15/04/2025

Phase-II
CODE-D

Aakash
Medical | IIT-JEE | Foundations

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FINAL TEST SERIES for NEET-2025

MM : 720 **Test – 6** **Time : 180 Mins.**

Answers

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

Hints and Solutions

PHYSICS

(1) **Answer :** (1)
Hint:
Power (P) $\propto AT^4$
Solution:
$\frac{P_2}{P_1} = \frac{A_2T_2^4}{A_1T_1^4}$
$= \bullet\frac{1}{2}\bullet^2(2)^4$
= 4
$P_2 = 4P_1 = 4 \times 600 = 2400$ W

(2) **Answer :** (4)
Solution:
Given A = 50 cm = $\frac{1}{2}$ m
At mean position, speed is maximum
i.e. $v_{max} = A\omega$
$8 = \frac{1}{2} \times \omega \Rightarrow \omega = 16$ rad/s
$\omega = 2\pi f \Rightarrow f = \frac{\omega}{2\pi} = \frac{16}{2\pi} = \frac{8}{\pi}$ Hz

(3) **Answer :** (3)
Solution:
For isobaric process, pressure is constant while temperature is constant for isothermal process.

(4) **Answer :** (1)
Solution:
Work done is equal to area under PV curve
$W = -(300 - 100) \times (200 - 100) \times 10^3 \times 10^{-6}$
$W = -200 \times 100 \times 10^{-3}$
$W = -20$ J

(5) **Answer :** (1)
Hint:
$\eta = 1 - \frac{T_2}{T_1}$
Solution:
$T_2 = 273 + 77 = 350$ K
$\frac{30}{100} = 1 - \frac{350}{T_1}$ • $\frac{70}{100} = \frac{350}{T_1}$
• $T_1 = 500$ K

(6) **Answer :** (1)
Solution:
ΔU_1 is positive, ΔU_2 is zero and ΔU_3 is negative. Hence $\Delta U_1 > \Delta U_2 > \Delta U_3$

(7) **Answer :** (3)
Solution:
$PV^\gamma = K$
$\Rightarrow V^\gamma dP = -P\gamma V^{(\gamma-1)}dV$
$\Rightarrow \frac{dP}{P} = -\gamma\frac{dV}{V}$

(8) **Answer :** (1)
Hint:
Kinetic energy of gas is proportional to absolute temperature T.
Solution:
K·E $\propto T$
$\frac{E}{E'} = \frac{200}{400} = \frac{1}{2}$

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

(9) **Answer :** (3)
Hint:
Use $C_{v_{mix}} = \frac{R}{\gamma_{mix} - 1}$ and $C_{v_{mix}} = \frac{n_1 C_{V_1} + n_2 C_{V_2}}{n_1 + n_2}$
Solution:
$C_{v_{mix}} = \frac{\frac{1 \times 3R}{2} + \frac{3 \times 5R}{2}}{4}$
$\Rightarrow \quad C_{v_{mix}} = \frac{9R}{4}$
and $C_{v_{mix}} = \frac{R}{\gamma_{mix} - 1} \Rightarrow \gamma_{mix} = \frac{13}{9}$

(10) **Answer :** (1)
Hint:
Use ideal gas equation
Solution:
$\frac{20P_0 \times V}{300} = \frac{P_0 \times 20V}{T_2}$
$\Rightarrow T_2 = 300$ K

(11) **Answer :** (4)
Solution:
$C = \frac{\Delta Q}{n \Delta T}$, for isothermal process $\Delta T = 0$

(12) **Answer :** (3)
Hint:
$v = \pm\omega \sqrt{A^2 - x^2}$
Solution:
$v = \pm\omega \sqrt{A^2 - x^2}$
$\left(\frac{v^2}{\omega^2}\right) = A^2 - x^2$
$\frac{v^2}{\omega^2} + x^2 = A^2$
$\frac{v^2}{(A\omega)^2} + \frac{x^2}{A^2} = 1 \rightarrow$ This is the equation of an ellipse.

(13) **Answer :** (2)
Solution:
$y = 4\cos^2 \cdot \frac{t}{2} \cdot \sin \cdot 1000t \cdot$
$y = 2\,[1 + \cos t] \sin 1000\,t$
$y = 2 \sin 1000\,t + 2 \cos t \sin 1000\,t$
$= 2 \sin 1000\,t + \sin (1001)\,t + \sin (999)\,t$
Therefore it carries 3 SHM's

(14) **Answer :** (1)
Solution:
This is a periodic motion but not oscillatory.

(15) **Answer :** (3)
Solution:
$KE_m = \frac{1}{2} k A^2$
$k = m\omega^2$
$KE_m = \frac{1}{2} m\omega^2 A^2$
$= \frac{1}{2} \times 2 \times 10^{-3} \times (5)^2 \times 10^{-4} \times (100)^2$
$= 25 \times 10^{-3}$ J = 25 mJ

(16) **Answer :** (1)
Solution:
$f_A = f + \frac{f}{50}$

$f_B = f - \frac{f}{50}$

$f_A - f_B = \frac{f}{50} + \frac{f}{50}$

$\frac{f}{25} = 8$

$f = 200$ Hz

$f_B = 200 - \frac{200}{50} = 196$ Hz

(17) **Answer :** (2)
Solution:

$v = \sqrt{\frac{Y}{\rho}} = \sqrt{\frac{1\times10^{10}}{2.5\times10^{3}}} = 2\times10^{3}\,\mathrm{m/s}$

(18) **Answer :** (4)
Solution:
Sound waves are longitudinal and longitudinal waves cannot be polarised.

