14/04/2025

Phase-2
CODE-C

Aakash
Medical | IIT-JEE | Foundations

***Corporate Office*:** AESL, 3rd Floor, Incuspaze Campus-2, Plot no. 13, Sector-18, Udyog Vihar, Gurugram, Haryana-122015

FINAL TEST SERIES for NEET-2025

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

Answers

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

Hints and Solutions

PHYSICS

(1) **Answer :** (2)
Solution:
Let the faulty thermometer shows correct reading at x°C, then
$\frac{x-40}{80-40} = \frac{x-0}{100-0} \Rightarrow \frac{x-40}{40} = \frac{x}{100}$
$10x - 400 = 4x \Rightarrow 6x = 400$
$x = \frac{200}{3}$ °C

(2) **Answer :** (3)
Solution:
Rate of radiation:
$\frac{dQ}{dt} = eA\sigma T^4$
For blackbody, $e = 1$
$\frac{\left(\frac{dQ}{dt}\right)_{\text{blackbody}}}{\left(\frac{dQ}{dt}\right)_{\text{realbody}}} = \frac{A\sigma T^4}{eA\sigma T^4} = \frac{4}{3}$
$\therefore \frac{1}{e} = \frac{4}{3} \Rightarrow e = \frac{3}{4} = 0.75$

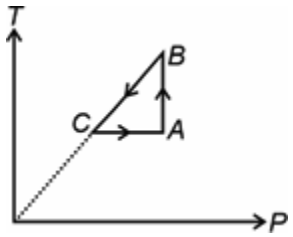
(3) **Answer :** (1)
Solution:
Energy required to increase 1°C of 100 g water is
$Q = ms\Delta T \Rightarrow Q = 100 \times 1 \times 1 = 100$ cal
Since water equivalent of metallic bar is 100 g, therefore its energy requirement is also 100 cal for 1°C increase in its temperature.

(4) **Answer :** (4)
Solution:
1st law of thermodynamics:
$Q = \Delta U + W$
$W = P\Delta V$ for isobaric process
Also, $PV = nRT$

(5) **Answer :** (4)
Solution:
Heat and work are path functions.

(6) **Answer :** (2)
Solution:
Maximum efficiency exists for Carnot engine.
$\eta = 1 - \frac{T_L}{T_H} \Rightarrow \eta = 1 - \frac{200}{600}$
$\eta = \frac{2}{3}$ or 66.67%

(7) **Answer :** (2)
Solution:
· Process A-B is an isobaric process with increase in temperature.
· Process B-C is an isochoric process with decrease in pressure as well as temperature.
$PV = nRT \Rightarrow P \propto T$ for isochoric
· Process C-A is an isothermal process with increase in pressure.
Hence the correct T vs P curve will be



(8) **Answer :** (3)
Solution:
Molecules of a gas collide among themselves as well as with the walls of the container and all collisions are elastic.

(9) **Answer :** (1)
Solution:
Internal energy is given by
$U = nC_VT$

$C_V = \frac{5}{2}R$ for O_2

$C_V = \frac{3}{2}R$ for He

$\therefore$ Total internal energy = $2 \times \frac{5}{2}RT + 4 \times \frac{3}{2}RT$

$U_T = 11\ RT$

(10) **Answer :** (3)
Solution:

$v_{rms} = \sqrt{\frac{3RT}{M}}$

For a particular gas at constant temperature, v_{rms} remains same.

(11) **Answer :** (2)
Solution:

$v_{avg} = \sqrt{\frac{8RT}{\pi M}}$

(12) **Answer :** (4)
Solution:
In SHM, total mechanical energy remain conserved.
$\therefore$ $TME = KE + PE$
$8 = 10 + PE \Rightarrow PE = -2$ J

(13) **Answer :** (4)
Hint:
The position at which the force starts acting is one of the extreme positions.
The mean position would be:
$Kx_0 = F \Rightarrow x_0 = \frac{F}{K}$
The distance between mean and extreme positions is equal to amplitude.
Hence amplitude = $\frac{F}{K}$

(14) **Answer :** (2)
Solution:
$T = 2\pi\sqrt{\frac{l}{g}}$, Given T = 2 s, take $\pi^2 = g$

$\therefore\ 2 = 2\pi\sqrt{\frac{l}{\pi^2}} \Rightarrow l = 1$ m

(15) **Answer :** (3)
Solution:
Wave is moving along $+x$ axis not along $+y$ axis.

