} = x^{2/3}$$

$$v = \frac{3}{2}x^{1/3}$$

$$v \propto x^{1/3}$$

5. Answer (1)

Hint: Use $s = ut + \frac{1}{2}at^2$

Sol.: $x = \frac{1}{2}a\left(\frac{t}{3}\right)^2$

$$x = \frac{1}{2}a\frac{t^2}{9}$$

$$y_1 = \frac{1}{2}at^2$$

$$y = y_1 - x$$

$$y = \frac{1}{2}at^2 - \frac{1}{2}a\frac{t^2}{9}$$

$$= \frac{1}{2}a\frac{t^2}{9}(9-1)$$

$$y = 8x$$

6. Answer (2)

Hint: Horizontal component of velocity remains constant.

Sol.: $v\cos 45^\circ = u\cos 60^\circ$

$$\Rightarrow v\frac{1}{\sqrt{2}} = 20 \times \frac{1}{2}$$

$$\Rightarrow v = 10\sqrt{2} \text{ m/s}$$

7. Answer (1)

Hint: River boat problem

Drift = $V_{RG} \times t_c$

Sol.: $t_c = \frac{1}{5} \text{ h}$

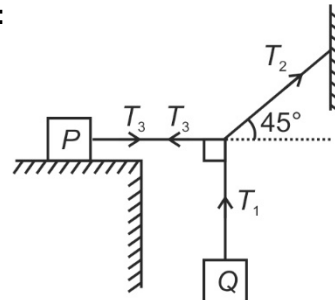
$$\text{Drift} = 4 \times \frac{1}{5} = \frac{4}{5} \text{ km}$$

$$= \frac{4}{5} \times 1000 = 800 \text{ m}$$

8. Answer (2)

Hint: For translational equilibrium $F_{\text{net}} = 0$

Sol.:



$$T_2 \sin 45^\circ = m_Q g$$

$$T_2 \cos 45^\circ \leq \mu m_P g$$

$$m_Q g \cot 45^\circ \leq \mu m_P g$$

$$m_Q \leq \mu m_P$$

$$m_Q \leq 0.4 \times 10$$

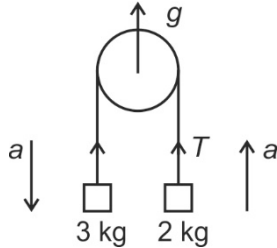
Maximum mass of Q

$$m_Q = 4 \text{ kg}$$

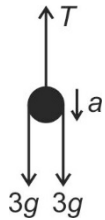
9. Answer (1)

Hint: Assuming observer on pulley, apply $F_{\text{net}} = ma$

Sol.:

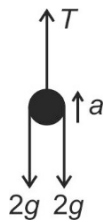


F.B.D of 3 kg



$$6g - T = 3a \quad \dots(1)$$

F.B.D. of 2 kg



$$T - 4g = 2a \quad \dots(2)$$

From (1) and (2)

$$6g - 4g = 5a$$

$$a = \frac{2g}{5}$$

10. Answer (3)

Hint: $F_c = \frac{Mv^2}{R}$

Sol.: $M = 250 \text{ kg}$

$$v = 54 \times \frac{5}{18} \text{ m/s}$$

$$= 15 \text{ m/s}$$

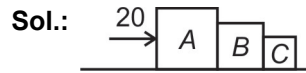
$$R = 25 \text{ m}$$

$$F_c = \frac{250 \times (15)^2}{25}$$

$$F_c = 2250 \text{ N}$$

11. Answer (1)

Hint: $F_{\text{net}} = ma$



$$F = ma$$

$$20 = 10a$$

$$a = 2 \text{ m/s}^2$$

$$N_{BC} = 2 \times 2 = 4 \text{ N}$$

$$N_{AB} - N_{BC} = 3 \times 2$$

$$N_{AB} = 10 \text{ N}$$

$$\frac{N_{AB}}{N_{BC}} = \frac{10}{4} = \frac{5}{2}$$

12. Answer (3)

Hint: $W = \int_{x_1}^{x_2} F dx$

Sol.: $k_1 = \frac{1}{2}mv^2$

$$= \frac{1}{2} \times 4 \times (4)^2 = 32 \text{ J}$$

$$W = \int_2^4 -2x dx$$

$$= 4 - 16 = -12 \text{ J}$$

Now, $W = \Delta K$

$$K_f - K_i = -12$$

$$K_f = 32 - 12 = 20 \text{ J}$$

13. Answer (2)

Hint: Apply conservation of kinetic energy.

Sol.: $\frac{1}{2}mv^2 = \frac{1}{2}mv_1^2 + \frac{1}{2}mv_2^2$

$$v^2 = \frac{v_1^2}{4} + v_2^2$$

$$\Rightarrow v_2 = \frac{\sqrt{3}v}{2}$$

14. Answer (4)

Hint & Sol.: $\vec{a} = k\vec{b} + \vec{c}$

$$\vec{a} \cdot \vec{b} = k\vec{b} \cdot \vec{b} + \vec{c} \cdot \vec{b}$$

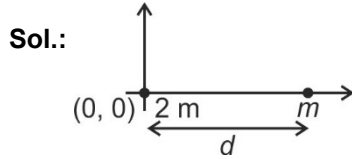
take dot product from \vec{b}

$$kb^2 = \vec{a} \cdot \vec{b} - \vec{c} \cdot \vec{b}$$

$$k = \frac{\vec{a} \cdot \vec{b} - \vec{b} \cdot \vec{c}}{b^2}$$

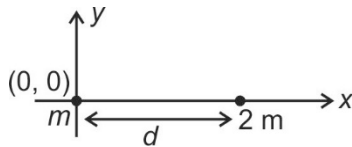
15. Answer (1)

Hint: $x_{cm} = \frac{m_1 \bar{x}_1 + m_2 \bar{x}_2}{m_1 + m_2}$



$$x_{cm_1} = \frac{2mx_0 + md}{m + 2m}$$

$$x_{cm_1} = \frac{d}{3}$$



$$x_{cm_2} = \frac{mx_0 + 2md}{m + 2m}$$

$$x_{cm_2} = \frac{2d}{3}$$

$$\Delta x = x_{cm_2} - x_{cm_1}$$

$$\Delta x = \frac{2d}{3} - \frac{d}{3} = \frac{d}{3}$$

16. Answer (2)

Hint: $a = \frac{g \sin \theta}{1 + \gamma}$ and $t = \sqrt{\frac{2s}{a}}$, $\gamma = \frac{I_{cm}}{mR^2}$

Sol.: $a_r = \frac{g \sin \theta}{1 + 1}$

$$a_r = \frac{g \sin \theta}{2}$$

$$a_d = \frac{g \sin \theta}{1 + \frac{1}{2}}$$

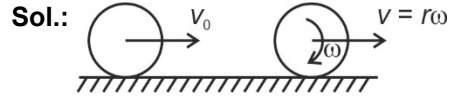
$$a_d = \frac{2g \sin \theta}{3}$$

$$\frac{t_r}{t_d} = \sqrt{\frac{a_d}{a_r}}$$

$$= \sqrt{\frac{\frac{2g \sin \theta}{3}}{\frac{g \sin \theta}{2}}} = \frac{2}{\sqrt{3}}$$

17. Answer (3)

Hint: Conservation of angular momentum about a point on horizontal surface.



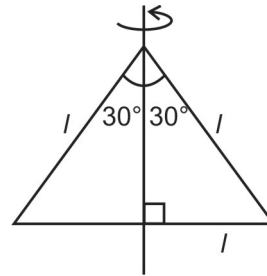
$$L_i = L_f$$

$$mv_0 r = mvr + \frac{2}{3}mr^2 \left(\frac{v}{r}\right)$$

$$v = \frac{3v_0}{5}$$

18. Answer (4)

Hint:



Sol.: $I = \frac{MI^2}{3} \sin^2 30^\circ + \frac{MI^2}{3} \sin^2 30^\circ + \frac{MI^2}{12}$

$$I = \frac{MI^2}{12} + \frac{MI^2}{12} + \frac{MI^2}{12}$$

$$I = \frac{MI^2}{4}$$

19. Answer (3)

Hint: $P = \frac{W}{t}$

Sol.: $30 = \frac{W}{30}$

$$W = 900 \text{ J}$$

$$W = \Delta K$$

$$\frac{1}{2}I\omega^2 = 900$$

$$\frac{1}{4\pi^2}\omega^2 = 900$$

$$\omega^2 = 3600\pi^2$$

$$\omega = 60\pi \text{ rad/s}$$

20. Answer (3)

Hint: $v_{\max} = A\omega$

Sol.: $\omega = \frac{v_{\max}}{A}$

$$= \frac{0.5}{5 \times 10^{-2}}$$

$$\omega = \frac{5 \times 10^{-1}}{5 \times 10^{-2}}$$

$$\omega = 10 \text{ rad/s}$$

$$T = \frac{2\pi}{\omega}$$

$$T = \frac{\pi}{5} \text{ s}$$

21. Answer (2)

Hint: $f = \frac{1}{2\pi} \sqrt{\frac{g}{l}}$

Sol.: $f_0 = \frac{1}{2\pi} \sqrt{\frac{g}{l}}$

$$\frac{f_0}{2} = \frac{1}{2\pi} \sqrt{\frac{g-a}{l}}$$

$$2 = \sqrt{\frac{g}{g-a}}$$

$$4g - 4a = g \Rightarrow a = \frac{3g}{4}$$

22. Answer (3)

Hint & Sol.: $x = 2x_0 \cos 3\omega t$

Equation is simple harmonic with amplitude $2x_0$ and time period $T = \left(\frac{2\pi}{3\omega}\right)$

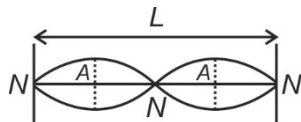
23. Answer (4)

Hint & Sol.: In longitudinal wave the density is higher corresponding to compression.

24. Answer (1)

Hint: If sonometer wire vibrate in first overtone then two loop will be formed

Sol.:



$$L = \frac{\lambda}{2} + \frac{\lambda}{2}$$

$$\lambda = L$$

Anti node will be formed at $\frac{\lambda}{4} = \frac{L}{4}$

and at $\frac{3\lambda}{4} = \frac{3L}{4}$

25. Answer (2)

Hint: Phase difference $\Delta\phi = \frac{2\pi}{\lambda} \times \text{path difference}$.

Sol.: $v = f\lambda \Rightarrow \lambda = \frac{v}{f} = v \times T$

$$= 300 \times 0.04 = 12 \text{ m}$$

$$\Delta\phi = \frac{2\pi}{12} \times 20 = \frac{10\pi}{3}$$

$$\Delta\phi = \frac{10\pi}{3}$$

26. Answer (1)

Hint: $f = f_0 \left(\frac{v \pm v_0}{v \pm v_s}\right)$

Sol.: $f = f_0 \left(\frac{v + v_A}{v}\right)$

$$5 = 4 \left(\frac{v + v_A}{v}\right)$$

$$\frac{5}{4} = \left(\frac{v + v_A}{v}\right)$$

$$\frac{v_A}{v} = \frac{1}{4}$$

$$\frac{9}{2} = 4 \left(\frac{v + v_B}{v}\right)$$

$$\frac{9}{8} = \left(\frac{v + v_B}{v}\right)$$

$$\frac{1}{8} = \frac{v_B}{v}$$

$$\frac{v_A}{v_B} = 2$$

27. Answer (1)

Hint & Sol.: $L = 10 \log_{10} \frac{I}{I_0}$

$$L = 10 \log_{10} \frac{10^{-10}}{10^{-12}}$$

$$L = 20 \text{ dB}$$

28. Answer (4)

Hint: $E = -\frac{GMm}{2r}$

$$U = -\frac{GMm}{r}$$

Sol.: $\frac{U}{E} = \frac{-\frac{GMm}{r}}{-\frac{GMm}{2r}}$

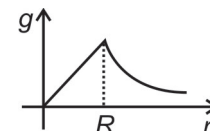
$$\frac{U}{E} = 2$$

29. Answer (2)

Hint & Sol.: for $r < R_e$
 $g \propto r$

For $r \geq R_e$

$$g \propto \frac{1}{r^2}$$



30. Answer (3)

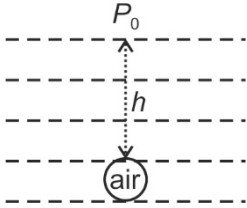
Hint & Sol.: If the gravitational force suddenly disappears the satellite will move with velocity ' v_0 ' tangential to the original orbit.