(19) **Answer :** (2)
Solution:
$v_p = 2v_W$
$A\omega = 2f\lambda$
$A2\pi f = 2f\lambda$
$\lambda = \pi A$

(20) **Answer :** (4)
Hint:
Speed of sound in air $v = \sqrt{\frac{\gamma RT}{M}}$
Solution:
$\frac{v_1}{v_2} = \sqrt{\frac{T_1}{T_2}}$

$\Rightarrow \quad \frac{v}{2v} = \sqrt{\frac{(273+27)}{T}} \Rightarrow \quad T = 1200$ K
= 927°C

(21) **Answer :** (4)
Solution:
$f_5 = (2n + 1)\,50$
$= 11 \times 50$
$= 550$ Hz

(22) **Answer :** (1)
Solution:
At thermal equilibrium two bodies are at same temperature.

(23) **Answer :** (1)
Solution:

$\frac{C-0}{100-0} = \frac{V_b - V_{ice}}{V_{bw} - V_{ice}} \Rightarrow \frac{C}{100} = \frac{67-40}{60-40} \Rightarrow C = 135^{\circ}\mathrm{C}$

(24) **Answer :** (4)
Solution:

$\alpha = \frac{\Delta L}{L_0 \Delta T} = \frac{0.01}{5\times100} = 2\times10^{-5}/^{\circ}\mathrm{C}$

(25) **Answer :** (4)
Solution:
$\sigma = Y\alpha\Delta T \Rightarrow F = Y\alpha\Delta TA$
$F = 2 \times 10^{11} \times 1.2 \times 10^{-5} \times 10 \times 40 \times 10^{-4}$
$F = 9.6 \times 10^{4}$ N

(26) **Answer :** (3)
Solution:
For an isochoric process, volume remains constant

(27) **Answer :** (1)
Solution:

Work done in isothermal process

$W = nRT \ln \frac{V_2}{V_1}$

$W = 2 \times 8.314 \times 300 \ \ln \frac{4}{2}$

= 3457 J

(28) **Answer :** (3)
Solution:
Isothermal process : T = constant ⇒ PV = constant
Adiabatic process: $Q = 0 \Rightarrow \Delta U = -W$
Isochoric process : $\Delta V = 0 \Rightarrow W = 0$
Isobaric process : $\Delta P = 0, \Rightarrow \ \frac{T}{V} = \text{constant}$

(29) **Answer :** (2)
Solution:
Molecules of an ideal gas have kinetic energy and because of that molecules collide with the container walls and generate pressure.

(30) **Answer :** (4)
Solution:
Total kinetic energy depends on the amount of gas, hence it can be different in the given condition

- $v_{\text{rms}} = \sqrt{\frac{3RT}{M}} \Rightarrow v_{\text{rms}} \propto \frac{1}{\sqrt{M}}$
- $\rho = \frac{PM}{RT} \Rightarrow \rho \propto PM$

(31) **Answer :** (2)
Solution:
Ideal gas equation
$PV = nRT$
For constant pressure, $V \propto T$
$\frac{V}{2V} = \frac{273+27}{T} \Rightarrow T = 600$ K

(32) **Answer :** (3)
Solution:
In the given data, 5 m/s is the most probable speed.

(33) **Answer :** (3)
Solution:

Restoring force is tension (T).
$T = F_S = kx$
$\therefore \ -kx = m \times a$
$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{m}{k}}$

(34) **Answer :** (2)
Solution:
$x = a\cos\bullet\omega t + \frac{\pi}{2}\bullet$
At $t = 0, \ x = a\cos\frac{\pi}{2} = 0$
At $t = 0$, the particle is at mean position
$v = \frac{dx}{dt} = -a\omega\sin\bullet\omega t + \frac{\pi}{2}\bullet$
At $t = 0$, $v = -a\omega$
At $t = 0$, particle is moving towards negative x axis

(35) **Answer :** (4)
Solution:
$\Delta\phi = \frac{2\pi}{\lambda}\Delta x$
$0.5\pi = \frac{2\pi}{\lambda} \times 0.3 \Rightarrow \ \lambda = \frac{6}{5}$m
Speed of the wave, $v = \lambda \times f$
$v = \frac{6}{5} \times 150$ Hz = 180 m/s

(36) **Answer :** (1)
Solution:

$I_{max} = \bullet\bullet \sqrt{I_1} + \bullet \sqrt{I_2} \bullet^2$, $I_{min} = \bullet\bullet \sqrt{I_1} - \bullet \sqrt{I_2} \bullet^2$

$I_{max} - I_{min} = 4 \bullet \sqrt{I_1 I_2}$

(37) Answer : (2)
Solution:
Third overtone of a closed organ pipe :

$f_c = \frac{7v}{4l_c}$ ...(i)

Third overtone of an open pipe

$f_o = \frac{4v}{2l_0}$ ...(ii)

Given $f_C = f_O$

$\therefore \frac{7v}{4l_c} = \frac{4v}{2l_0} \Rightarrow \frac{l_c}{l_0} = \frac{7}{8}$

(38) Answer : (4)
Solution:
Speed of sound in air in adiabatic condition is given by