(16) **Answer :** (4)
Solution:

For closed organ pipe, $n = 3$ for 1^{st} overtone.

$f = \frac{nv}{4L}$

$480 = \frac{3 \times 320}{4 \times L} \Rightarrow L = \frac{3 \times 320}{4 \times 480}$

$L = \frac{1}{2}$ m

(17) Answer : (1)
Solution:
Speed of sound wave on a stretched string is $v = \sqrt{\frac{T}{\mu}} \Rightarrow v = \sqrt{\frac{16}{10^{-4}}}$ = 4 × 100 = 400 m/s

(18) Answer : (2)
Solution:
By Newton's law of cooling
$\frac{(80-70)}{12} = k\left(\frac{80+70}{2} - 40\right)$
$\frac{(70-60)}{t} = k\left(\frac{70+60}{2} - 40\right)$ Dividing equations
$t = 12 \times \frac{35}{25} = 12 \times \frac{7}{5} = 16.8$ min

(19) Answer : (4)
Solution:
$a + r + t = 1$
$a = 1 - \frac{1}{8} - \frac{1}{7} = \frac{56-7-8}{56} = \frac{41}{56}$

(20) Answer : (1)
Solution:
$\beta = 2 \times 10^{-5}$/°C
$\alpha = 1 \times 10^{-5}$/°C
$\Delta l = l\,\alpha\,\Delta t = 4 \times 10^{-5} \times 40 = 160 \times 10^{-5}$
$= 1.6 \times 10^{-3}$ m

(21) Answer : (3)
Solution:
$S = m \times c = 40 \times 0.2 = 8$ cal/°C

(22) Answer : (2)
Solution:
In an adiabatic process $\Delta Q = 0$
$\Delta U = -W$

(23) Answer : (1)
Solution:
$\because PV = nRT \Rightarrow \frac{V}{T} =$ constant.
Therefore independent of temperature.

(24) Answer : (3)
Solution:
$(\Delta T)_{\text{in °C}} = (\Delta T)_{\text{in K}}$

(25) Answer : (4)
Solution:
Condition for thermodynamic equilibrium is when temperature is same.

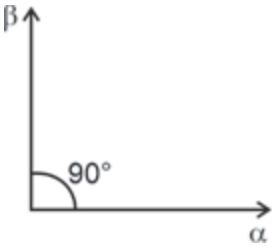
(26) Answer : (1)
Solution:
$\lambda \propto \frac{1}{n}$

(27) Answer : (3)
Solution:
$PV = nRT$
$\frac{P_1V_1}{P_2V_2} = \frac{T_1}{T_2}$
$\frac{V_1}{V_2} = \frac{T_1}{T_2} \times \frac{P_2}{P_1}$
$\frac{V_1}{V_2} = \frac{400}{600} \times \frac{2P_0}{P_0}$
$\frac{V_1}{V_2} = \frac{4}{3}$

(28) Answer : (2)
Solution:
A rigid diatomic molecules has 3 translational and 2 rotational degrees of freedom.

(29) Answer : (2)
Solution:
$PV = \mu RT$
$PV = \left(\frac{m}{M}\right)RT$
$PV = \left(\frac{14}{28}\right)RT$
$PV = \frac{1}{2}RT$

(30) Answer : (3)
Solution:



Amplitude of oscillation $= A = \sqrt{\alpha^2 + \beta^2}$

(31) Answer : (3)
Solution:
$|a_{max}| = \omega^2 A = (2 \times 4\pi)^2\ 0.15 = 94.65\ \text{m s}^{-2}$

(32) Answer : (3)
Solution:
Comparing with standard equation
$\frac{d^2y}{dt^2} + \omega_0^2 y = 0$
$\omega_0^2 = k \quad \therefore\ T = \frac{2\pi}{\sqrt{k}}$

(33) Answer : (2)
Solution:
Compare with equation, x = acosωt
$\omega = \frac{\pi}{2}$
$\frac{2\pi}{T} = \frac{\pi}{2} \Rightarrow T = 4$ s
∴ In 3 s, its distance covered is 3a