31. Answer (2)

Hint: Excess pressure inside a bubble in liquid

$$= \frac{2T}{R}$$

Sol.:



$$P_{\text{inside bubble}} = P_0 + \rho gh + \frac{2T}{R}$$

32. Answer (2)

Hint: Use Bernoulli's equation

$$\text{Sol.} \quad P_0 + \frac{1}{2}\rho v_0^2 = \frac{3P_0}{2} + \frac{1}{2}\rho v^2$$

$$\frac{1}{2}\rho v^2 = \frac{1}{2}\rho v_0^2 - \frac{P_0}{2}$$

$$v = \sqrt{v_0^2 - \frac{P_0}{\rho}}$$

33. Answer (4)

Hint & Sol.: According to Stoke's law

$$F_0 = 6\pi\eta r v_0$$

$$r = \frac{F_0}{6\pi\eta v_0}$$

34. Answer (3)

$$\text{Hint:} \quad \frac{\Delta l}{l} = \frac{F}{YA}$$

Sol.: In horizontal position tension in the wire will be $3mg$ in critical looping.

$$\frac{\Delta l}{l} = \frac{3mg}{YA}$$

35. Answer (4)

Hint & Sol.: Poisson's ratio of the rod is 0.50 therefore fractional change in volume will be zero.

36. Answer (2)

$$\text{Hint:} \quad \frac{dQ}{dt} = KA \frac{dT}{dx}$$

$$\text{Sol.} \quad Q = KA \frac{\Delta T}{\Delta x} \times t$$

$$Q_1 = 4KA \frac{\Delta T}{\Delta x} t$$

$$Q_1 = 4Q$$

37. Answer (1)

Hint & Sol.: The surface temperature of the star is determined by using Wein's displacement law.

38. Answer (3)

Hint: Use principle of calorimetry.

Sol.: Heat supplied by steam if it was totally condense into water at 100°C .

$$Q_1 = mL_v$$

$$= 5 \times 540 = 2700 \text{ Cal}$$

Heat required to convert total ice into water at 100°C

$$Q_2 = mL_f + mS\Delta t$$

$$= 5 \times 80 + 5 \times 1 \times 100$$

$$= 400 + 500$$

$$= 900 \text{ Cal}$$

$Q_1 > Q_2$ therefore total steam will not condense

Let m is mass of steam condense into water at 100°C

$$mL_v = 5 \times 80 + 5 \times 1 \times 100$$

$$m = \frac{900}{540} = \frac{10}{6} = \frac{5}{3} \text{ g}$$

$$\text{Total mass of water} = 5 \text{ g} + \frac{5}{3} \text{ g} = \frac{20}{3} \text{ g}$$

39. Answer (4)

$$\text{Hint:} \quad c = \frac{R}{\gamma - 1} + \frac{R}{1 - n}$$

Sol.: $VT^{-2/3} = \text{constant}$

$$PV = nRT$$

$$V(PV)^{-2/3} = \text{constant}$$

$$P \cdot V^{-1/2} = \text{constant}$$

$$n = -\frac{1}{2}$$

$$\Rightarrow C = C_v + \frac{R}{-n+1}$$

$$\Rightarrow C = \frac{5R}{2} + \frac{R}{\left(\frac{1}{2}+1\right)}$$

$$\Rightarrow C = \frac{5R}{2} + \frac{2R}{3}$$

$$\Rightarrow C = \frac{19R}{6}$$

40. Answer (4)

$$\text{Hint: } \Delta U = \frac{nR\Delta T}{\gamma - 1}$$

$$\text{Sol.: } \gamma = \frac{7}{5}$$

$$T_A = \frac{P_0 V_0}{2R}$$

$$T_B = \frac{6P_0 V_0}{2R}$$

$$\Delta T = \frac{5P_0 V_0}{2R}$$

$$\Delta U = \frac{2R \times 5P_0 V_0}{\left(\frac{7}{5} - 1\right) 2R}$$

$$\Delta U = \frac{25P_0 V_0}{2}$$

41. Answer (3)

$$\text{Hint: } \beta = \frac{1 - \eta}{\eta}$$

$$\text{Sol.: } \beta = \frac{1 - \frac{4}{10}}{\frac{4}{10}} \Rightarrow \beta = \frac{3}{2}$$

42. Answer (1)

$$\text{Hint: } Q = \Delta U + W$$

$$\text{Sol.: } Q_1 = \Delta U_1 + W_1$$

$$120 = \Delta U_1 + 40$$

$$\Delta U_1 = 80 \text{ J}$$

$$Q_2 = \Delta U_2 + W_2$$

$$Q_2 = -\Delta U_1 + W_2$$

$$-50 = -80 + W_2$$

$$W_2 = 30 \text{ J}$$

43. Answer (2)

$$\text{Hint & Sol.: } n_1 = n_2$$

$$\frac{m_1}{M_1} = \frac{m_2}{M_2}$$

$$\frac{56}{28} = \frac{x}{4}$$

$$x = 8$$

44. Answer (2)

$$\text{Hint & Sol.: } PV = nRT$$

$$P = \frac{nRT}{V}$$

$$\text{Slope } m = \frac{nR}{V}$$

$$m_2 > m_1$$

$$V_2 < V_1 \text{ or } V_1 > V_2$$

45. Answer (1)

$$\text{Hint & Sol.: } F_c = \frac{mv^2}{r_1}$$

$$\left(\frac{v_1}{v_2}\right)^2 = \left(\frac{r_1}{r_2}\right)$$

$$\frac{v_1}{v_2} = \sqrt{\frac{r_1}{r_2}} = \frac{2}{3}$$

[CHEMISTRY]

46. Answer (3)

$$\text{Hint: Mole of urea} = \frac{\text{Mass of urea in g}}{\text{Molar mass of urea}}$$

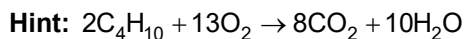
$$\text{Sol.: Mole of urea} = \frac{60}{60} = 1$$

$$\text{Mole of atoms} = 1 \times 8$$

$$\text{Number of atoms} = 8 \times 6.02 \times 10^{23}$$

$$= 4.8 \times 10^{24}$$

47. Answer (2)



$$\text{Sol.: Mole of butane} = \frac{5.8 \times 10^3}{58} = 10^2$$

$$\text{Mole of } O_2 \text{ required} = \frac{13}{2} \times 10^2$$

Volume of O_2 required at STP is

$$= \frac{13}{2} \times 10^2 \times 22.4 \text{ L}$$

$$= 14.56 \times 10^3 \text{ L}$$

48. Answer (4)

$$\text{Hint: Mg : } 1s^2 2s^2 2p^6 3s^2$$

Sol.: For s orbital and for one p orbital, the value of m is zero.

\therefore Maximum number of electrons with $m = 0$ and

$$s = \frac{1}{2} \text{ is } 4.$$

49. Answer (2)

$$\text{Hint: } \frac{1}{\lambda} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \times Z^2$$

$$\text{Sol.: } \frac{1}{\lambda} = R_H \left(\frac{1}{1^2} - \frac{1}{4^2} \right) \times (2)^2$$

$$\text{or, } \frac{1}{\lambda} = R_H \times \frac{15}{16} \times 4$$

$$\text{or, } \lambda = \frac{4}{15 R_H}$$

50. Answer (3)

$$\text{Hint: } \lambda = \frac{h}{mv}$$

$$\text{Sol.: } \lambda = \frac{6.6 \times 10^{-34}}{10 \times 10^{-6} \times 400} = 1.65 \times 10^{-31} \text{ m}$$

51. Answer (3)

Hint: 100 g of enzyme contains 0.02 g of Zn^{2+}

Sol.: 13.1 g of enzyme contains

$$\frac{0.02}{100} \times 13.1 \text{ g of } \text{Zn}^{2+}$$

$$\text{Mole of } \text{Zn}^{2+} = \frac{0.02 \times 13.1}{100 \times 65.5} = 4 \times 10^{-5}$$

$$\begin{aligned} \text{Number of } \text{Zn}^{2+} \text{ ions} &= 4 \times 10^{-5} \times 6.02 \times 10^{23} \\ &= 24.08 \times 10^{18} \\ &= 2.4 \times 10^{19} \end{aligned}$$

52. Answer (2)

Hint: Element having half filled subshells is difficult to ionise.

Sol.: Along the period effective nuclear charge increases hence ionization potential increases. In nitrogen, p subshell is half filled. Hence, it is highly stable. As a result the ionisation potential of nitrogen is more than that of oxygen. Therefore, the correct order of ionisation potential is ($F > N > O > C$).

53. Answer (3)

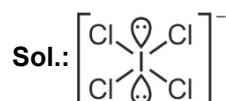
Hint: O_2 is not a green house gas.

54. Answer (3)

Hint: Oxides of alkaline earth metals are basic in nature (except BeO).

55. Answer (2)

Hint: It has octahedral electronic arrangement around central atom.



Hybridization : sp^3d^2

Shape : Square planar

56. Answer (2)

$$\text{Hint: Bond order} = \frac{\text{Number of } \sigma \text{ bonds} + \text{Number of } \pi \text{ bonds}}{\text{Number of } \sigma \text{ bonds}}$$

$$\text{Sol.: Bond order} = \frac{6}{4} = 1.5$$

57. Answer (4)

Hint: The species having unpaired electrons are paramagnetic in nature.

Sol.: B_2 & O_2 contain unpaired electrons in their respective molecular orbitals.

58. Answer (3)

Hint: Compounds which form intermolecular hydrogen bond with water are soluble in water.

Sol.: Hexane is insoluble in water as it is non-polar molecule.

59. Answer (3)

$$\text{Hint: Density (d)} = \frac{PM}{RT}$$

Sol.: At constant temperature and pressure, $d \propto M$.

$$\frac{d_{\text{H}_2}}{d_{\text{CH}_4}} = \frac{M_{\text{H}_2}}{M_{\text{CH}_4}} = \frac{2}{16} = \frac{1}{8}$$

60. Answer (2)

Hint: Higher the polarity in the molecule easier it is to liquify.

Sol.: NH_3 is most polar among the given compounds hence its critical temperature will be high and it is most easily liquified.

61. Answer (1)

Hint: At high pressure, $\left(\frac{a}{V^2} \right)$ term is negligible w.r.t. P for van der Waals gas equation.

Sol.: van der Waals equation for one mole of gas.

$$\left(P + \frac{a}{V^2} \right) (V - b) = RT$$

$$\text{At high pressure, } \left(\frac{a}{V^2} \right) = 0.$$

$$P(V - b) = RT$$

$$\text{or, } PV - Pb = RT$$

$$\text{or, } \left(\frac{PV}{RT} \right) = \left(1 + \frac{Pb}{RT} \right) = Z$$

62. Answer (3)

$$\text{Hint: } w = -2.303 n RT \log \frac{V_f}{V_i}$$

$$\begin{aligned}\text{Sol.: } w &= -2.303 \times 3RT \log \frac{100}{10} \\ &= -6.909 \times 300R \log 10 \\ &= -2.07 \times 10^3 R\end{aligned}$$

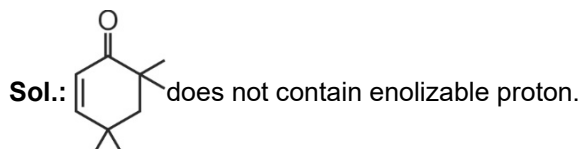
63. Answer (2)

Hint: The property which is independent of quantity of matter is called intensive.

Sol.: Pressure is an intensive property.

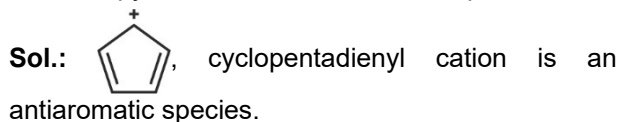
64. Answer (4)

Hint: The compound which does not contain enolizable proton will not show keto-enol tautomerism.



65. Answer (3)

Hint: Tropylium cation is an aromatic species.



Correct order of stability is (i) > (iii) > (ii).

66. Answer (3)

Hint: Percentage s character in hybrid orbital of carbon of acetylene is highest among the given hydrocarbons.

Sol.: Higher the percentage s character in the hybrid orbital of hydrocarbon higher is the acidity of hydrocarbon.

67. Answer (3)

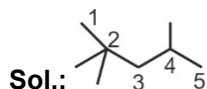
Hint: No α -hydrogen is present in $(\text{CH}_3)_3\text{CCH}_2^+$.

68. Answer (3)

Hint: Graphite is thermodynamically most stable allotrope of carbon.

69. Answer (2)

Hint: Numbering of carbon chain is done applying lowest locant rule.



2,2,4-trimethylpentane

70. Answer (1)

Hint: If molecular weight is same then the molecule with bigger surface area will have higher boiling point.