$v = \sqrt{\frac{\gamma P}{\rho}}$ or $\sqrt{\frac{\gamma RT}{M}}$

(39) Answer : (1)
Solution:
$W = W_{AB} + W_{AC}$

$= P_0(2V_0 - V_0) + 0$

$= P_0 V_0$

$P_0 V_0 = RT_0$

$W = RT_0$

(40) Answer : (3)
Solution:

$\left(\frac{dP}{dV}\right)_{adiabatic} = -\gamma P$ and

$\left(\frac{dP}{dV}\right)_{isothermal} = -P$

$\therefore$ Slope of adiabatic curve is more than slope of isothermal curve at same point

(41) Answer : (2)
Solution:

$\lambda = \frac{1}{\sqrt{2}\pi d^2 n} = \frac{kT}{\sqrt{2}\pi d^2 P}$

$\boxed{\lambda \propto \frac{1}{P}}$

(42) Answer : (3)
Solution:
$y_1 = A\sin(\omega t)$

$y_2 = -A\sin(\omega t)$

$y = (y_1 - y_2) = 2A\sin(\omega t)$

$y_{max} = 2A$

(43) Answer : (1)
Solution:

- $T = 2\pi\sqrt{\frac{L}{g}}$

Now in liquid the time period is given by

$T' = 2\pi \bullet \sqrt{\frac{L}{g - \frac{g}{n}}}$

$\Rightarrow T' = \left(\sqrt{\frac{3}{2}}\right)T$

(44) Answer : (1)
Solution:

910	1274	1638		2366
↓ ÷182	↓ ÷182	↓ ÷182		↑ ×182
5	7	9	11	13
(2nd overtone)	3rd	4th	5th	6th

The ratio of frequencies are 5 : 7 : 9 --,
So it is a closed organ pipe
Hence frequency of 6th overtone = (6 × 2 + 1) × 182
= 2366 Hz

(45) Answer : (3)
Solution:
$f = \frac{1}{2L}\sqrt{\frac{T}{\mu}}$
$\Delta f\% = \frac{1}{2}\Delta T\%$
Hence, $f = \frac{5\times 200}{2} = 500$ Hz

CHEMISTRY

(46) Answer : (4)
Solution:
Mole of NaOH = 8
Mass of NaOH = 40 × 8 = 320 g
Mass of water = 1000 g
Mass of solution = 1320 g
Volume of solution = $\frac{1320}{1.32}$mL
Molarity = $\frac{8 \text{ mole}}{\frac{1320}{1.3}\times 10^{-3}\text{ L}} = \frac{8\times 1.32\times 1000}{1320} = 8 \text{ M}$

(47) Answer : (4)
Solution:
For ideal solution
A↔ A and B↔B intractions are similar as A↔B intractions.

(48) Answer : (4)
Solution:
Freezing point of solution ∝ $\frac{1}{i}$
$[Co(H_2O)_6]Cl_3$, i = 4
$[Co(H_2O)_5Cl]Cl_2\cdot H_2O$, i = 3
$[Co(H_2O)_4Cl_2]Cl\cdot 2H_2O$, i = 2
$[Co(H_2O)_3Cl_3]\cdot 3H_2O$, i = 1

(49) Answer : (4)
Solution:
C_2H_5Cl and C_2H_5OH is a non ideal solution.

(50) Answer : (4)
Solution:
$\frac{P^\circ - P_s}{P^\circ} = \frac{n}{n+N} \simeq \frac{n}{N} \simeq \frac{w}{MW_{solute}\times N}$
Q Solution has same amount of solvent, so P_S value depends only on molecular mass of solute.
So, vapour pressure of solution ∝ MWsolute

(51) Answer : (1)
Hint:
$\Delta T_f = i \times m \times K_f$ (i = van't Hoff factor)
Solution:
$$Ca_3(PO_4)_2 \rightleftharpoons 3Ca^{2+} + 2PO_4^{3-}$$

Initially 1
At equilibrium (1 – 0.8) 3 × 0.8 2 × 0.8
$\Delta T_f = 4.2 \times 0.1 \times 1.86 = 0.78$
$T_f = -0.78°C$

(52) Answer : (4)
Solution:
If $d_{solution} = 1$ g/ml
Then molarity of 1 molal solution will be less than 1.
Mole fraction is temp independent.

(53) Answer : (2)
Hint:
$\Delta T_f = iK_fm$
Solution:
$\Delta T_f = 0.88°C$
$\therefore 0.88 = i \times 1.86 \times 0.2 \Rightarrow i = 2.36$

Now $\alpha = \frac{i-1}{n-1} = \frac{2.36-1}{3-1} = 0.68$

(54) Answer : (3)
Solution:
$\pi = cRT$
$= \frac{\frac{18}{180}}{\frac{200}{1000}} \times 0.082 \times 300$
π = 12.3 atm

(55) Answer : (3)
Solution:
95% by volume of ethanol form minimum boiling azeotrope.

(56) Answer : (1)
Solution:

$\pi_1 = \pi_2 \frac{3/M_0 \text{ mol}}{1 \text{ L}} = 0.05$

$M_0 = 60$
$(12 + 2 + 16)x = 60$
$\therefore x = 2$
So, formula is $C_2H_4O_2$.