(34) Answer : (3)
Solution:
$v = \frac{\omega}{k} = \frac{4\pi \times 10}{0.4\pi}$
v = 10 m/s

(35) Answer : (2)
Solution:
$11f_1 = 4f_2$
$11 \times \frac{v}{4\ell_1} = 4\frac{v}{2\ell_2}$

(36) Answer : (1)
Solution:
Work done in process A to $B = -P_0(2V_0 - V_0) = -P_0V_0$
Work done in process, B to $C = 0$
Work done in process C to D = $3P_0\ (3V_0 - V_0) = 6P_0V_0$
Total work done = $-P_0V_0 + 6P_0V_0 = 5P_0V_0$

(37) Answer : (2)
Solution:
In series, rate of flow of heat will be equal for both the rods.

$\left(\frac{dQ}{dt}\right)_1 = \left(\frac{dQ}{dt}\right)_2$

$K_1 A_1 \frac{\Delta T_1}{l_1} = K_2 A_2 \frac{\Delta T_2}{l_2}$

Given, $A_1 = A_2$, $l_1 = l_2$, $K_1 > K_2$

$\therefore\ K_1 \Delta T_1 = K_2 \Delta T_2 \Rightarrow \frac{\Delta T_1}{\Delta T_2} = \frac{K_2}{K_1}$

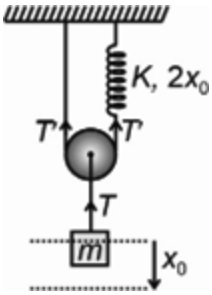
$\frac{\Delta T_1}{\Delta T_2} < 1 \Rightarrow (100 - T) < (T - 0)$

$100 < 2T \Rightarrow T > 50°C$

(38) Answer : (3)
Solution:
Emissive power is energy radiated per unit area per unit time.

Its unit is $\frac{J}{m^2 s}$

(39) Answer : (4)
Solution:
In SHM, restoring force (F) = $m \times a$
From the figure, $T = 2T'$
and $T' = K(2x_0)$



$\therefore T = 4Kx_0$

$-4Kx_0 = m \times a$

Comparing with $a = -\omega^2 x$,

We get $\omega^2 = \frac{4Kx_0}{m}$

$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{m}{4K}} = \pi\sqrt{\frac{m}{K}}$

(40) Answer : (2)
Solution:

In SHM, $V_{max} = A\omega$ and $a_{max} = \omega^2 A$

$\frac{v_m}{A_m} = \frac{A\omega}{A\omega^2} \Rightarrow v_m = \frac{a_m}{\omega}$

Slope of v_m v/s a_m curve is $\frac{1}{\omega}$.

$\frac{1}{\omega} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow \omega = \sqrt{3}$ rad/s

(41) Answer : (4)
Solution:
Diatomic molecules has 3 degrees of translational and 2 degrees of rotation.

Total translational kinetic energy = $\frac{3}{2}nRT$

Total rotational kinetic energy = $\frac{2}{2}nRT = nRT$

Total kinetic energy per mole = $\frac{3}{2}RT + \frac{2}{2}RT$

= $\frac{5}{2}RT$

Total kinetic energy per molecule = $\frac{5}{2}\frac{R}{N_A}T$

$= \frac{5}{2}K_B T$

(42) Answer : (1)
Solution:

$y = P\sin\left(\frac{2\pi Q}{\lambda}t - \frac{2\pi}{\lambda}x\right)$

From equation, $\omega = \frac{2\pi Q}{\lambda} = 2\pi f$

$f = \frac{Q}{\lambda}$

(43) Answer : (4)
Solution:
Frequency $\propto \sqrt{\text{Tension}}$, hence originally frequency of string *B* has to be more than string *A*.
$f_B - f_A = 3 \Rightarrow f_B = 3 + 630$ = 633 Hz.

(44) Answer : (4)
Solution:

Hint : Speed of sound in air $v = \sqrt{\frac{\gamma RT}{M}}$

Sol. : $\frac{v_1}{v_2} = \sqrt{\frac{T_1}{T_2}}$

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

(45) Answer : (1)
Solution:
$\omega_1 = 1020\pi \Rightarrow f_1 = 510$ Hz.
$\omega_2 = 1004\pi \Rightarrow f_2 = 502$ Hz
$f_b = |f_1 - f_2| = 8$ Hz

CHEMISTRY

(46) Answer : (2)
Hint:
Catalyst does not catalyses non-spontaneous reactions.