Sol.: Unbranched alkane has higher surface area hence van der Waals force of attraction is high.

71. Answer (3)

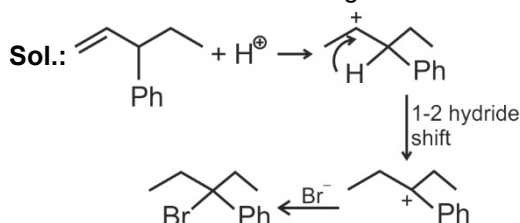
Hint: The species which does not contain vacant orbital will not act as an electrophile.

72. Answer (4)

Hint: Electron donating group present on the benzene ring increases the rate of electrophilic substitution reaction at o/p position.

73. Answer (4)

Hint: Carbonium ion rearrangement occurs.



74. Answer (1)

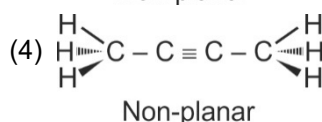
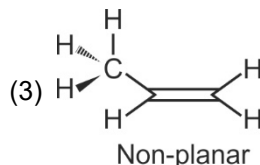
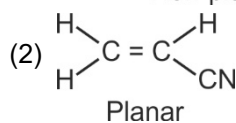
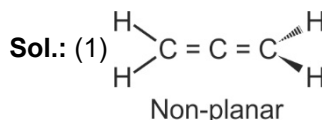
Hint: Most stable alkene will have lowest heat of hydrogenation.

75. Answer (3)

Hint: Alkene and alkynes decolourise Br_2/water .

76. Answer (2)

Hint: Allenes are three dimensional in shape.



77. Answer (2)

$$\text{Hint: } \% \text{ of N} = \frac{1.4 \times \text{meq. of NH}_3}{\text{mass of compound}}$$

$$\begin{aligned}\text{Sol.: meq of H}_2\text{SO}_4 &= \text{meq of NH}_3 \\ &= 10 \times 0.5 \times 2 = 10 \text{ meq}\end{aligned}$$

$$\% \text{ of nitrogen} = \frac{1.4 \times 10}{1} = 14\%$$

78. Answer (3)

Hint: Sodium nitroprusside test.

Sol.: $[\text{Fe}(\text{CN})_5\text{NOS}]^{4-}$ is violet in colour.

79. Answer (3)

Hint: Excess nitrate in drinking water causes methemoglobinemia (blue baby syndrome).

80. Answer (4)

Hint: For BeSO_4 , hydration enthalpy of Be^{2+} is high due to small size of ion.

Sol.: Down the group, the solubility of sulphates of alkaline earth metals decreases.

81. Answer (3)

Hint: Due to inert pair effect, +1 oxidation state is most preferred in Tl.

82. Answer (3)

Hint: KI provides I^- as common ion.

Sol.: $\text{AgI}(s) \rightleftharpoons \text{Ag}^+(aq) + \text{I}^-(aq)$
(s) (s+0.2)

$$[\text{Ag}^+][\text{I}^-] = K_{sp}$$

$$s(s + 0.2) = 8 \times 10^{-17}$$

$$\therefore s \ll 0.2, \therefore s + 0.2 \approx 0.2$$

$$\text{we get, } s \times 0.2 = 8 \times 10^{-17}$$

$$\therefore s = \frac{8 \times 10^{-17}}{0.2} = 4 \times 10^{-16}$$

83. Answer (2)

Hint: $M_1V_1 - M_2V_2 = M_3V_3$

Sol.: mmol of OH^- derived from $\text{Ba}(\text{OH})_2$
 $= 100 \times 0.2 \times 2 = 40$

mmol of OH^- unreacted
 $= 40 - (100 \times 0.2) = 20$

Let molarity of OH^- in resultant solution be M

$$20 = (100 + 100)M$$

$$M = \frac{20}{200} = 0.1 \text{ M} = [\text{OH}^-]$$

$$\text{pOH} = 1$$

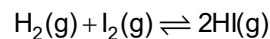
$$\text{pH} = 14 - 1 = 13$$

84. Answer (4)

Hint: For gaseous reaction, $K_p = K_c(RT)^{\Delta n_g}$

Sol.: If $\Delta n_g = 0$, then $K_p = K_c$

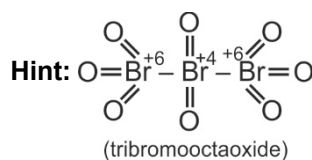
for the equilibrium reaction



$$\Delta n_g = 0$$

$$\therefore K_p = K_c$$

85. Answer (2)



86. Answer (4)

Hint: $\text{Cr}_2\text{O}_7^{2-}(aq) + 3\text{SO}_3^{2-}(aq) + 8\text{H}^+(aq) \rightarrow$



87. Answer (2)

Hint: The species having vacant orbital can act as Lewis acid.

88. Answer (3)

Hint: Volume strength of $\text{H}_2\text{O}_2 = 11.2 \times M$

$$\text{Sol.} \quad M = \frac{16.8}{11.2} = 1.5$$

89. Answer (1)

Hint: ($\text{CO} + \text{H}_2$) mixture is called synthesis gas or water gas.

90. Answer (1)

Hint: Higher is the lattice energy, higher will be the melting point.

[BIOLOGY]

91. Answer (2)

Hint: Consciousness is defining property of living organisms.

Sol.: Human being is the only organism who is aware of himself *i.e.*, has self-consciousness.

92. Answer (2)

Hint: Different kinds of organisms are referred to as biodiversity of the earth.

Sol.: Biodiversity is the number and various kinds of organisms found on earth. It stands for the variability found among living organisms inhabiting this world.

93. Answer (1)

Hint: Rules of scientific naming of animals is assigned in ICZN.

Sol.: Animals do not have the capacity to convert glucose into starch. This conversion occurs in plants.

94. Answer (3)
Hint: Collections of preserved plants and animals are used for study and reference in educational institutes.
Sol.: Museums have collection of preserved plant and animal specimens.
95. Answer (4)
Hint: Unicellular organisms may be both prokaryotes and eukaryotes.
Sol.: In three-domain system of classification, first two domains are for prokaryotes and the third domain is for eukaryotes.
96. Answer (1)
Hint: In five-kingdom classification system, prokaryotes are placed in kingdom Monera.
Sol.: *Euglena*, *Amoeba* and *Plasmodium* are eukaryotes whereas *Mycoplasma* is prokaryote.
97. Answer (4)
Hint: Sexual stage is not found in the members of Deuteromycetes.
Sol.: *Albugo* is parasite on mustard. *Ustilago* belongs to Basidiomycetes in which basidium is formed.
Neurospora belongs to Ascomycetes.
98. Answer (3)
Hint: BSE is caused by prions.
Sol.: Prions are proteinaceous infectious particles.
99. Answer (1)
Hint: Carrageen is obtained from red algae.
Sol.: Algin and carrageen are hydrocolloids obtained from brown and red algae respectively.
100. Answer (2)
Hint: Gametes are non-motile in *Spirogyra*.
Sol.: *Spirogyra* and the members of class Rhodophyceae do not form motile gametes.
101. Answer (3)
Hint: Bryophytes, pteridophytes and gymnosperms are archegoniates.
Sol.: Female sex organ in *Chara* is called nucule or oogonium.
102. Answer (4)
Sol.: Coralloid roots are associated with nitrogen fixing cyanobacteria.
103. Answer (2)
Hint: Pneumatophores are respiratory roots in some plants growing in swampy areas.
Sol.: Pneumatophores grow vertically upward to get oxygen for respiration.
104. Answer (2)
Hint: Thorns and spines are analogous structures.
Sol.: Thorns are modified axillary buds whereas spines are modified leaves. Both are the structures for self defence.
105. Answer (3)
Hint: Petioles are cylindrical structures.
Sol.: Petiole joins the leaf base with the leaf blade.
106. Answer (1)
Hint: Number in brackets represents united condition *i.e.* gamosepalous or gamopetalous.
Sol.: Floral formula does not tell about the aestivation of the sepals or petals.
107. Answer (4)
Hint: Chlorenchyma performs photosynthesis but does not provide mechanical support to the plant organs.
Sol.: Corners of collenchyma cells are thickened with cellulose, hemicellulose and pectin.
108. Answer (2)
Hint: A mature sieve tube element possesses a peripheral cytoplasm.
Sol.: At maturity, tracheids and vessels are dead cells, hence devoid of protoplasm.
109. Answer (1)
Hint: Bulliform cells help in the rolling of leaves during drought.
Sol.: Stomata regulate the process of transpiration and gaseous exchange.
110. Answer (4)
Hint: Heartwood does not conduct water as their xylary elements are blocked.
Sol.: Heartwood and sapwood are formed as a result of secondary growth.
111. Answer (3)
Hint: Endoplasmic reticulum is found in eukaryotes.
Sol.: RER are attached with 60S subunits of 80S ribosomes.
112. Answer (1)
Hint: Several ribosomes may attach to a single mRNA and form a chain called polysome.
Sol.: The ribosomes of a polysome translate the mRNA into proteins.
113. Answer (1)
Hint: Leucoplasts are colourless plastids.
Sol.: Elaioplasts store fats and oils, amyloplasts store starch and aleuoplasts store proteins.

114. Answer (2)

Hint: Na⁺/K⁺ pump is energy dependent.

Sol.: Na⁺/K⁺ pump in cells is an uphill movement of ions which require energy in the form of ATP. Therefore it is an active transport.

115. Answer (4)

Hint: Kinetochore is the site where microtubules of spindle attach.

Sol.: On the side of centromere of chromosome, disc shaped structures are present known as kinetochore.

116. Answer (3)

Hint: Duplication of centrosome occurs during S phase of cell cycle.

Sol.: S phase occurs between G₁ phase and G₂ phase of cell cycle.

117. Answer (1)

Hint: Synaptonemal complex (stabilises synapsis of homologous chromosomes) is formed in the zygotene phase of prophase I.

Sol.: Dissolution of synaptonemal complex – Diplotene

Formation of recombination nodule – Pachytene

Assembling of meiotic spindle at the poles – Diakinesis.

118. Answer (3)

Hint: Homologous chromosomes separate in anaphase I.

Sol.: In both anaphase of mitosis and anaphase II, centromere splits.

119. Answer (2)

Hint: Porins are found in the outer membrane of mitochondria, chloroplasts and some bacteria.

Sol.: Ribosomes of mitochondria do not cross the mitochondrial membrane. Facilitated transport does not require energy (ATP).

120. Answer (2)

Hint: Solute potential will become more negative if the concentration of solute increases.

Sol.: Water potential of cells A, B and C will be as follows.

$$\psi_w(C) > \psi_w(A) > \psi_w(B)$$

121. Answer (1)

Hint: Symplast is the pathway formed by the system of interconnected protoplasts of different cells.

Sol.: Apoplast pathway includes cell wall and intercellular spaces.

122. Answer (3)

Hint: Stomata regulate the transpiration.

Sol.: Creating transpiration pull, cooling of leaf surface and transportation of material from soil to plant parts are the purpose of transpiration.

123. Answer (4)

Hint: Minerals are absorbed by the plants as ions from the soil.

Sol.: Carbon is not a mineral element. It is absorbed by the plant as carbon dioxide from atmosphere.

124. Answer (4)

Hint: Turgidity of the cell is maintained by an element which is absorbed by the plants as monovalent cation.

Sol.: Potassium helps in maintaining turgidity of the cells. Iron is essential for the formation of chlorophyll and other pigments.

125. Answer (2)

Hint: Leg-haemoglobin is formed in root nodules of legume plants.

Sol.: The red or pink-coloured pigment leghaemoglobin is an O₂ scavenger that protects the enzyme nitrogenase from oxygen.

126. Answer (3)

Hint: T.W. Engelmann experimented on a green alga.

Sol.: The first action spectrum of photosynthesis was described by an experiment by using green alga *Cladophora*.

127. Answer (1)

Hint: In blue and red regions of light spectrum maximum photosynthesis occurs.

Sol.: P, Q, R and S represent 400, 500, 600 and 700 nm of wavelengths. Green light falls between 500 to 600 nm of wavelengths.

128. Answer (1)

Hint: Non-cyclic photophosphorylation is connected with photolysis of water.

Sol.: In non-cyclic photophosphorylation, NADP⁺ is reduced to NADPH + H⁺.

129. Answer (1)

Hint: In plants having Kranz anatomy, double fixation of carbon dioxide occurs.

Sol.: Plants those have Kranz anatomy in their leaves show C₄ pathway. The extra ATP is used during C₄ pathway.

130. Answer (2)

Hint: Both malic acid and oxaloacetic acid are 4-carbon molecules.