(57) Answer : (4)
Solution:
$P_{total} = P_A^\circ X_A + P_B^\circ X_B = \left(540 \times \frac{2}{3}\right) + \left(420 \times \frac{1}{3}\right)$
$= \frac{1080+420}{3} = \frac{1500}{3} = 500\, torr$

(58) Answer : (1)
Solution:
At a given pressure, higher is the value of Henry's constant of a gas, lower will be its solubility in the liquid.

(59) Answer : (2)
Solution:
$\frac{P_1^0 - P}{P_1^0} = \frac{w_2 \times M_1}{M_2 \times w_1}$
$\frac{400-390}{400} = \frac{0.8 \times 154}{M_2 \times 77}$
or, $M_2 = 64$ g mol^{-1}

(60) Answer : (3)
Solution:
$\Delta T_b = i \times m \times K_b = 1 \times \frac{0.1}{500 \times 10^{-3}} \times 0.52$
= 0.104°C
$T_b = 100.1°C$

(61) Answer : (2)
Solution:
Anode: $Cl^{-}(aq) \rightarrow \frac{1}{2}Cl_2(g) + e^{-}$
Cathode: $H_2O(l) + e^{-} \rightarrow \frac{1}{2}H_2(g) + OH^{-}(aq)$

(62) Answer : (4)
Solution:

$$\underset{\frac{12}{12}=1 \text{ mole}}{C(s)} + \underset{1 \text{ mole}}{O_2(g)} \rightarrow CO_2 \begin{matrix} \bullet & \bullet \\ \bullet & \bullet \end{matrix} g$$

$2H_2O \rightarrow 4H^{\oplus} + O_2 + 4e$
Number of mole of O_2 required = 1
$4 \times 96500 = t \times 100$
Time = $\frac{4\times 96500}{100}$ sec
= 4 × 965 sec
Number of hours = $\frac{4\times 965}{3600} = \frac{965}{900} = \frac{9.65}{9}$
= 1.07 hours

(63) Answer : (1)
Solution:
$Fe^{2+} + 2e^{-} \rightarrow Fe;\ \Delta G_1^0 = -2Fx_1$ .....(i)
$Fe^{3+} + 3e^{-} \rightarrow Fe;\ \Delta G_2^0 = -3Fx_2$ .....(ii)
$Fe^{3+} + e^{-} \rightarrow Fe^{2+};\ \Delta G_3^0 = -Fy$ .....(iii)
$\therefore$ (ii) – (i) = (iii), $\Delta G_3^0 = \Delta G_2^0 - \Delta G_1^0$
$Y = 3x_2 - 2x_1$

(64) Answer : (2)
Hint:
$E_{cell} = E°_{cell} - \frac{0.0591}{n} \log Q$
Solution:
$A(s) + \underset{0.1\ M}{2B^{+}} \rightleftharpoons \underset{0.1\ M}{A^{2+}} + 2B(s)$

$Q = \frac{\left[A^{2+}\right]}{[B^{+}]^2} = \frac{(0.1)}{(0.1)^2} = 10$

$5 = E°_{cell} - \frac{0.0591}{2} \log 10$
$E°_{cell} = 5.03$ V

(65) Answer : (2)
Solution:
$\alpha = \frac{\Lambda_m}{\Lambda_m^{\circ}}$
$\alpha = \frac{10}{500} = 0.02$
$K = C \times \alpha^2 = 0.04 \times (0.02)^2 = 1.6 \times 10^{-5}$

(66) Answer : (2)
Solution:
$\alpha = \frac{\Lambda_m}{\Lambda_m^{\circ}} = \frac{25}{400} \times 100 = 6.25\%$

(67) Answer : (3)
Solution:
$\lambda^{\circ}_{A^{+}} + 2\lambda^{\circ}_{Cl^{-}} = 200 \ldots (1)$
$\lambda^{\circ}_{B^{+}} + \lambda^{\circ}_{OH^{-}} = 100 \ldots (2)$
$\lambda^{\circ}_{B^{+}} + \lambda^{\circ}_{Cl^{-}} = 50 \ldots (3)$
$\lambda^{\circ}_{A(OH)_2} = \lambda^{\circ}_{A^{+}} + 2\lambda^{\circ}_{Cl^{-}} + 2\left(\lambda^{\circ}_{B^{+}} + \lambda^{\circ}_{OH^{-}}\right) - 2\left(\lambda^{\circ}_{B^{+}} + \lambda^{\circ}_{Cl^{-}}\right)$
= 200 + 2 × 100 – 2 × 50

= 300 S cm^2 mol^{-1}.

(68) **Answer :** (2)
Solution:

$$\underset{(0.001\text{ M})}{Mg(s)} + 2\underset{}{Ag^+(aq)} \rightarrow \underset{(0.1\text{ M})}{Mg^{2+}(aq)} + 2Ag(s)$$

$$E_{cell} = E^\circ_{cell} - \frac{0.0591}{2}\log\frac{[Mg^{2+}]}{[Ag^+]^2}$$

$$= 3.17 - \frac{0.0591}{2}\log\frac{(0.1)}{(0.001)^2}$$

$$= 3.0225\ V \approx 3\ V$$

(69) **Answer :** (4)
Hint:

$Pb(s) + PbO_2(s) + 2\ H_2SO_4 \underset{\text{charging}}{\overset{\text{discharging}}{\rightleftharpoons}} 2\ PbSO_4(s) + 2\ H_2O(l)$

Solution:
H_2SO_4 gets consumed during discharging.
∴ pH of solution increases.