(47) Answer : (2)
Solution:
For zero order reaction
$[B] = kt = 2 \times 10^{-3} \times 2 \times 60$
= 0.24 M

(48) Answer : (2)
Solution:
Rate expression for given reaction
$\frac{-1}{2}\frac{d[SO_2]}{dt} = \frac{-d[O_2]}{dt} = \frac{1}{2}\frac{d[SO_3]}{dt}$

(49) Answer : (3)
Solution:
For 1st order reaction
$t_{1/2} = \frac{\ln 2}{k}$
$t_{75\%} = \frac{\ln 4}{k}$
$t_{99.9\%} = \frac{10 \ln 2}{k}$
$t_{90\%} = \frac{\ln 10}{k}$

(50) Answer : (2)
Solution:
$r = k[A]^x[B]^y$
$2r = k[2A]^x [B]^y$
$x = 1$
$Gr = k(2A)^x (2B)^y$
$y = 1$

(51) Answer : (2)
Solution:
Slope of lnk vs $\frac{1}{T}$ graph is $\frac{-Ea}{R}$

(52) Answer : (1)
Solution:
Since molecularity is number of molecules participating in reaction hence it cannot be zero or fractional.

(53) Answer : (4)
Solution:
Unit of rate of reaction is mol L^{-1} s^{-1} irrespective of order of reaction.

(54) Answer : (1)
Solution:
For zero order reaction
$r = k [A]^0$
hence rate is independent to concentration.

(55) Answer : (2)
Solution:
Step with maximum activation energy is slowest and rate determining step.

(56) Answer : (3)
Solution:
For zero order reaction
$t_{100\%} = 2t_{50\%}$
$= 2 \times 15 = 30$ min

(57) Answer : (3)
Solution:
$\frac{r_2}{r_1} = 2^{\frac{30}{10}} = 8$
$r_2 = 8r_1$

(58) Answer : (4)
Solution:
$2E = 1 \times E_1 + 1E_2$
$2E = x + y$
$E = \frac{x+y}{2}$

(59) Answer : (3)
Solution:
As value of SRP decrease reactivity of metal increases.

(60) Answer : (1)
Solution:
• Reduced form of element with high SRP is more stable.
• Since F_2 has highest SRP, F^- will be weakest reducing agent.

(61) Answer : (4)
Solution:

Batteries/Cell	Electrolyte
Dry cell	Moist paste of NH_4Cl and $ZnCl_2$
Mercury cell	Paste of KOH and ZnO
(H_2–O_2) Fuel cell	Conc. (aq) NaOH solution
Lead storage battery	38% solution of H_2SO_4

(62) Answer : (2)
Solution:

$w = \frac{Eit}{96500}$

$= \frac{108 \times 2 \times 965}{96500}$

= 2.16 g

(63) Answer : (1)

Solution:

For lead storage battery

Anode ⇒ Lead

Cathode ⇒ Lead packed with PbO_2

(64) Answer : (2)

Solution:

$\because \quad \pi_{1(\text{urea})} = \pi_{2(\text{unknown})}$

$\therefore \quad C_1 = C_2$

$\frac{W_1}{M_1} = \frac{W_2}{M_2}$

$\frac{5}{60} = \frac{2}{M_2}$

$M_2 = \frac{60 \times 2}{5} = 24$ g/mol

(65) Answer : (4)

Solution:

Azeotropic composition : HNO_3 (68% by mass) and H_2O (32% by mass).

(66) Answer : (4)

Solution:

- Aquatic species are more comfortable in cold water rather than in warm water.

(67) Answer : (2)

Solution:

Boiling point of azeotropic solutions is always constant because the mole fraction in solution as well as vapour phase are same.