Sol.: During the conversion of malic acid into oxaloacetic acid, $\text{NADH} + \text{H}^+$ is formed but CO_2 is not released. In rest of the conversions both $\text{NADH} + \text{H}^+$ and CO_2 are formed.

131. Answer (2)

Hint: Complex I and complex II are NADH dehydrogenase and succinate dehydrogenase respectively.

Sol.:

NADH dehydrogenase (Complex I) – Receives the electrons produced by $\text{NADH} + \text{H}^+$

Complex c oxidase – Contains two copper centres.

Succinate dehydrogenase (complex II) – Provides reducing equivalents to ubiquinone.

Cytochrome bc_1 complex – Receives electrons from ubiquinone.

132. Answer (3)

Hint: The product formed from glycerol enters into EMP pathway when it is taken as respiratory substrate.

Sol.: The product formed from glycerol that enters the respiratory pathway is phosphoglyceraldehyde.

133. Answer (3)

Hint: Sigmoid growth curve shows three phases.

Sol.: Three phases in sigmoid growth curve are lag phase, exponential phase and stationary phase.

134. Answer (4)

Hint: Auxin and cytokinin act antagonistically to each other w.r.t. apical dominance.

Sol.: Cytokinins help to overcome the apical dominance. They promote nutrient mobilisation which helps in the delay of leaf senescence.

135. Answer (1)

Sol.: Chemicals like abscisic acids, phenolic acids and para-ascorbic acid causes seed dormancy. Gibberellic acid and nitrates remove the effect of such inhibitory substances.

136. Answer (3)

Hint: Aquatic animals that do not respire through gills.

Sol.: *Macaca* and *Rattus* are terrestrial mammals. *Trygon* is a cartilaginous fish. *Testudo* is a reptile. Whales and dolphins are aquatic mammals.

137. Answer (4)

Hint: Formation of proteins.

Sol.: Insulin an anabolic hormone facilitates uptake of glucose by cells, thus leading to hypoglycemia. Lipolysis occurs to provide substrate for energy production in the body *i.e.* fatty acids & triglycerides. Protein catabolism occurs for energy causing body wasting. Glycogenolysis is breakdown of glycogen into glucose.

138. Answer (1)

Hint: They are composed of proteins which perform zipper action.

Sol.: Adhering junctions like macula adherens are usually present just below the tight junctions where two cells are joined to form a barrier.

Plasmodesmata are present in plant cells while gap junctions work as communication channels in animal cells.

139. Answer (3)

Hint: It is also the cofactor for carboxypeptidase.

Sol.: Zn^{++} is required for activity of carbonic anhydrase. Mg^{+2} is activator for hexokinase. Fe^{2+} is found in heme.

140. Answer (2)

Hint: K_m indicates the substrate affinity for the enzyme.

Sol.: Turnover number indicates the number of product molecules formed per minute and K_m represents affinity of substrate for the enzyme in an inverse relation. Thus, lesser the $K_m \rightarrow$ more the affinity \rightarrow higher the turnover number.

141. Answer (4)

Hint: Cellulose is a polymer of glucose.

Sol.: Haemoglobin is made up of 2 parts *i.e.* haem & globin. Globin is protein part & contains peptide bonds. Nucleosides are formed by nitrogenous bases and sugar.

142. Answer (3)

Hint: Bidder's canal is present in male frogs.

Sol.: Urinogenital duct in male frogs transport both urine and sperms. Bidder's canal in kidney of frog transports only sperms.

143. Answer (3)

Hint: Nearly 1-1.5 L of this product is passed per day by humans.

Sol.: Volume of urine is decided after glomerular filtration, therefore it will not affect the rate of filtration. GFR depends upon blood pressure and volume of blood passing through kidney.

144. Answer (4)

Hint: It promotes loss of Na^+ from the body.

Sol.: ANF increases Na^+ excretion causing water to be lost along with Na^+ , hence its secretion will not occur in case of dehydration. All other hormones in given options increase absorption of Na^+ directly or indirectly.

145. Answer (1)

Hint: This part is internally lined by brush border epithelium.

Sol.: Proximal convoluted tubule is internally lined by simple cuboidal epithelium with microvilli that increase the surface area for reabsorption. Further, it is permeable for nearly all types of substances present in glomerular filtrate. Minimum reabsorption occurs in ascending limb of loop of Henle.

B – DCT

C – Vasa recta

D – Collecting duct

146. Answer (4)

Hint: Approximately total volume of blood in the body.

Sol.: About 5L of blood is pumped by each ventricle per minute.

Cardiac output = Heart rate \times stroke volume
 $= 72 \times 70 = 5040 \text{ ml}$.

147. Answer (1)

Hint: These are small fibres projecting from cell body.

Sol.: Dendrites are afferent processes that receive impulses of the neuron. Nerve endings of axons are efferent processes that transmit impulses at synapses.

148. Answer (3)

Hint: Role of gap junctions.

Sol.: The membranes of pre and post synaptic neurons are in very close proximity. Pre and post synaptic neurons are connected together by connexons.

149. Answer (1)

Hint: Part of brain containing iter.

Sol.: Hypothalamus is a part of forebrain.

150. Answer (2)

Hint: It is released from thymus.

Sol.: Thymus releases thymosins which play a major role in differentiation of T lymphocytes. Thymus degenerates in older individuals. Thyroxine is responsible for maintaining basal metabolic rate.

151. Answer (1)

Hint: Circular mouth fishes.

Sol.: Class cyclostomata includes *Myxine*. *Ascidia* is placed in urochordata which are considered as most primitive a craniates.

152. Answer (1)

Hint: Bowing of legs occurs in Rickets.

Sol.: Rickets is a disease caused in children due to deficiency of Vitamin D i.e. a form of calciferol. Deficiency of thiamine causes beri-beri while deficiency of retinol causes nyctalopia.

153. Answer (3)

Hint: Tasteless urine is passed upon deficiency of ADH stored in posterior pituitary.

Sol.: Hyperthyroidism results in exophthalmic goitre. Acromegaly occurs due to excessive release of GH from adenohypophysis after puberty.

154. Answer (4)

Hint: Cobalamine absorption occurs in intestine.

Sol.: Castle's intrinsic factor is secreted by parietal cells which also secrete HCl, but HCl has no role in absorption of vit-B₁₂.

155. Answer (3)

Hint: Sympathetic nervous system supplies more energy for 'flight or fight response'.

Sol.: Increasing blood glucose level is a function of sympathetic nervous system.

156. Answer (2)

Hint: Decrease in hormones of adrenal cortex such as mineralocorticoids.

Sol.: In case of adrenal insufficiency, the adrenal hormones will decrease including glucocorticoids and sex corticoids. Decrease in aldosterone will decrease the reabsorption of Na^+ , thus Na^+ loss in urine occurs causing decrease in blood pressure.

157. Answer (2)

Hint: Structure that joins a muscle to a bone.

Sol.: Tendons connect bone to a muscle. Ligaments join bone to a bone.

158. Answer (3)

Hint: Oxygen deficient stage of the body.

Sol.: Extra O_2 is consumed to replenish ATP and phosphorylcreatine stores during O_2 debt characterised by increased breathing rate after strenuous exercise. Rigor mortis involves sustained contraction of muscle fibres due to lack of ATP after death. Glycolysis is an anaerobic process.

159. Answer (1)

Hint: Head part of this protein acts as an ATPase.

Sol.: Heavy meromyosin (HMM) part of myosin acts as ATPase. LMM forms tail of myosin.

160. Answer (3)

Hint: Aqueous humor is replenished regularly.

Sol.: Aqueous humor is present ahead of lens and behind cornea. Rhodopsin is absent in bipolar cells but present in rod cells.

161. Answer (3)

Hint: Hair cells behave as receptors.

Sol.: The basal end is in contact with afferent neurons which are sensory in function *i.e.* they take impulses from organ of Corti to brain. Efferent nerve fibres are motor in nature.

162. Answer (4)

Hint: These help in blood clotting.

Sol.: Megakaryocytes fragment to form platelets or thrombocytes. Lymphocytes participate in providing body immunity.

163. Answer (3)

Hint: Lactose is a sugar found in milk.

Sol.: Milk sugar lactose is converted into lactic acid by a bacteria *Lactobacillus acidophilus*. Rennin converts milk protein casein into curd that is calcium paracaseinate. Optic nerve emerges from blind spot.

164. Answer (1)

Hint: It is present in segment posterior to testis.

Sol.: It functions as an accessory reproductive gland.

165. Answer (3)

Hint: They are unjointed structures.

Sol.: Anal styles are present attached with 9th sternum in males and aid in differentiating male from female cockroach. Tenth tergum provides attachment to anal cerci in both male and female cockroach.

166. Answer (2)

Hint: Excitability is property of structural and functional cells of this tissue.

Sol.: Neural tissue present in CNS & PNS, controls the functions of the body. Cardiac muscles regulate heart contraction and skeletal muscles cause movement of body parts.

167. Answer (4)

Hint: Epithelial cells obtain O₂ and nourishment from surrounding tissue by diffusion.

Sol.: The epithelium is devoid of blood supply hence called avascular. It forms the innermost lining of intestine.

168. Answer (3)

Hint: It prevents backflow of blood from left ventricle into left atrium.

Sol.: The conduction system of heart includes SA node → AV node → Bundle of His → Purkinje fibres.

169. Answer (1)

Hint: It is the time from the onset of the P wave to the start of the QRS complex.

Sol.: P wave represents atrial depolarisation. QRS complex represents ventricular depolarisation. Therefore, P-R interval is the time that represents atrioventricular conduction.

170. Answer (3)

Hint: Exocrine glands do not secrete hormones.

Sol.: Glucagon is a hormone secreted by the endocrine part of the pancreas *i.e.* α-cells of Islets of Langerhans. All others are enzymes of pancreatic juice.

171. Answer (2)

Hint: Presence of saliva is important to maintain cleanliness of mouth.

Sol.: Xerostomia is dry mouth state *i.e.* less amount of saliva is secreted. Hence, in absence of saliva, chances of occurrence of dental caries are high as lysozyme is deficient.

172. Answer (3)

Hint: Pancreatic amylase is released in this 'C' shaped structure.

Sol.: Lipase is absent in colon whereas mouth, stomach and duodenum respectively contain lingual, gastric and pancreatic lipases.

173. Answer (1)

Hint: Contraction of diaphragm requires energy.

Sol.: Inspiration is an active process in humans. It is initiated by contraction of muscles which require energy. Our lungs obey Boyle's law and act at negative pressure.

174. Answer (1)

Hint: Decreased affinity of Hb for O₂ leads to its release.

Sol.: Bohr's effect occurs at the level of actively metabolising tissues where pCO₂ is higher, so O₂ diffuses into the tissues and CO₂ diffuses into blood from tissues.

175. Answer (2)

Hint: They are chemoreceptors and influence alveolar ventilation.

Sol.: They initiate impulses that stimulate the respiratory center. Respiration is stimulated by high $p\text{CO}_2$ and high H^+ concentration.

176. Answer (4)

Hint: At high heart rate, duration of each cardiac cycle decreases.

Sol.: The duration of systole & diastole both decrease due to decrease in duration of cardiac cycle.

177. Answer (2)

Hint: Gaseous product of respiration is CO_2 .

Sol.: Hb combines with CO_2 to form carbaminohaemoglobin. CO forms carboxyhaemoglobin. O_2 forms oxyhaemoglobin and reduced hemoglobin is known as methaemoglobin.

178. Answer (4)

Hint: They are present in lungs.

Sol.: Lung parenchyma is the tissue present in lungs involved in gas transfer. Alveoli form the lung parenchyma where exchange of gases takes place.

179. Answer (2)

Hint: Gill cover is absent in chondrichthyes.

Sol.: Chondrichthyes are marine animals with a ventral mouth. Placoid scales are present & many of them are viviparous. Fertilisation is mostly internal.

180. Answer (4)

Hint: Presence of mammary gland.

Sol.: Mammals possess mammary glands which secrete milk with which they nourish their young ones. Prototherians are oviparous. Mostly heterodont dentition is seen in most mammals. Sea cow does not have seven cervical vertebrae.