(70) **Answer :** (1)
Solution:
A secondary cell after recharging can be used again. Fuel cells are also galvanic cells.

(71) **Answer :** (1)
Solution:

$Mg^{2+}(aq) + 2e^- \rightarrow Mg(s)$	E° = –2.36 V
$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$	E° = 0.34 V
$Ni^{2+}(aq) + 2e^- \rightarrow Ni(s)$	E° = –0.25 V
$H^+(aq) + e^- \rightarrow \frac{1}{2}H^2(s)$	E° = 0 V

(72) **Answer :** (2)
Solution:
Metal with less SRP has high reactivity hence reactivity order will be
Li > K > Ca > Na

(73) **Answer :** (3)
Solution:
Prevention of corrosion of iron can be done by
• Covering iron by paint
• Covering the surface of iron by metal like Zn
• Using more reactive sacrificial electrode like Mg.

(74) **Answer :** (2)
Hint:
$Mg^{2+} + 2e^- \rightarrow Mg$
Solution:
Moles of Mg^{2+} = 4.8/24 = 0.2
One mole of Mg^{2+} require 2 Faradays of electrons
0.2 mole of Mg^{2+} requires,
No. of faraday = 2 × 0.2 = 0.4

(75) **Answer :** (1)
Solution:
Anode : $Pb(s) + SO_4^{2-}(aq) \rightarrow PbSO_4 + 2e^-$
Cathode: $PbO_2(s) + SO_4^{2-}(aq) + 4H^+(aq) + 2e^- \rightarrow PbSO_4 + H_2O$

(76) **Answer :** (3)
Solution:

Molecularity cannot be fractional or zero and it is applicable to elementary reactions only.

(77) Answer : (4)
Solution:
For zero order reaction
At = $a_0 - kt$
At t = $t_{100\%}$
$a_t = 0$
$0 = a_0 - kt_{100\%}$
$t_{100\%} = \frac{a_0}{k}$

(78) Answer : (2)
Solution:
Hydrolysis of cane sugar in acidic medium is a pseudo first order reaction.

(79) Answer : (4)
Solution:
$\log\left(\frac{K_2}{K_1}\right) = \frac{Ea}{2.303\,R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

$\log 2 = \frac{Ea}{2.303 \times 8.314}\left(\frac{1}{300} - \frac{1}{310}\right)$

Ea = 0.3 × 2.303 × 8.314 × 300 × 31 J = 53.42 kJ

(80) Answer : (1)
Solution:
For a first order rection for example decomposition of N_2S_5,

Half life $t_{\frac{1}{2}} = \frac{0.693}{K}$

(81) Answer : (1)
Solution:
Slow step is rate determining step
$r = K[A_3][A]$

$K_C = \frac{[A_2][A]}{[A_3]}$

$[A] = \frac{K_C[A_3]}{[A_2]}$

$r = K\,KC\ \frac{[A_3]}{[A_2]}[A_3]$

$r = K^1[A_3]^2[A_2]^{-1}$

(82) Answer : (2)
Solution:
For reaction

$H_2O_2(aq) + 3I^-(aq) + 2H^+(aq) \rightarrow 2H_2O + I_3^-(aq)$

$\frac{-d[H_2O_2]}{dt} = \frac{-1}{3}\frac{d\bullet I^-\bullet}{dt} = \frac{-1}{2}\frac{d\bullet H^+\bullet}{dt} = \frac{1}{2}\frac{d[H_2O]}{dt} = \frac{d\bullet I_3^-\bullet}{dt}$

$\frac{-1}{3}\frac{d\bullet I^-\bullet}{dt} = \frac{d\bullet I_3^-\bullet}{dt}$

$\frac{d\bullet I_3^-\bullet}{dt} = \frac{1}{3}x$

(83) Answer : (3)
Solution:

Unit of rate constant for nth order reaction is $(mol\ L^{-1})^{1-n}\ s^{-1}$

(84) Answer : (1)
Solution:
On doubling concentration [A] by keeping [B] constant rate of reaction becomes doubled hence order w.r.t. A is 1.
On doubling concentration [B] by keeping [A] constant rate of reaction becomes doubled hence order w.r.t. B is 1.
Hence rate law
r = k[A][B]

(85) Answer : (3)
Solution:

Since temperature coefficient is 3

$\frac{r_1}{r_2} = 3^{\frac{\Delta T}{10}}$

$= 3^{\frac{30}{10}} = 27$

(86) Answer : (4)
Solution:
$t_{93.75\%} = 4 \times t_{50\%}$
$= 4 \times 24 = 96$ min

(87) Answer : (2)
Solution:
For first order reaction same % consumption requires same amount of time.
1 M to 0.6 M and 0.6 M to 0.36 M both are 40% consumption hence time required will be 10 min.