(68) Answer : (1)

Solution:

$x_{urea} = \frac{n_{urea}}{n_{urea} + n_{water}}$

$= \frac{30/60}{30/60 + 90/18} = 0.09$

(69) Answer : (2)

Hint:

Relative lowering of vapour pressure,

$\frac{P^\circ - P_s}{P^\circ}$ = mole fraction of the solute

Solution:

Vapour pressure of the solution is reduced to 90%

$\frac{P^\circ - 0.9P^\circ}{P^\circ} = \frac{n_{solute}}{n_{Total}}$

$0.1 = \frac{\frac{60}{M}}{\frac{60}{M} + \frac{162}{18}}$

Molar mass of solute = 60 g mol^{-1}

(70) Answer : (2)

Hint:

$K_3[Fe(CN)_6] \rightarrow 3K^+ + [Fe(CN)_6]^{3-}$

and $i = 1 + (n - 1)\alpha$

Solution:

- $Na_2SO_4 \rightarrow i = 1 + 2\alpha$

$\Rightarrow \; 1 + 2 \times \frac{1}{2} = 2$

- $K_3[Fe(CN)_6] \rightarrow i = 1 + 3\alpha$

$\Rightarrow \; 1 + 3 \times \frac{3}{4} = 3.25$

- $[Ag(NH_3)_2]Cl \rightarrow i = 1 + \alpha$

⇒ 1 + 0.8 = 1.8
• $[Cr(NH_3)_5Cl]SO_4$ → i = 1 + α
⇒ 1 + 0.9 = 1.9

(71) Answer : (2)
Solution:
For decimolar solution : 1 L of solution contains 0.1 mol solute or 1 mol solute is present in 10 L of solution.

(72) Answer : (1)
Solution:
$\text{Molarity} = \frac{\text{n}_{\text{solute}}}{\text{V}_{\text{solution}}(\text{L})}$
$0.2 = \frac{n \times 1000}{400}$
n = 0.08
Mass of HNO_3 = 0.08 × 63
= 5.04 g

(73) Answer : (3)
Solution:
Molality, mass percentage and mole fraction are temperature independent.

(74) Answer : (2)
Hint:
• Higher the value of ΔT_f, lower will be the freezing point of the solution.
• $\Delta T_f = i \times K_f \times m$
∴ $\Delta T_f \propto i$ (when K_f and molality are constant)
Solution:
• For 0.1 m NaCl (α = 60%), i = 1+(n – 1)α
= 1 + (2 – 1) × 0.6 = 1.6
• For 0.1 m $MgCl_2$ (α = 50%), i = 1 +(n – 1)α
1 + 2 × 0.5 = 2
• For 0.1 m $AlCl_3$ (α = 40%), i = 1+(n – 1)α
= 1 + 3 × 0.4 = 2.2
So the order of ΔT_f is III > II > I
∴ Order of T_f is I > II > III

(75) Answer : (1)
Solution:
$\pi = \text{CRT}$
$= \frac{6 \times 1000}{60 \times 400} \times 0.0821 \times 300 = 6.2 \text{ bar}$

(76) Answer : (2)
Solution:
More will be the $E^\circ_{\text{Reduction}}$, lesser is the reducing power.

(77) Answer : (3)
Hint:
$$\underset{\text{C}-\text{C}\alpha}{\text{CH}_3\text{COOH}} \rightleftharpoons \underset{\text{C}\alpha}{\text{CH}_3\text{COO}^-} + \underset{\text{C}\alpha}{\text{H}^+}$$
$K_a = \frac{[CH_3COO^-][H^+]}{CH_3COOH}$
$= \frac{C\alpha^2}{1-\alpha} \simeq C\alpha^2$
Solution:
$\Lambda^\circ_{CH_3COOH} = \Lambda^\circ_{H^+} + \Lambda^\circ_{CH_3COO^-}$
= 350 + 50
= 400 S cm^2 mol^{-1}
$\alpha = \frac{\Lambda_m}{\Lambda^\circ_m} = \frac{4}{400} = 0.01$
$K_a = C\alpha^2 = 0.1 \times (0.01)^2$
$= 10^{-5}$

(78) Answer : (4)

Hint:
Molar conductivity depends on both size as well as charge of ion.
Solution:

Ion	λ° (S cm^2 mol^{-1})
Na^+	50.1
Cl^-	76.3
Br^-	78.1
Ca^{2+}	119

(79) **Answer :** (2)
Solution:
$G^* = \frac{k}{G} = k \times R$
$= 5 \times 10^{-3} \times 300$
$= 1\ cm^{-1}$

(80) **Answer :** (4)
Solution:
The graph shows the conductance of weak electrolyte i.e. CH_3COOH.