All India Aakash Test Series for Medical - 2021

TEST - 7 (Code-D)

Test Date : 08/03/2020

ANSWERS

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

HINTS & SOLUTIONS**[PHYSICS]**

1. Answer (1)

$$\text{Hint \& Sol.: } F_c = \frac{mv^2}{r_1}$$

$$\left(\frac{v_1}{v_2}\right)^2 = \left(\frac{r_1}{r_2}\right)$$

$$\frac{v_1}{v_2} = \sqrt{\frac{r_1}{r_2}} = \frac{2}{3}$$

2. Answer (2)

$$\text{Hint \& Sol.: } PV = nRT$$

$$P = \frac{nRT}{V}$$

$$\text{Slope } m = \frac{nR}{V}$$

$$m_2 > m_1$$

$$V_2 < V_1 \text{ or } V_1 > V_2$$

3. Answer (2)

$$\text{Hint \& Sol.: } n_1 = n_2$$

$$\frac{m_1}{M_1} = \frac{m_2}{M_2}$$

$$\frac{56}{28} = \frac{x}{4}$$

$$x = 8$$

4. Answer (1)

$$\text{Hint: } Q = \Delta U + W$$

$$\text{Sol.: } Q_1 = \Delta U_1 + W_1$$

$$120 = \Delta U_1 + 40$$

$$\Delta U_1 = 80 \text{ J}$$

$$Q_2 = \Delta U_2 + W_2$$

$$Q_2 = -\Delta U_1 + W_2$$

$$-50 = -80 + W_2$$

$$W_2 = 30 \text{ J}$$

5. Answer (3)

$$\text{Hint: } \beta = \frac{1-\eta}{\eta}$$

$$\text{Sol.: } \beta = \frac{1-\frac{4}{10}}{\frac{4}{10}} \Rightarrow \beta = \frac{3}{2}$$

6. Answer (4)

$$\text{Hint: } \Delta U = \frac{nR\Delta T}{\gamma-1}$$

$$\text{Sol.: } \gamma = \frac{7}{5}$$

$$T_A = \frac{P_0 V_0}{2R}$$

$$T_B = \frac{6P_0 V_0}{2R}$$

$$\Delta T = \frac{5P_0 V_0}{2R}$$

$$\Delta U = \frac{2R \times 5P_0 V_0}{\left(\frac{7}{5}-1\right)2R}$$

$$\Delta U = \frac{25P_0 V_0}{2}$$

7. Answer (4)

$$\text{Hint: } c = \frac{R}{\gamma-1} + \frac{R}{1-n}$$

$$\text{Sol.: } VT^{-2/3} = \text{constant}$$

$$PV = nRT$$

$$V(PV)^{-2/3} = \text{constant}$$

$$P \cdot V^{-1/2} = \text{constant}$$

$$n = -\frac{1}{2}$$

$$\Rightarrow C = C_v + \frac{R}{-n+1}$$

$$\Rightarrow C = \frac{5R}{2} + \frac{R}{\left(\frac{1}{2}+1\right)}$$

$$\Rightarrow C = \frac{5R}{2} + \frac{2R}{3}$$

$$\Rightarrow C = \frac{19R}{6}$$

8. Answer (3)

Hint: Use principle of calorimetry.

Sol.: Heat supplied by steam if it was totally condense into water at 100°C.

$$Q_1 = mL_v$$

$$= 5 \times 540 = 2700 \text{ Cal}$$

Heat required to convert total ice into water at 100°C

$$Q_2 = mL_f + mS\Delta t$$

$$= 5 \times 80 + 5 \times 1 \times 100$$

$$= 400 + 500$$

$$= 900 \text{ Cal}$$

$Q_1 > Q_2$ therefore total steam will not condense

Let m is mass of steam condense into water at 100°C

$$mL_v = 5 \times 80 + 5 \times 1 \times 100$$

$$m = \frac{900}{540} = \frac{10}{6} = \frac{5}{3} \text{ g}$$

$$\text{Total mass of water} = 5 \text{ g} + \frac{5}{3} \text{ g} = \frac{20}{3} \text{ g}$$

9. Answer (1)

Hint & Sol.: The surface temperature of the star is determined by using Wein's displacement law.

10. Answer (2)

Hint: $\frac{dQ}{dt} = KA \frac{dT}{dx}$

Sol.: $Q = KA \frac{\Delta T}{\Delta x} \times t$

$$Q_1 = 4KA \frac{\Delta T}{\Delta x} t$$

$$Q_1 = 4Q$$

11. Answer (4)

Hint & Sol.: Poisson's ratio of the rod is 0.50 therefore fractional change in volume will be zero.

12. Answer (3)

Hint: $\frac{\Delta l}{l} = \frac{F}{YA}$

Sol.: In horizontal position tension in the wire will be $3mg$ in critical looping.

$$\frac{\Delta l}{l} = \frac{3mg}{YA}$$

13. Answer (4)

Hint & Sol.: According to Stoke's law

$$F_0 = 6\pi\eta r v_0$$

$$r = \frac{F_0}{6\pi\eta v_0}$$

14. Answer (2)

Hint: Use Bernoulli's' equation

Sol.: $P_0 + \frac{1}{2}\rho v_0^2 = \frac{3P_0}{2} + \frac{1}{2}\rho v^2$

$$\frac{1}{2}\rho v^2 = \frac{1}{2}\rho v_0^2 - \frac{P_0}{2}$$

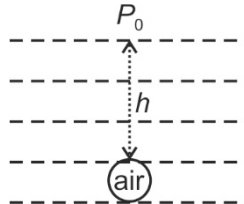
$$v = \sqrt{v_0^2 - \frac{P_0}{\rho}}$$

15. Answer (2)

Hint: Excess pressure inside a bubble in liquid

$$= \frac{2T}{R}$$

Sol.:



$$P_{\text{inside bubble}} = P_0 + \rho gh + \frac{2T}{R}$$

16. Answer (3)

Hint & Sol.: If the gravitational force suddenly disappears the satellite will move with velocity ' v_0 ' tangential to the original orbit.

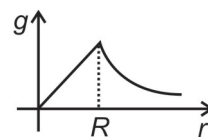
17. Answer (2)

Hint & Sol.: for $r < R_e$

$$g \propto r$$

For $r \geq R_e$

$$g \propto \frac{1}{r^2}$$



18. Answer (4)

Hint: $E = -\frac{GMm}{2r}$

$$U = -\frac{GMm}{r}$$

Sol.: $\frac{U}{E} = \frac{-\frac{GMm}{r}}{-\frac{GMm}{2r}}$

$$\frac{U}{E} = 2$$

19. Answer (1)

Hint & Sol.: $L = 10 \log_{10} \frac{l}{l_0}$

$$L = 10 \log_{10} \frac{10^{-10}}{10^{-12}}$$

$$L = 20 \text{ dB}$$

20. Answer (1)

Hint: $f = f_0 \left(\frac{v \pm v_0}{v \pm v_s} \right)$

Sol.: $f = f_0 \left(\frac{v + v_A}{v} \right)$

$$5 = 4 \left(\frac{v + v_A}{v} \right)$$

$$\frac{5}{4} = \left(\frac{v + v_A}{v} \right)$$

$$\frac{v_A}{v} = \frac{1}{4}$$

$$\frac{9}{2} = 4 \left(\frac{v + v_B}{v} \right)$$

$$\frac{9}{8} = \left(\frac{v + v_B}{v} \right)$$

$$\frac{1}{8} = \frac{v_B}{v}$$

$$\frac{v_A}{v_B} = 2$$

21. Answer (2)

Hint: Phase difference $\Delta\phi = \frac{2\pi}{\lambda} \times \text{path difference}$.

Sol.: $v = f\lambda \Rightarrow \lambda = \frac{v}{f} = v \times T$

$$= 300 \times 0.04 = 12 \text{ m}$$

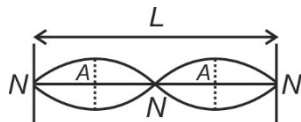
$$\Delta\phi = \frac{2\pi}{12} \times 20 = \frac{10\pi}{3}$$

$$\Delta\phi = \frac{10\pi}{3}$$

22. Answer (1)

Hint: If sonometer wire vibrate in first overtone then two loop will be formed

Sol.:



$$L = \frac{\lambda}{2} + \frac{\lambda}{2}$$

$$\lambda = L$$

Anti node will be formed at $\frac{\lambda}{4} = \frac{L}{4}$

and at $\frac{3\lambda}{4} = \frac{3L}{4}$

23. Answer (4)

Hint & Sol.: In longitudinal wave the density is higher corresponding to compression.

24. Answer (3)

Hint & Sol.: $x = 2x_0 \cos 3\omega t$

Equation is simple harmonic with amplitude $2x_0$

and time period $T = \left(\frac{2\pi}{3\omega} \right)$

25. Answer (2)

Hint: $f = \frac{1}{2\pi} \sqrt{\frac{g}{l}}$

Sol.: $f_0 = \frac{1}{2\pi} \sqrt{\frac{g}{l}}$

$$\frac{f_0}{2} = \frac{1}{2\pi} \sqrt{\frac{g-a}{l}}$$

$$2 = \sqrt{\frac{g}{g-a}}$$

$$4g - 4a = g \Rightarrow a = \frac{3g}{4}$$

26. Answer (3)

Hint: $v_{\max} = A\omega$

Sol.: $\omega = \frac{v_{\max}}{A}$

$$= \frac{0.5}{5 \times 10^{-2}}$$

$$\omega = \frac{5 \times 10^{-1}}{5 \times 10^{-2}}$$

$$\omega = 10 \text{ rad/s}$$

$$T = \frac{2\pi}{\omega}$$

$$T = \frac{\pi}{5} \text{ s}$$

27. Answer (3)

Hint: $P = \frac{W}{t}$

Sol.: $30 = \frac{W}{30}$

$$W = 900 \text{ J}$$

$$W = \Delta K$$

$$\frac{1}{2} I \omega^2 = 900$$

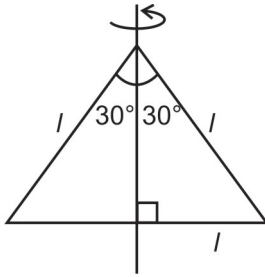
$$\frac{1}{4\pi^2} \omega^2 = 900$$

$$\omega^2 = 3600\pi^2$$

$$\omega = 60\pi \text{ rad/s}$$

28. Answer (4)

Hint:



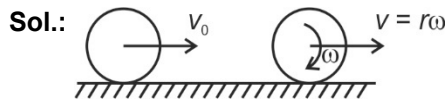
$$\text{Sol.: } I = \frac{Ml^2}{3} \sin^2 30^\circ + \frac{Ml^2}{3} \sin^2 30^\circ + \frac{Ml^2}{12}$$

$$I = \frac{Ml^2}{12} + \frac{Ml^2}{12} + \frac{Ml^2}{12}$$

$$I = \frac{Ml^2}{4}$$

29. Answer (3)

Hint: Conservation of angular momentum about a point on horizontal surface.



$$L_i = L_f$$

$$mv_0 r = mvr + \frac{2}{3} mr^2 \left(\frac{v}{r} \right)$$

$$v = \frac{3v_0}{5}$$

30. Answer (2)

Hint: $a = \frac{g \sin \theta}{1 + \gamma}$ and $t = \sqrt{\frac{2s}{a}}$, $\gamma = \frac{I_{cm}}{mR^2}$

Sol.: $a_r = \frac{g \sin \theta}{1 + 1}$

$$a_r = \frac{g \sin \theta}{2}$$

$$a_d = \frac{g \sin \theta}{1 + \frac{1}{2}}$$

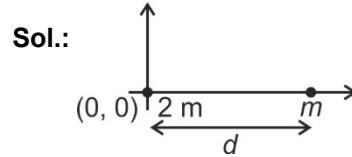
$$a_d = \frac{2g \sin \theta}{3}$$

$$\frac{t_r}{t_d} = \sqrt{\frac{a_d}{a_r}}$$

$$= \sqrt{\frac{\frac{2g \sin \theta}{3}}{\frac{g \sin \theta}{2}}} = \frac{2}{\sqrt{3}}$$

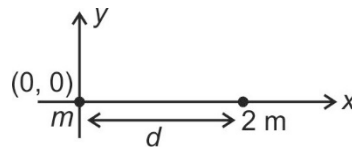
31. Answer (1)

Hint: $x_{cm} = \frac{m_1 \bar{x}_1 + m_2 \bar{x}_2}{m_1 + m_2}$



$$x_{cm_1} = \frac{2mx_0 + md}{m + 2m}$$

$$x_{cm_1} = \frac{d}{3}$$



$$x_{cm_2} = \frac{mx_0 + 2md}{m + 2m}$$

$$x_{cm_2} = \frac{2d}{3}$$

$$\Delta x = x_{cm_2} - x_{cm_1}$$

$$\Delta x = \frac{2d}{3} - \frac{d}{3} = \frac{d}{3}$$

32. Answer (4)

Hint & Sol.: $\vec{a} = k\vec{b} + \vec{c}$

$$\vec{a} \cdot \vec{b} = k\vec{b} \cdot \vec{b} + \vec{c} \cdot \vec{b}$$

take dot product from \vec{b}

$$kb^2 = \vec{a} \cdot \vec{b} - \vec{c} \cdot \vec{b}$$

$$k = \frac{\vec{a} \cdot \vec{b} - \vec{b} \cdot \vec{c}}{b^2}$$

33. Answer (2)

Hint: Apply conservation of kinetic energy.