(88) Answer : (1)
Solution:

$$\underset{t=0}{} \quad A(g) \longrightarrow B(g) + C(g)$$

$$t = 20 \quad 60 - p \qquad p \qquad p$$

$60 - p + p + p = 105$
$p = 45$

$$t = \frac{2.303}{K}\log\bullet\frac{P_0}{P_0 - p}\bullet$$

$$20 = \frac{2.303}{K}\log\bullet\frac{60}{60 - 45}\bullet$$

$$20 = \frac{2 \times 2.303 \log 2}{K}$$

$$20 = \frac{2 \times 0.693}{K}$$

$20 = 2 \times t_{\frac{1}{2}}$

$t_{\frac{1}{2}} = 10$ min

(89) Answer : (4)
Hint:
$k = Ae^{-E_a/RT}$
Solution:

$$\log k = \log A - \frac{E_a}{2.303\ RT}$$

So, graph between log k and $\frac{1}{T}$ is a straight line with negative slope.

(90) Answer : (4)
Solution:
Rate of reaction always increases with increase in temperature.

BOTANY

(91) Answer : (2)
Solution:
Ethylene enhances the rate of respiration during fruit ripening.

(92) Answer : (2)
Solution:
Enolase acts on 2-phosphoglycerate and converts it into phosphoenolpyruvate. Alcohol dehydrogenase converts acetaldehyde to ethanol

(93) Answer : (2)
Solution:

In wind pollinated flowers there is single ovule in each ovary and light, non-sticky pollen grains are found.

(94) Answer : (1)
Solution:
This sigmoid graph explains geometric growth and the expression is $W_1 = W_0e^{rt}$

(95) Answer : (3)
Solution:
During respiration, oxidative decarboxylation reaction occur inside the mitochondria.

(96) Answer : (1)
Solution:
Aqueous solution of ethephon is readily absorbed by plants and releases ethylene slowly.

(97) Answer : (3)
Solution:
Nucellus is a diploid tissue and aleurone layer is triploid, so both have different ploidy.

(98) Answer : (4)
Solution:
Secondary xylem and phloem are formed by the redifferentiation process.

(99) Answer : (2)
Solution:
In groundnut, endosperm is completely consumed during embryo development.

(100) Answer : (3)
Solution:
Complex I : Oxidizes the electrons from NADH produced during TCA.
Complex II : Ubiquinone receives reducing equivalents via this, generated during succinate oxidation.
Complex III : Ubiquinol is oxidized with transfer of electrons to cytochrome 'c' via this complex.
Complex IV : Contains cytochromes *a* and a_3 and two copper centres.

(101) Answer : (1)
Solution:
Pollen grains coming in contact with stigma is chance factor in both wind and water pollinated flowers. Therefore, they produce enormous amount of pollens as compared to number of ovules available to compensate the uncertainties and losses.

(102) Answer : (3)
Solution:
Both auxin and cytokinin promote cell division.

(103) Answer : (4)
Solution:
Generative cell divides and form 2 male gametes in pollen tube.

(104) Answer : (3)
Solution:
Epiblast is present in embryo of monocot seeds.

(105) Answer : (1)
Solution:
Oxidation of one molecule of NADH gives rise to 3 molecules of ATP, while, one molecule of $FADH_2$ produces 2 molecules of ATP.

(106) Answer : (2)
Solution:
Sporopollenin can withstand high temperatures and strong acids, and it is found in the exine of pollen grains.

(107) Answer : (4)
Solution:
In some members of Rosaceae, Leguminoseae and Solanaceae, pollen grains maintain viability for months.

(108) Answer : (3)
Solution:
Succinate dehydrogenase (SDH) removes 2 redox equivalents from succinic acid, which are accepted by FAD^+ and reduced into $FADH_2$ and the succinic acid is converted into fumaric acid

(109) Answer : (3)
Hint:
Precursor of gibberellin is product of link reaction of respiration.
Solution:
It is Acetyl CoA

(110) Answer : (2)
Solution:
Auxins are derived from indole compounds.

(111) Answer : (4)
Solution:
Aleurone layer of endosperm release α--amylase and protease enzyme. They together promote germination of the seeds.

(112) Answer : (2)
Solution:
In pineapple, flowering and fruit set up is synchronized by ethylene and it increases female flowers in cucumber.

(113) Answer : (1)
Solution:
Strawberry is a false fruit.

(114) Answer : (3)
Solution:
Less than 7 percent of energy in glucose is released during lactic acid and alcohol fermentation.

(115) Answer : (4)
Solution:
Glycerol would enter the pathway after being converted to PGAL.

(116) Answer : (3)
Solution:
The continued oxidation of acetyl CoA via TCA cycle requires the continued replenishment of OAA.

(117) Answer : (2)
Solution:
Gibberellins promote bolting in rossette plants and also hastens the maturity period in juvenile conifers.

(118) Answer : (3)
Solution:
Auxins : Widely used to kill dicotyledonous weeds.
Gibberellins : Speed up the malting process in brewing industry.
ABA : Stimulates closure of stomata in water stress conditions.

(119) Answer : (2)
Solution:
Kinetin is a synthetic product and does not occur naturally in plants

(120) Answer : (4)
Solution:
CO_2 is not evolved during glycolysis.

(121) Answer : (4)
Solution:
Cells of nucellus are diploid but synergids are haploid. So, number of chromosomes will be 24 and 12 respectively as megaspore mother cell is also diploid.

(122) Answer : (4)
Solution:
Pollen tube is produced through the germ pore of the pollen grain.

(123) Answer : (4)
Solution:
Amorphophallus is an insect pollinated plant. In anemophilous flowers, large feathery stigma is found.

(124) Answer : (4)
Solution:
Cytokinins counteract apical dominance.