(81) **Answer :** (4)
Solution:
$\Delta T_f = i\ K_f \times m$
$0.24 = i \times 1.8 \times \frac{3/60}{500/1000}$
$0.24 = i \times 1.8 \times 0.1$
$i = .24/.18 = 4/3$
$4/3 = 1 + \alpha$
$\therefore \alpha = 1/3$

(82) **Answer :** (3)
Solution:
Smaller is the value of Henry's constant higher will be the solubility of gas.

(83) **Answer :** (3)
Solution:
n-Hexane and n-pentane solution forms ideal solution.

(84) **Answer :** (3)
Solution:
Hint: Magnitude of osmotic pressure is large even for very dilute solutions.
Sol.: Solubility of polymers in solvent is very poor hence their solution is very dilute. Osmotic pressure is used to determine the molecular mass of such compounds.

(85) **Answer :** (1)
Solution:
$y_B = \frac{P_B}{P_A + P_B}$
$P_T = P_A + P_B$
$180 = 150\ (1 - x_B) + 200\ x_B$
$180 = 150 - 150x_B + 200\ x_B$
$30 = 50xB$
$x_B = \frac{3}{5};\ x_A = \frac{2}{5}$
$y_B = \frac{200 \times \frac{3}{5}}{200 \times \frac{3}{5} + 150 \times \frac{2}{5}} = 0.67$

(86) **Answer :** (2)
Solution:
Li^+ has minimum standard reduction potential value.

(87) **Answer :** (2)

Solution:
$\Delta G^\circ = -nFE^\circ$
$= -6 \times 96500 \times 1.6$ s
$= -955.3$ s kJ mol^{-1}

(88) **Answer :** (1)
Hint:
Mass deposited by 96500 C is one equivalent.
Solution:
$Q = it = 9.65 \times 100 = 965$ C
965 C gives 0.3 g metal
96500 C gives 0.3×100 g of metal
= 30 g of metal
$\therefore$ Equivalent weight of metal = 30

(89) **Answer :** (2)
Solution:
$\Delta T_f = i K_f m$

$.5 = 1 \times 5.12 \times \frac{1.5 \times 1000}{M_0 \times 75}$

$M_0 = 204.8$

(90) **Answer :** (2)
Solution:
Unit of rate constant = $(mol\ L^{-1})^{1-n}\ s^{-1}$
Given unit = $(mol\ L^{-1})^{-5/2}\ s^{-1}$
$1 - n = \frac{-5}{2}$
$n = 1 + \frac{5}{2} = \frac{7}{2} = 3.5$

BOTANY

(91) **Answer :** (3)
Solution:
ABA – promotes seed dormancy
Ethylene – promotes fruit ripening
Auxins – first isolated from human urine

(92) **Answer :** (2)
Solution:
Ethylene is a gaseous hormone and it is used to initiate flowering and for synchronising fruit set in pineapples. It also induces flowering in mango. It breaks seed and bud dormancy.

(93) **Answer :** (1)
Solution:
Turgidity of plant cells helps in extension growth. Thus, plant growth and further development is intimately linked to water status of plant.

(94) **Answer :** (3)
Solution:
Ethephon accelerates abscission in flowers and fruits (thinning of cotton, cherry, walnut). Cytokinins help to overcome the apical dominance. Buttercup shows heterophyllous development due to environment.

(95) **Answer :** (2)
Solution:
An increase in surface area denotes its growth in a dorsiventral leaf.

(96) **Answer :** (4)
Solution:
GA_3 is used to speed up the malting process in a brewing industry.

(97) **Answer :** (4)
Solution:
Abscisic acid stimulates the closure of stomata.

(98) Answer : (2)
Solution:
- **Differentiation** – In plants, it is open because cells/ tissues arising out of the same meristem have different structures at maturity.
- **Efficiency index –** The measure of the ability of the plant to produce new plant material.
- **Plasticity –** The ability of plants to follow different pathways in response to environment or phases of life to form different kinds of structures.
- **Arithmetic growth – I**t is the growth rate in which growth occurs at constant rate from very beginning and progresses arithmetically.

(99) Answer : (2)
Solution:
Oxaloacetic acid (4C) is the first member of the Krebs' cycle.

(100) Answer : (4)
Solution:
The mobile electron carrier between complex III and IV is cytochrome '*c*'.