Sol.: $\frac{1}{2}mv^2 = \frac{1}{2}mv_1^2 + \frac{1}{2}mv_2^2$

$$v^2 = \frac{v^2}{4} + v_2^2$$

$$\Rightarrow v_2 = \frac{\sqrt{3}v}{2}$$

34. Answer (3)

Hint: $W = \int_{x_1}^{x_2} F dx$

Sol.: $k_1 = \frac{1}{2}mv^2$

$$= \frac{1}{2} \times 4 \times (4)^2 = 32 \text{ J}$$

$$W = \int_2^4 -2x dx$$

$$= 4 - 16 = -12 \text{ J}$$

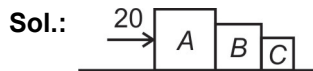
Now, $W = \Delta K$

$$K_f - K_i = -12$$

$$K_f = 32 - 12 = 20 \text{ J}$$

35. Answer (1)

Hint: $F_{\text{net}} = ma$



$$F = ma$$

$$20 = 10a$$

$$a = 2 \text{ m/s}^2$$

$$N_{BC} = 2 \times 2 = 4 \text{ N}$$

$$N_{AB} - N_{BC} = 3 \times 2$$

$$N_{AB} = 10 \text{ N}$$

$$\frac{N_{AB}}{N_{BC}} = \frac{10}{4} = \frac{5}{2}$$

36. Answer (3)

Hint: $F_c = \frac{Mv^2}{R}$

Sol.: $M = 250 \text{ kg}$

$$v = 54 \times \frac{5}{18} \text{ m/s}$$

$$= 15 \text{ m/s}$$

$$R = 25 \text{ m}$$

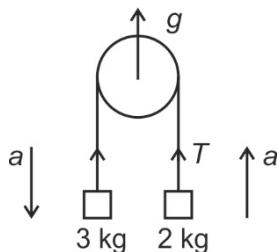
$$F_c = \frac{250 \times (15)^2}{25}$$

$$F_c = 2250 \text{ N}$$

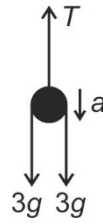
37. Answer (1)

Hint: Assuming observer on pulley, apply $F_{\text{net}} = ma$

Sol.:

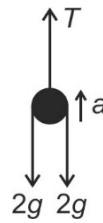


F.B.D of 3 kg



$$6g - T = 3a \quad \dots(1)$$

F.B.D. of 2 kg



$$T - 4g = 2a \quad \dots(2)$$

From (1) and (2)

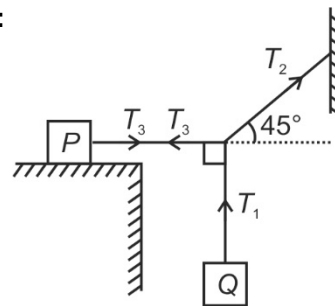
$$6g - 4g = 5a$$

$$a = \frac{2g}{5}$$

38. Answer (2)

Hint: For translational equilibrium $F_{\text{net}} = 0$

Sol.:



$$T_2 \sin 45^\circ = m_Q g$$

$$T_2 \cos 45^\circ \leq \mu m_P g$$

$$m_Q g \cot 45^\circ \leq \mu m_P g$$

$$m_Q \leq \mu m_P$$

$$m_Q \leq 0.4 \times 10$$

Maximum mass of Q

$$m_Q = 4 \text{ kg}$$

39. Answer (1)

Hint: River boat problem

$$\text{Drift} = V_{RG} \times t_c$$

$$\text{Sol.} \quad t_c = \frac{1}{5} \text{ h}$$

$$\text{Drift} = 4 \times \frac{1}{5} = \frac{4}{5} \text{ km}$$

$$= \frac{4}{5} \times 1000 = 800 \text{ m}$$

40. Answer (2)

Hint: Horizontal component of velocity remains constant.

$$\text{Sol.: } v \cos 45^\circ = u \cos 60^\circ$$

$$\Rightarrow v \frac{1}{\sqrt{2}} = 20 \times \frac{1}{2}$$

$$\Rightarrow v = 10\sqrt{2} \text{ m/s}$$

41. Answer (1)

$$\text{Hint: Use } s = ut + \frac{1}{2}at^2$$

$$\text{Sol.: } x = \frac{1}{2}a\left(\frac{t}{3}\right)^2$$

$$x = \frac{1}{2}a \frac{t^2}{9}$$

$$y_1 = \frac{1}{2}at^2$$

$$y = y_1 - x$$

$$y = \frac{1}{2}at^2 - \frac{1}{2}a \frac{t^2}{9}$$

$$= \frac{1}{2}a \frac{t^2}{9} (9-1)$$

$$y = 8x$$

42. Answer (4)

$$\text{Hint: } v = \frac{dx}{dt}$$

$$\text{Sol.: } x = \frac{1}{(t+2)^{-3/2}}$$

$$x = (t+2)^{3/2}$$

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

$$v = \frac{3}{2}(t+2)^{1/2}$$

$$(t+2)^{1/2} = x^{1/3}$$

$$v = \frac{3}{2}x^{1/3}$$

$$v \propto x^{1/3}$$

43. Answer (4)

$$\text{Hint \& Sol.: Surface tension} = \frac{\text{Force}}{\text{Length}}$$

$$\text{Dimension of force} = \text{MLT}^{-2}$$

$$\text{Dimension of surface tension} = \text{ML}^0\text{T}^{-2}$$

44. Answer (2)

Hint: Use dimensional analysis

$$\text{Sol.: } \text{ML}^{-1}\text{T}^{-2} = (\text{T})^a(\text{LT}^{-1})^b(\text{MLT}^{-1})^c$$

$$\text{ML}^{-1}\text{T}^{-2} = \text{M}^c\text{L}^{b+c}\text{T}^{a-b-c}$$

$$c = 1$$

$$b + c = -1$$

$$b = -2$$

$$a - b - c = -2$$

$$a + 2 - 1 = -2$$

$$a = -3$$

$$\text{Dimensional formula of bulk modulus} = [T^{-3}V^{-2}P]$$

45. Answer (3)

Hint \& Sol.: Strong nuclear force mediated by the ' π -meson' particle.

[CHEMISTRY]

46. Answer (1)

Hint: Higher is the lattice energy, higher will be the melting point.

47. Answer (1)

Hint: (CO + H₂) mixture is called synthesis gas or water gas.

48. Answer (3)

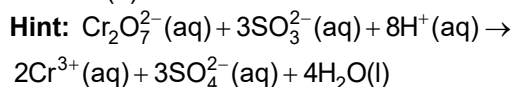
Hint: Volume strength of H₂O₂ = 11.2 × M

$$\text{Sol.: } M = \frac{16.8}{11.2} = 1.5$$

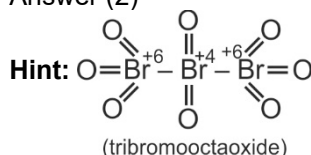
49. Answer (2)

Hint: The species having vacant orbital can act as Lewis acid.

50. Answer (4)



51. Answer (2)

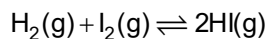


52. Answer (4)

Hint: For gaseous reaction, $K_p = K_c(RT)^{\Delta n_g}$

Sol.: If $\Delta n_g = 0$, then $K_p = K_c$

for the equilibrium reaction



$$\Delta n_g = 0$$

$$\therefore K_p = K_c$$

53. Answer (2)

Hint: $M_1V_1 - M_2V_2 = M_3V_3$

Sol.: mmol of OH^- derived from $\text{Ba}(\text{OH})_2$

$$= 100 \times 0.2 \times 2 = 40$$

mmol of OH^- unreacted

$$= 40 - (100 \times 0.2) = 20$$

Let molarity of OH^- in resultant solution be M

$$20 = (100 + 100)M$$

$$M = \frac{20}{200} = 0.1 \text{ M} = [\text{OH}^-]$$

$$\text{pOH} = 1$$

$$\text{pH} = 14 - 1 = 13$$

54. Answer (3)

Hint: KI provides I^- as common ion.

Sol.: $\text{AgI}(\text{s}) \rightleftharpoons \underset{\text{s}}{\text{Ag}^+(\text{aq})} + \underset{(\text{s}+0.2)}{\text{I}^-(\text{aq})}$

$$[\text{Ag}^+][\text{I}^-] = K_{\text{sp}}$$

$$s(\text{s} + 0.2) = 8 \times 10^{-17}$$

$$\therefore s \ll 0.2, \therefore \text{s} + 0.2 \approx 0.2$$

$$\text{we get, } s \times 0.2 = 8 \times 10^{-17}$$

$$\therefore s = \frac{8 \times 10^{-17}}{0.2} = 4 \times 10^{-16}$$

55. Answer (3)

Hint: Due to inert pair effect, +1 oxidation state is most preferred in Tl.

56. Answer (4)

Hint: For BeSO_4 , hydration enthalpy of Be^{2+} is high due to small size of ion.

Sol.: Down the group, the solubility of sulphates of alkaline earth metals decreases.

57. Answer (3)

Hint: Excess nitrate in drinking water causes methemoglobinemia (blue baby syndrome).

58. Answer (3)

Hint: Sodium nitroprusside test.

Sol.: $[\text{Fe}(\text{CN})_5\text{NOS}]^{4-}$ is violet in colour.

59. Answer (2)

$$\text{Hint: } \% \text{ of N} = \frac{1.4 \times \text{meq. of NH}_3}{\text{mass of compound}}$$

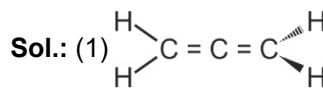
Sol.: meq of $\text{H}_2\text{SO}_4 = \text{meq of NH}_3$

$$= 10 \times 0.5 \times 2 = 10 \text{ meq}$$

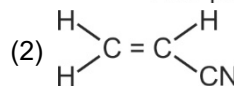
$$\% \text{ of nitrogen} = \frac{1.4 \times 10}{1} = 14\%$$

60. Answer (2)

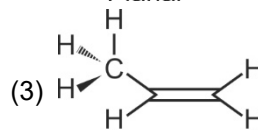
Hint: Allenes are three dimensional in shape.



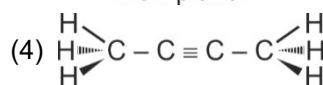
Non-planar



Planar



Non-planar



Non-planar

61. Answer (3)

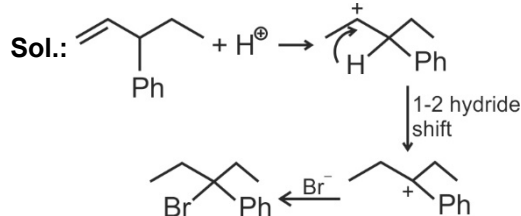
Hint: Alkene and alkynes decolourise Br_2/water .

62. Answer (1)

Hint: Most stable alkene will have lowest heat of hydrogenation.

63. Answer (4)

Hint: Carbonium ion rearrangement occurs.



64. Answer (4)

Hint: Electron donating group present on the benzene ring increases the rate of electrophilic substitution reaction at o/p position.

65. Answer (3)

Hint: The species which does not contain vacant orbital will not act as an electrophile.

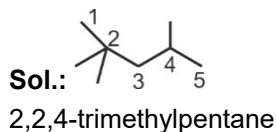
66. Answer (1)

Hint: If molecular weight is same then the molecule with bigger surface area will have higher boiling point.

Sol.: Unbranched alkane has higher surface area hence van der Waals force of attraction is high.

67. Answer (2)

Hint: Numbering of carbon chain is done applying lowest locant rule.



68. Answer (3)

Hint: Graphite is thermodynamically most stable allotrope of carbon.

69. Answer (3)

Hint: No α -hydrogen is present in $(\text{CH}_3)_3\text{C}^+\text{CH}_2$.


70. Answer (3)

Hint: Percentage s character in hybrid orbital of carbon of acetylene is highest among the given hydrocarbons.

Sol.: Higher the percentage s character in the hybrid orbital of hydrocarbon higher is the acidity of hydrocarbon.