(125) Answer : (4)
Solution:

Seeds form the basis of our agriculture and they provide advantages to angiosperms such as to generate genetic recombination as result of sexual reproduction.

(126) Answer : (4)
Solution:
Protoplasmic respiration brings about oxidation of proteins. Facultative anaerobes are normally aerobes.

(127) Answer : (2)
Solution:
One of the assumptions for calculating net gain of ATP in respiration is that, none of the intermediates in the pathway are utilized to synthesise any other compound.

(128) Answer : (1)
Hint:
There is no segregation of characters in the progeny if the hybrid seeds are made into apomictic.
Solution:
The hybrid seeds, if made into apomictic, would not undergo meiosis and thus would not show segregation of characters, rather maintain them. So, the farmers will not be required to buy fresh hybrid seeds every year for agriculture.

(129) Answer : (2)
Solution:
Funicle is the structure of the ovule by which it remains attached to the placenta.

(130) Answer : (2)
Solution:
Embryo sac or female gametophyte of angiosperms has two synergids, one egg cell, three antipodal cells and two polar nuclei.

(131) Answer : (1)
Solution:
During artificial hybridization, there is no need of emasculation when female parent produces unisexual flower.

(132) Answer : (3)
Solution:
A is integral protein *i.e.,* F_0.
B is matrix of mitochondria.

(133) Answer : (3)
Solution:
Ethylene induces rapid elongation of internode and petiole in rice seedlings in water

(134) Answer : (2)
Solution:
Relative growth rate of leaf A = $\frac{10}{20} \times 100\% = 50\%$
Relative growth rate of leaf B = $\frac{10}{30} \times 100\% = 33.33\%$

(135) Answer : (2)
Hint:
α-ketoglutaric acid and succinyl CoA respectively are 5 C and 4 C compounds.
Solution:
6 C isocitric acid is converted into 6 C oxalosuccinic acid in the presence of isocitrate dehydrogenase.

ZOOLOGY

(136) Answer : (3)
Solution:
The lining of oviduct contains ciliated epithelium which helps in the movement of ova through it.

(137) Answer : (2)
Hint:
Exclude tract of nerve fibres
Solution:
The dorsal portion of the midbrain consists mainly of four round swellings (lobes) called corpora quadrigemina. A deep cleft divides the cerebrum longitudinally into two halves, which are termed as the left and right cerebral hemispheres. The

hemispheres are connected by a tract of nerve fibres called corpus callosum. A canal called the cerebral aqueduct passes through the midbrain.

(138) Answer : (4)
Solution:
Parathyroid hormone (PTH) regulates circulating levels of Ca^{++} in blood.

(139) Answer : (1)
Solution:
Oxytocin is secreted from hypothalamus and released from neurohypophysis.

(140) Answer : (3)
Solution:
Cartilaginous joint is present in pubic symphysis.
Ball and socket joint is present between humerus and pectoral girdle.
Knee joint is an example of hinge joint.

(141) Answer : (3)
Solution:
Cranial bones are 8 in number.

(142) Answer : (2)
Solution:
The anterior lobe of the pituitary gland is called adenohypophysis.
GnRH is a neurogenic hormone of hypothalamus which acts on pars distalis of adenohypophysis to synthesize FSH and LH. Both FSH and LH regulate various functions of gonads in sexual reproduction, so named gonadotropins.

(143) Answer : (3)
Solution:
Synaptic knob contains synaptic vesicles which are filled with neurotransmitters that help in the conduction of the impulses across the synapse.

(144) Answer : (1)
Solution:
Neurotransmitters can be either excitatory or inhibitory in nature.

(145) Answer : (2)
Solution:
Presence of fat-rich myelin sheath provides white appearance to the inner part of cerebral hemisphere.

(146) Answer : (4)
Solution:
Bones do not store plenty of water.

(147) Answer : (1)
Solution:
The thick filaments in the ‘A’ band are held together in the middle of this band by a thin fibrous membrane called ‘M’ line. A ‘M’ line will bisect (divide into 2 equal halves) ‘A’ band, ‘H’ zone and a sarcomere (consisting of one ‘A’ band and two half of the ‘I’ bands).

(148) Answer : (2)
Solution:
Skeletal muscle fibres → Voluntary, striated
Visceral muscle fibres → Involuntary, unstriated
Cardiac muscle fibres → Involuntary, striated

(149) Answer : (4)
Solution:
There are 12 pairs of ribs in humans. Each rib is a thin, flat bone connected dorsally to the vertebral column and ventrally to the sternum.It has two articulation surfaces on its dorsal end and is hence called bicephalic. The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but join the seventh rib with the help of hyaline cartilage.

(150) Answer : (1)
Solution:
Cortisol is a glucocorticoid which is involved in carbohydrate metabolism.

(151) Answer : (3)
Solution:
The vertebral column is differentiated into cervical (7), thoracic (12), lumbar (5), sacral (5-fused) and coccygeal (4-fused) starting from the skull. The atlas is the first cervical vertebra.

(152) Answer : (1)

Solution:

In the resting state, a subunit of troponin masks the active binding sites for myosin on the actin filament. The human brain is well protected by the skull.

(153) Answer : (4)

Solution:

Hyoid – A single U-shaped bone which does not articulate with any other bone of the body.
Mandible – Movable bone of skull.
Scapula – A part of pectoral girdle.