(101) Answer : (3)
Solution:
Hexokinase catalyses the conversion of glucose to glucose–6-phosphate.

(102) Answer : (3)
Solution:
In plants, such as water hyacinth and water lily, the pollination is performed by insects or wind.

(103) Answer : (4)
Solution:
In the seeds of black pepper and beet remnants of nucellus are persistant called perisperm.

(104) Answer : (4)
Solution:
As the anther develops, the cells of sporogenous tissue undergo meiotic divisions to form microspore tetrads.

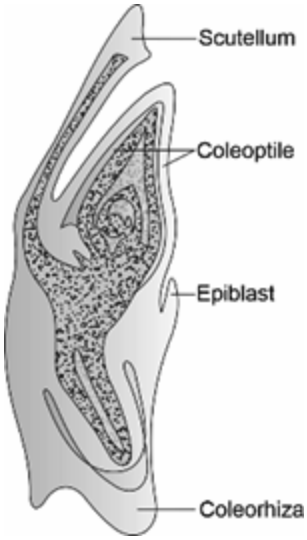
(105) Answer : (4)
Solution:
The number of ovules in an ovary may be one (wheat, paddy, mango) to many (papaya, watermelon, orchids)

(106) Answer : (3)
Solution:
Viola and *Commelina* produce two types of flowers (chasmogamous and cleistogamous). Cleistogamous flowers produce assured seed set.

(107) Answer : (4)
Solution:
Lupinus arcticus excavated from Arctic Tundra. In rice and wheat, pollen grains lose viability within 30 minutes of their release. *Michelia* have multicarpellary, apocarpous gynoecium.

(108) Answer : (2)
Solution:
Majority of insect pollinated flowers are large colourful, fragrant and rich in nectar. Wind pollinated flowers produce non-sticky, light pollen grains.

(109) Answer : (4)
Solution:



(110) Answer : (1)
Solution:
The generative cell of pollen grain is small and floats in the cytoplasm of vegetative cell.

(111) Answer : (1)
Solution:
RQ of carbohydrate is 1.

(112) Answer : (4)
Solution:
The respiratory pathway is involved in both anabolism and catabolism, hence it is better to consider the respiratory pathway as an amphibolic pathway.

(113) Answer : (1)
Solution:
During the conversion of succinyl CoA to succinic acid, substrate level phosphorylation occurs and yield 1 ATP/GTP.

(114) Answer : (3)
Solution:
In glycolysis, ATP is utilised at two steps : First in conversion of glucose into glucose-6-phosphate and second in the conversion of fructose-6-phosphate to fructose 1,6-bisphosphate.

(115) Answer : (3)
Solution:
ABA is also called stress hormone because it increases the tolerance of plants in adverse environmental conditions.

(116) Answer : (1)
Solution:
Absolute growth rate is measurement and the comparison of total growth per unit time.

$$\text{Relative growth rate} = \frac{\text{Growth per unit time}}{\text{Initial size}} \times 100$$

(117) Answer : (3)
Solution:
Inhibitor-B, abscission II and dormin all the three were proved to be chemically identical. It was named abscisic acid.

(118) Answer : (2)
Solution:
Auxin induces apical dominance.
Apical buds secretes auxin which inhibits growth of lateral buds. If the apical bud is removed (decapitation) the lateral buds starts growing.

(119) Answer : (1)
Solution:
Egg apparatus is a three-celled structure.

(120) Answer : (2)

Solution:
Anther and stigma when placed at the same position it promotes inbreeding.

(121) Answer : (3)
Solution:
Geitonogamy is functionally cross pollination involving pollinating agent. Genetically it is similar to autogamy since pollen grains come from the same plant.

(122) Answer : (4)
Solution:
In lactic acid fermentation, the reducing agent is $NADH+H^+$ which is reoxidised to NAD^+.

(123) Answer : (3)
Solution:
ATP synthase consists of two major components (F_0 and F_1). F_0 is an integral membrane protein and F_1 is a peripheral membrane protein complex. When cells photosynthesise, availability of O_2 is not a problem in these cells since O_2 is released within the cell.

(124) Answer : (2)
Solution:
- Succinate dehydrogenase – found attached to inner mitochondrial membrane
- Malic dehydrogenase – catalyse the regeneration of OAA
- Pyruvate dehydrogenase – requires coenzyme A and NAD^+ to catalyse link reaction
- PFK – pacemaker enzyme of glycolysis.