71. Answer (3)

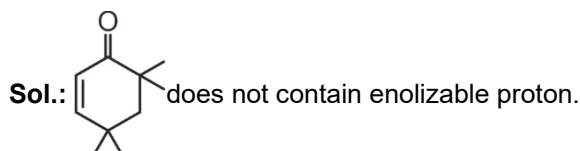
Hint: Tropylium cation is an aromatic species.

Sol.: , cyclopentadienyl cation is an antiaromatic species.

Correct order of stability is (i) > (iii) > (ii).

72. Answer (4)

Hint: The compound which does not contain enolizable proton will not show keto-enol tautomerism.



73. Answer (2)

Hint: The property which is independent of quantity of matter is called intensive.

Sol.: Pressure is an intensive property.

74. Answer (3)

Hint: $w = -2.303 n RT \log \frac{V_f}{V_i}$

Sol.: $w = -2.303 \times 3RT \log \frac{100}{10}$
 $= -6.909 \times 300R \log 10$
 $= -2.07 \times 10^3 R$

75. Answer (1)

Hint: At high pressure, $\left(\frac{a}{V^2}\right)$ term is negligible w.r.t. P for van der Waals gas equation.

Sol.: van der Waals equation for one mole of gas.

$$\left(P + \frac{a}{V^2}\right)(V - b) = RT$$

At high pressure, $\left(\frac{a}{V^2}\right) = 0$.

$$P(V - b) = RT$$

$$\text{or, } PV - Pb = RT$$

$$\text{or, } \left(\frac{PV}{RT}\right) = \left(1 + \frac{Pb}{RT}\right) = Z$$

76. Answer (2)

Hint: Higher the polarity in the molecule easier it is to liquify.

Sol.: NH_3 is most polar among the given compounds hence its critical temperature will be high and it is most easily liquified.

77. Answer (3)

Hint: Density $(d) = \frac{PM}{RT}$

Sol.: At constant temperature and pressure, $d \propto M$.

$$\frac{d_{\text{H}_2}}{d_{\text{CH}_4}} = \frac{M_{\text{H}_2}}{M_{\text{CH}_4}} = \frac{2}{16} = \frac{1}{8}$$

78. Answer (3)

Hint: Compounds which form intermolecular hydrogen bond with water are soluble in water.

Sol.: Hexane is insoluble in water as it is non-polar molecule.

79. Answer (4)

Hint: The species having unpaired electrons are paramagnetic in nature.

Sol.: B_2 & O_2 contain unpaired electrons in their respective molecular orbitals.

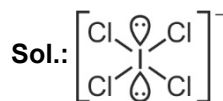
80. Answer (2)

Hint: Bond order = $\frac{\text{Number of } \sigma \text{ bonds} + \text{Number of } \pi \text{ bonds}}{\text{Number of } \sigma \text{ bonds}}$

Sol.: Bond order = $\frac{6}{4} = 1.5$

81. Answer (2)

Hint: It has octahedral electronic arrangement around central atom.



Hybridization : sp^3d^2

Shape : Square planar

82. Answer (3)

Hint: Oxides of alkaline earth metals are basic in nature (except BeO).

83. Answer (3)

Hint: O_2 is not a green house gas.

84. Answer (2)

Hint: Element having half filled subshells is difficult to ionise.

Sol.: Along the period effective nuclear charge increases hence ionization potential increases. In nitrogen, p subshell is half filled. Hence, it is highly stable. As a result the ionisation potential of nitrogen is more than that of oxygen. Therefore, the correct order of ionisation potential is ($F > N > O > C$).

85. Answer (3)

Hint: 100 g of enzyme contains 0.02 g of Zn^{2+}

Sol.: 13.1 g of enzyme contains

$$\frac{0.02}{100} \times 13.1 \text{ g of } Zn^{2+}$$

$$\text{Mole of } Zn^{2+} = \frac{0.02 \times 13.1}{100 \times 65.5} = 4 \times 10^{-5}$$

$$\begin{aligned} \text{Number of } Zn^{2+} \text{ ions} &= 4 \times 10^{-5} \times 6.02 \times 10^{23} \\ &= 24.08 \times 10^{18} \\ &= 2.4 \times 10^{19} \end{aligned}$$

86. Answer (3)

Hint: $\lambda = \frac{h}{mv}$

Sol.: $\lambda = \frac{6.6 \times 10^{-34}}{10 \times 10^{-6} \times 400} = 1.65 \times 10^{-31} \text{ m}$

87. Answer (2)

Hint: $\frac{1}{\lambda} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \times Z^2$

Sol.: $\frac{1}{\lambda} = R_H \left(\frac{1}{1^2} - \frac{1}{4^2} \right) \times (2)^2$

or, $\frac{1}{\lambda} = R_H \times \frac{15}{16} \times 4$

or, $\lambda = \frac{4}{15 R_H}$

88. Answer (4)

Hint: $Mg : 1s^2 2s^2 2p^6 3s^2$

Sol.: For s orbital and for one p orbital, the value of m is zero.

\therefore Maximum number of electrons with $m = 0$ and

$s = \frac{1}{2}$ is 4.

89. Answer (2)

Hint: $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

Sol.: Mole of butane = $\frac{5.8 \times 10^3}{58} = 10^2$

Mole of O_2 required = $\frac{13}{2} \times 10^2$

Volume of O_2 required at STP is

$$= \frac{13}{2} \times 10^2 \times 22.4 \text{ L}$$

$$= 14.56 \times 10^3 \text{ L}$$

90. Answer (3)

Hint: Mole of urea = $\frac{\text{Mass of urea in g}}{\text{Molar mass of urea}}$

Sol.: Mole of urea = $\frac{60}{60} = 1$

Mole of atoms = 1×8

Number of atoms = $8 \times 6.02 \times 10^{23}$
 $= 4.8 \times 10^{24}$

[BIOLOGY]

91. Answer (1)

Sol.: Chemicals like abscisic acids, phenolic acids and para-ascorbic acid causes seed dormancy. Gibberellic acid and nitrates remove the effect of such inhibitory substances.

92. Answer (4)

Hint: Auxin and cytokinin act antagonistically to each other w.r.t. apical dominance.

Sol.: Cytokinins help to overcome the apical dominance. They promote nutrient mobilisation which helps in the delay of leaf senescence.

93. Answer (3)
Hint: Sigmoid growth curve shows three phases.
Sol.: Three phases in sigmoid growth curve are lag phase, exponential phase and stationary phase.
94. Answer (3)
Hint: The product formed from glycerol enters into EMP pathway when it is taken as respiratory substrate.
Sol.: The product formed from glycerol that enters the respiratory pathway is phosphoglyceraldehyde.
95. Answer (2)
Hint: Complex I and complex II are NADH dehydrogenase and succinate dehydrogenase respectively.
Sol.:
- | | |
|--------------------------------------|--|
| NADH dehydrogenase (Complex I) | – Receives the electrons produced by NADH + H ⁺ |
| Complex c oxidase | – Contains two copper centres. |
| Succinate dehydrogenase (complex II) | – Provides reducing equivalents to ubiquinone. |
| Cytochrome bc ₁ complex | – Receives electrons from ubiquinone. |
96. Answer (2)
Hint: Both malic acid and oxaloacetic acid are 4-carbon molecules.
Sol.: During the conversion of malic acid into oxaloacetic acid, NADH + H⁺ is formed but CO₂ is not released. In rest of the conversions both NADH + H⁺ and CO₂ are formed.
97. Answer (1)
Hint: In plants having Kranz anatomy, double fixation of carbon dioxide occurs.
Sol.: Plants those have Kranz anatomy in their leaves show C₄ pathway. The extra ATP is used during C₄ pathway.
98. Answer (1)
Hint: Non-cyclic photophosphorylation is connected with photolysis of water.
Sol.: In non-cyclic photophosphorylation, NADP⁺ is reduced to NADPH + H⁺.
99. Answer (1)
Hint: In blue and red regions of light spectrum maximum photosynthesis occurs.
Sol.: P, Q, R and S represent 400, 500, 600 and 700 nm of wavelengths. Green light falls between 500 to 600 nm of wavelengths.
100. Answer (3)
Hint: T.W. Engelmann experimented on a green alga.
Sol.: The first action spectrum of photosynthesis was described by an experiment by using green alga *Cladophora*.
101. Answer (2)
Hint: Leg-haemoglobin is formed in root nodules of legume plants.
Sol.: The red or pink-coloured pigment leghaemoglobin is an O₂ scavenger that protects the enzyme nitrogenase from oxygen.
102. Answer (4)
Hint: Turgidity of the cell is maintained by an element which is absorbed by the plants as monovalent cation.
Sol.: Potassium helps in maintaining turgidity of the cells. Iron is essential for the formation of chlorophyll and other pigments.
103. Answer (4)
Hint: Minerals are absorbed by the plants as ions from the soil.
Sol.: Carbon is not a mineral element. It is absorbed by the plant as carbon dioxide from atmosphere.
104. Answer (3)
Hint: Stomata regulate the transpiration.
Sol.: Creating transpiration pull, cooling of leaf surface and transportation of material from soil to plant parts are the purpose of transpiration.
105. Answer (1)
Hint: Symplast is the pathway formed by the system of interconnected protoplasts of different cells.
Sol.: Apoplast pathway includes cell wall and intercellular spaces.
106. Answer (2)
Hint: Solute potential will become more negative if the concentration of solute increases.
Sol.: Water potential of cells A, B and C will be as follows.

$$\psi_w(C) > \psi_w(A) > \psi_w(B)$$
107. Answer (2)
Hint: Porins are found in the outer membrane of mitochondria, chloroplasts and some bacteria.
Sol.: Ribosomes of mitochondria do not cross the mitochondrial membrane. Facilitated transport does not require energy (ATP).

108. Answer (3)
Hint: Homologous chromosomes separate in anaphase I.
Sol.: In both anaphase of mitosis and anaphase II, centromere splits.
109. Answer (1)
Hint: Synaptonemal complex (stabilises synapsis of homologous chromosomes) is formed in the zygotene phase of prophase I.
Sol.: Dissolution of synaptonemal complex – Diplotene
 Formation of recombination nodule – Pachytene
 Assembling of meiotic spindle at the poles – Diakinesis.
110. Answer (3)
Hint: Duplication of centrosome occurs during S phase of cell cycle.
Sol.: S phase occurs between G₁ phase and G₂ phase of cell cycle.
111. Answer (4)
Hint: Kinetochore is the site where microtubules of spindle attach.
Sol.: On the side of centromere of chromosome, disc shaped structures are present known as kinetochore.
112. Answer (2)
Hint: Na⁺/K⁺ pump is energy dependent.
Sol.: Na⁺/K⁺ pump in cells is an uphill movement of ions which require energy in the form of ATP. Therefore it is an active transport.
113. Answer (1)
Hint: Leucoplasts are colourless plastids.
Sol.: Elaioplasts store fats and oils, amyloplasts store starch and aleuroplasts store proteins.
114. Answer (1)
Hint: Several ribosomes may attach to a single mRNA and form a chain called polysome.
Sol.: The ribosomes of a polysome translate the mRNA into proteins.
115. Answer (3)
Hint: Endoplasmic reticulum is found in eukaryotes.
Sol.: RER are attached with 60S subunits of 80S ribosomes.
116. Answer (4)
Hint: Heartwood does not conduct water as their xylary elements are blocked.
Sol.: Heartwood and sapwood are formed as a result of secondary growth.
117. Answer (1)
Hint: Bulliform cells help in the rolling of leaves during drought.
Sol.: Stomata regulate the process of transpiration and gaseous exchange.
118. Answer (2)
Hint: A mature sieve tube element possesses a peripheral cytoplasm.
Sol.: At maturity, tracheids and vessels are dead cells, hence devoid of protoplasm.
119. Answer (4)
Hint: Chlorenchyma performs photosynthesis but does not provide mechanical support to the plant organs.
Sol.: Corners of collenchyma cells are thickened with cellulose, hemicellulose and pectin.
120. Answer (1)
Hint: Number in brackets represents united condition *i.e.* gamosepalous or gamopetalous.
Sol.: Floral formula does not tell about the aestivation of the sepals or petals.
121. Answer (3)
Hint: Petioles are cylindrical structures.
Sol.: Petiole joins the leaf base with the leaf blade.
122. Answer (2)
Hint: Thorns and spines are analogous structures.
Sol.: Thorns are modified axillary buds whereas spines are modified leaves. Both are the structures for self defence.
123. Answer (2)
Hint: Pneumatophores are respiratory roots in some plants growing in swampy areas.
Sol.: Pneumatophores grow vertically upward to get oxygen for respiration.
124. Answer (4)
Sol.: Coraloid roots are associated with nitrogen fixing cyanobacteria.
125. Answer (3)
Hint: Bryophytes, pteridophytes and gymnosperms are archegoniates.
Sol.: Female sex organ in *Chara* is called nucule or oogonium.
126. Answer (2)
Hint: Gametes are non-motile in *Spirogyra*.
Sol.: *Spirogyra* and the members of class Rhodophyceae do not form motile gametes.
127. Answer (1)
Hint: Carrageen is obtained from red algae.
Sol.: Algin and carrageen are hydrocolloids obtained from brown and red algae respectively.