(154) Answer : (2)

Solution:

Myasthenia gravis is an auto-immune disorder affecting the neuro-muscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

(155) Answer : (2)

Hint:

The central nervous system lies along the central axis of our body.

Solution:

The CNS consists of the brain and spinal cord. It is the site of processing of information and control. Cranial and spinal nerves lie along the periphery of our body and are the components of PNS.

(156) Answer : (4)

Solution:

A motor neuron alongwith the muscle fibres connected to it constitute a motor unit.

(157) Answer : (4)

Hint:

Electrogenic pump.

Solution:

The $Na^+ – K^+$ pumps transport $3Na^+$ outwards for $2K^+$ into the axon maintaining the polarised state.

(158) Answer : (3)

Solution:

The afferent nerve fibres/sensory neurons transmit impulses from tissues/organs to the CNS and the efferent fibres/ motor neurons transmit regulatory impulses from the CNS to the concerned peripheral tissues/organs.

(159) Answer : (4)

Solution:

Multipolar neurons have a cyton with one axon and two or more dendrites.

(160) Answer : (4)

Solution:

The medulla oblongata contains centres which control respiration, cardiovascular reflexes and gastric secretions.

(161) Answer : (3)

Solution:

In case of hypothyroidism, TSH levels increase in blood.

(162) Answer : (1)

Solution:

Adrenal cortex can be divided into three layers.

	Parts		**Hormones**
(1)	Zona glomerulosa (outer)	–	Mineralocorticoids
(2)	Zona fasciculata (middle)	–	Glucocorticoids
(3)	Zona reticularis (inner)	–	Sex corticoids

(163) Answer : (3)

Solution:

Adrenal gland	Addison's disease
Parathyroid gland	Tetany
Thyroid gland	Cretinism
Pituitary gland	Acromegaly

(164) Answer : (3)
Solution:
Androgens act on CNS and influence libido. They show anabolic effects on protein and carbohydrate metabolism.

(165) Answer : (2)
Solution:
Adrenal medulla secretes two hormones called epinephrine and nor-epinephrine. Both hormones are secreted in response to stress and during emergency situations.
These hormones increase alertness, pupillary dilation, piloerection, sweating, the strength of heart contractions and rate of respiration. These hormones also stimulate glycogenolysis and increase the concentration of glucose in blood. They also stimulate the breakdown of lipids and proteins.

(166) Answer : (4)
Solution:
There are two half 'I' bands made of thin actin filaments on either side of 'Z' lines attached to it.

(167) Answer : (2)
Solution:
ATP is hydrolysed by the myosin head and the cycle of cross bridge formation and breakage is repeated.

(168) Answer : (3)
Solution:
Anti-diuretic hormone functions against diuresis *i.e.,* increased production of urine.
ADH is produced from hypothalamus and released from posterior pituitary and it prevents diuresis by stimulating reabsorption of water from the distal regions of nephrons.

(169) Answer : (4)
Solution:
The light band contains actin and is called I-band or isotropic band, whereas the dark band called A-band contains myosin.

(170) Answer : (4)
Hint:
Sternum is present ventrally
Solution:
Vertebral column is placed dorsally.
• First vertebra is atlas and axis is the 2^{nd} vertebra.
• Each vertebra has a central canal (neural canal) through which spinal cord passes.

(171) Answer : (2)
Solution:
Inside the skull, the brain is covered by cranial meninges.
Both cerebral hemispheres are connected by a tract of nerve fibres called corpus callosum.

(172) Answer : (2)
Solution:
Blood Ca^{+2} levels is maintained by PTH and TCT.

(173) Answer : (1)
Solution:
Thyroxine interacts with intracellular receptors as they are iodothyronines.
Thyroid hormones mostly regulate gene expression or chromosome functions by the interaction of hormone-receptor complex with the genome.

(174) Answer : (2)
Solution:
Thalamus is the major coordinating centre for sensory and motor signaling. It is present in forebrain. Pons, medulla oblongata and cerebellum are the parts of hind brain.

(175) Answer : (2)
Solution:
Axial skeleton : 80 bones
Appendicular skeleton : 126 bones
Total bones in human : 206 bones

(176) Answer : (1)
Hint:
Synapses are junctions through which a nerve impulse is transmitted from one neuron to another.
Solution:

Chemical synapses possess larger synaptic clefts compared to the electrical synapses.
Hence, impulse transmission is always faster in electrical synapses than chemical synapses.

(177) Answer : (1)
Solution:
Adrenal gland (Adrenal cortex) is common source of steroidal hormones.

(178) Answer : (3)
Hint:
Dendrites are absent
Solution:
Based on the number of axon and dendrites the neurons are divided into 3 types.
Multipolar neuron – With one axon and two or more dendrites; found in cerebral cortex of humans.
Bipolar neuron – With one axon and one dendrite; found in the retina of eye of humans.
Unipolar neuron – With a cell body and one axon found in the embryonic stage.

(179) Answer : (2)
Hint:
Glands secreting parathormone.
Solution:
Parathormone secreted by the parathyroid gland plays a key role in regulating calcium and phosphorous metabolism in our body; Pineal gland produces melatonin; Pancreas secretes insulin and glucagon; Adrenal medulla produces adrenaline and noradrenaline.

(180) Answer : (2)
Solution:
Zygomatic, maxilla and lacrimal are included under the category of facial bones.