128. Answer (3)
Hint: BSE is caused by prions.
Sol.: Prions are proteinaceous infectious particles.
129. Answer (4)
Hint: Sexual stage is not found in the members of Deuteromycetes.
Sol.: *Albugo* is parasite on mustard. *Ustilago* belongs to Basidiomycetes in which basidium is formed.
Neurospora belongs to Ascomycetes.
130. Answer (1)
Hint: In five-kingdom classification system, prokaryotes are placed in kingdom Monera.
Sol.: *Euglena*, *Amoeba* and *Plasmodium* are eukaryotes whereas *Mycoplasma* is prokaryote.
131. Answer (4)
Hint: Unicellular organisms may be both prokaryotes and eukaryotes.
Sol.: In three-domain system of classification, first two domains are for prokaryotes and the third domain is for eukaryotes.
132. Answer (3)
Hint: Collections of preserved plants and animals are used for study and reference in educational institutes.
Sol.: Museums have collection of preserved plant and animal specimens.
133. Answer (1)
Hint: Rules of scientific naming of animals is assigned in ICZN.
Sol.: Animals do not have the capacity to convert glucose into starch. This conversion occurs in plants.
134. Answer (2)
Hint: Different kinds of organisms are referred to as biodiversity of the earth.
Sol.: Biodiversity is the number and various kinds of organisms found on earth. It stands for the variability found among living organisms inhabiting this world.
135. Answer (2)
Hint: Consciousness is defining property of living organisms.
Sol.: Human being is the only organism who is aware of himself *i.e.*, has self-consciousness.
136. Answer (4)
Hint: Presence of mammary gland.
Sol.: Mammals possess mammary glands which secrete milk with which they nourish their young ones. Prototherians are oviparous. Mostly heterodont dentition is seen in most mammals. Sea cow does not have seven cervical vertebrae.
137. Answer (2)
Hint: Gill cover is absent in chondrichthyes.
Sol.: Chondrichthyes are marine animals with a ventral mouth. Placoid scales are present & many of them are viviparous. Fertilisation is mostly internal.
138. Answer (4)
Hint: They are present in lungs.
Sol.: Lung parenchyma is the tissue present in lungs involved in gas transfer. Alveoli form the lung parenchyma where exchange of gases takes place.
139. Answer (2)
Hint: Gaseous product of respiration is CO₂.
Sol.: Hb combines with CO₂ to form carbaminohaemoglobin. CO forms carboxyhaemoglobin. O₂ forms oxyhaemoglobin and reduced hemoglobin is known as methaemoglobin.
140. Answer (4)
Hint: At high heart rate, duration of each cardiac cycle decreases.
Sol.: The duration of systole & diastole both decrease due to decrease in duration of cardiac cycle.
141. Answer (2)
Hint: They are chemoreceptors and influence alveolar ventilation.
Sol.: They initiate impulses that stimulate the respiratory center. Respiration is stimulated by high pCO₂ and high H⁺ concentration.
142. Answer (1)
Hint: Decreased affinity of Hb for O₂ leads to its release.
Sol.: Bohr's effect occurs at the level of actively metabolising tissues where pCO₂ is higher, so O₂ diffuses into the tissues and CO₂ diffuses into blood from tissues.
143. Answer (1)
Hint: Contraction of diaphragm requires energy.
Sol.: Inspiration is an active process in humans. It is initiated by contraction of muscles which require energy. Our lungs obey Boyle's law and act at negative pressure.

144. Answer (3)

Hint: Pancreatic amylase is released in this 'C' shaped structure.

Sol.: Lipase is absent in colon whereas mouth, stomach and duodenum respectively contain lingual, gastric and pancreatic lipases.

145. Answer (2)

Hint: Presence of saliva is important to maintain cleanliness of mouth.

Sol.: Xerostomia is dry mouth state *i.e.* less amount of saliva is secreted. Hence, in absence of saliva, chances of occurrence of dental caries are high as lysozyme is deficient.

146. Answer (3)

Hint: Exocrine glands do not secrete hormones.

Sol.: Glucagon is a hormone secreted by the endocrine part of the pancreas *i.e.* α -cells of Islets of Langerhans. All others are enzymes of pancreatic juice.

147. Answer (1)

Hint: It is the time from the onset of the P wave to the start of the QRS complex.

Sol.: P wave represents atrial depolarisation. QRS complex represents ventricular depolarisation. Therefore, P-R interval is the time that represents atrioventricular conduction.

148. Answer (3)

Hint: It prevents backflow of blood from left ventricle into left atrium.

Sol.: The conduction system of heart includes SA node \rightarrow AV node \rightarrow Bundle of His \rightarrow Purkinje fibres.

149. Answer (4)

Hint: Epithelial cells obtain O_2 and nourishment from surrounding tissue by diffusion.

Sol.: The epithelium is devoid of blood supply hence called avascular. It forms the innermost lining of intestine.

150. Answer (2)

Hint: Excitability is property of structural and functional cells of this tissue.

Sol.: Neural tissue present in CNS & PNS, controls the functions of the body. Cardiac muscles regulate heart contraction and skeletal muscles cause movement of body parts.

151. Answer (3)

Hint: They are unjointed structures.

Sol.: Anal styles are present attached with 9th sternum in males and aid in differentiating male

from female cockroach. Tenth tergum provides attachment to anal cerci in both male and female cockroach.

152. Answer (1)

Hint: It is present in segment posterior to testis.

Sol.: It functions as an accessory reproductive gland.

153. Answer (3)

Hint: Lactose is a sugar found in milk.

Sol.: Milk sugar lactose is converted into lactic acid by a bacteria *Lactobacillus acidophilus*. Rennin converts milk protein casein into curd that is calcium paracaseinate. Optic nerve emerges from blind spot.

154. Answer (4)

Hint: These help in blood clotting.

Sol.: Megakaryocytes fragment to form platelets or thrombocytes. Lymphocytes participate in providing body immunity.

155. Answer (3)

Hint: Hair cells behave as receptors.

Sol.: The basal end is in contact with afferent neurons which are sensory in function *i.e.* they take impulses from organ of Corti to brain. Efferent nerve fibres are motor in nature.

156. Answer (3)

Hint: Aqueous humor is replenished regularly.

Sol.: Aqueous humor is present ahead of lens and behind cornea. Rhodopsin is absent in bipolar cells but present in rod cells.

157. Answer (1)

Hint: Head part of this protein acts as an ATPase.

Sol.: Heavy meromyosin (HMM) part of myosin acts as ATPase. LMM forms tail of myosin.

158. Answer (3)

Hint: Oxygen deficient stage of the body.

Sol.: Extra O_2 is consumed to replenish ATP and phosphorylcreatine stores during O_2 debt characterised by increased breathing rate after strenuous exercise. Rigor mortis involves sustained contraction of muscle fibres due to lack of ATP after death. Glycolysis is an anaerobic process.

159. Answer (2)

Hint: Structure that joins a muscle to a bone.

Sol.: Tendons connect bone to a muscle. Ligaments join bone to a bone.

160. Answer (2)

Hint: Decrease in hormones of adrenal cortex such as mineralocorticoids.

Sol.: In case of adrenal insufficiency, the adrenal hormones will decrease including glucocorticoids and sex corticoids. Decrease in aldosterone will decrease the reabsorption of Na^+ , thus Na^+ loss in urine occurs causing decrease in blood pressure.

161. Answer (3)

Hint: Sympathetic nervous system supplies more energy for 'flight or fight response'.

Sol.: Increasing blood glucose level is a function of sympathetic nervous system.

162. Answer (4)

Hint: Cobalamine absorption occurs in intestine.

Sol.: Castle's intrinsic factor is secreted by parietal cells which also secrete HCl, but HCl has no role in absorption of vit- B_{12} .

163. Answer (3)

Hint: Tasteless urine is passed upon deficiency of ADH stored in posterior pituitary.

Sol.: Hyperthyroidism results in exophthalmic goitre. Acromegaly occurs due to excessive release of GH from adenohypophysis after puberty.

164. Answer (1)

Hint: Bowing of legs occurs in Rickets.

Sol.: Rickets is a disease caused in children due to deficiency of Vitamin D *i.e.* a form of calciferol. Deficiency of thiamine causes beri-beri while deficiency of retinol causes nyctalopia.

165. Answer (1)

Hint: Circular mouth fishes.

Sol.: Class cyclostomata includes *Myxine*. *Ascidia* is placed in urochordata which are considered as most primitive a craniates.

166. Answer (2)

Hint: It is released from thymus.

Sol.: Thymus releases thymosins which play a major role in differentiation of T lymphocytes. Thymus degenerates in older individuals. Thyroxine is responsible for maintaining basal metabolic rate.

167. Answer (1)

Hint: Part of brain containing iter.

Sol.: Hypothalamus is a part of forebrain.

168. Answer (3)

Hint: Role of gap junctions.

Sol.: The membranes of pre and post synaptic neurons are in very close proximity. Pre and post synaptic neurons are connected together by connexons.

169. Answer (1)

Hint: These are small fibres projecting from cell body.

Sol.: Dendrites are afferent processes that receive impulses of the neuron. Nerve endings of axons are efferent processes that transmit impulses at synapses.

170. Answer (4)

Hint: Approximately total volume of blood in the body.

Sol.: About 5L of blood is pumped by each ventricle per minute.

Cardiac output = Heart rate \times stroke volume
= $72 \times 70 = 5040$ ml.

171. Answer (1)

Hint: This part is internally lined by brush border epithelium.

Sol.: Proximal convoluted tubule is internally lined by simple cuboidal epithelium with microvilli that increase the surface area for reabsorption. Further, it is permeable for nearly all types of substances present in glomerular filtrate. Minimum reabsorption occurs in ascending limb of loop of Henle.

B – DCT

C – Vasa recta

D – Collecting duct

172. Answer (4)

Hint: It promotes loss of Na^+ from the body.

Sol.: ANF increases Na^+ excretion causing water to be lost along with Na^+ , hence its secretion will not occur in case of dehydration. All other hormones in given options increase absorption of Na^+ directly or indirectly.

173. Answer (3)

Hint: Nearly 1-1.5 L of this product is passed per day by humans.

Sol.: Volume of urine is decided after glomerular filtration, therefore it will not affect the rate of filtration. GFR depends upon blood pressure and volume of blood passing through kidney.

174. Answer (3)

Hint: Bidder's canal is present in male frogs.

Sol.: Urinogenital duct in male frogs transport both urine and sperms. Bidder's canal in kidney of frog transports only sperms.

175. Answer (4)

Hint: Cellulose is a polymer of glucose.

Sol.: Haemoglobin is made up of 2 parts *i.e.* haem & globin. Globin is protein part & contains peptide bonds. Nucleosides are formed by nitrogenous bases and sugar.

176. Answer (2)

Hint: K_m indicates the substrate affinity for the enzyme.

Sol.: Turnover number indicates the number of product molecules formed per minute and K_m represents affinity of substrate for the enzyme in an inverse relation. Thus, lesser the $K_m \rightarrow$ more the affinity \rightarrow higher the turnover number.

177. Answer (3)

Hint: It is also the cofactor for carboxypeptidase.

Sol.: Zn^{++} is required for activity of carbonic anhydrase. Mg^{+2} is activator for hexokinase. Fe^{2+} is found in heme.

178. Answer (1)

Hint: They are composed of proteins which perform zipper action.

Sol.: Adhering junctions like macula adherens are usually present just below the tight junctions where two cells are joined to form a barrier.

Plasmodesmata are present in plant cells while gap junctions work as communication channels in animal cells.

179. Answer (4)

Hint: Formation of proteins.

Sol.: Insulin an anabolic hormone facilitates uptake of glucose by cells, thus leading to hypoglycemia. Lipolysis occurs to provide substrate for energy production in the body *i.e.* fatty acids & triglycerides. Protein catabolism occurs for energy causing body wasting. Glycogenolysis is breakdown of glycogen into glucose.

180. Answer (3)

Hint: Aquatic animals that do not respire through gills.

Sol.: *Macaca* and *Rattus* are terrestrial mammals. *Trygon* is a cartilaginous fish. *Testudo* is a reptile. Whales and dolphins are aquatic mammals.