(125) Answer : (1)
Solution:
In glycolysis, 2 × BPGA ⇒ 2 + 2 ⇒ 4 ATP
In link reaction, 2 $NADH+H^+$ = 2 × 3 ⇒ 6 ATP
In Kreb's cycle ⇒ 2 × 3 $NADH + H^+$ = 2 (3 × 3) = 18 ATP
⇒ 2 × $FADH_2$ = 2 × 2 ⇒ 4 ATP
⇒ 2 × GTP = 2 ATP
Total ⇒ 34 ATP

(126) Answer : (4)
Solution:
Some species of Asteraceae and grasses, have evolved a special mechanism called apomixis for seed production. In maize, autogamy is prevented but not geitonogamy.

(127) Answer : (1)
Solution:
In parthenocarpy, fruit is formed without fertilization. In apomixis, seeds are formed without fertilization.

(128) Answer : (3)
Solution:
Mammals, tree dwelling rodents and some reptiles are reported as pollinators for different plant species.

(129) Answer : (2)
Solution:
Proximal end of the filament of stamen is attached to the thalamus or the petal, whereas the distal end attaches to the anther.

(130) Answer : (3)
Hint:
This plant growth hormone is gaseous in nature.
Solution:
The gaseous PGR, ethylene, could fit in either of the groups, but it is largely an inhibitor of growth activities.

(131) Answer : (1)
Solution:
The 'bakanae' (foolish seedling) a disease of rice seedlings reported by E. Kurosawa was due to a pathogen *Gibberella fujikuroi* which releases the chemicals that cause bolting in plants.

(132) Answer : (4)
Solution:
Plants show unlimited growth which is open type.

(133) Answer : (3)

Solution:

Malic acid to oxaloacetic acid conversion produces NADH + H^+ but not CO_2.

(134) Answer : (2)
Solution:
Photolysis of water occurs during light reaction of photosynthesis.

(135) Answer : (2)
Solution:
Triple fusion involves the fusion of three haploid nuclei. Syngamy results in formation of a diploid cell, the zygote.

ZOOLOGY

(136) Answer : (2)
Solution:
Cells of the human body exhibit three main types of movements, namely, amoeboid, ciliary and muscular. Macrophages in tissues and leucocytes in blood exhibit amoeboid movement; also called pseudopodial movement.

(137) Answer : (2)
Solution:

Active transportation of Ca^{+2} back into the sarcoplasmic reticulum indicates relaxation of muscle. Length of A-bands remains the same during muscle contraction or relaxation.

(138) Answer : (1)
Solution:
Rheumatoid arthritis– Inflammation of joints, an auto-immune disorder.
Gout – Inflammation of joints due to accumulation of uric acid crystals.
Myasthenia gravis – Auto-immune disorder affecting neuro-muscular junctions.

(139) Answer : (2)
Solution:
The human skull is dicondylic because it has two occipital condyles.

(140) Answer : (4)
Solution:
Brain stem forms the connections between the brain and spinal cord. Midbrain, pons and medulla oblongata make up the brain stem.

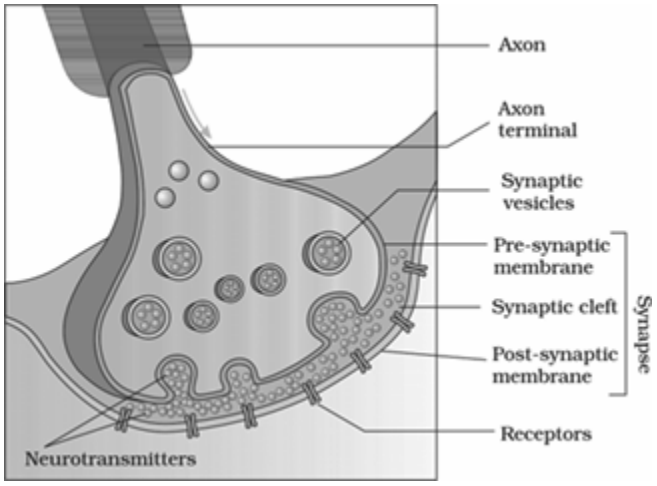
(141) Answer : (2)
Solution:
Vertebral column extends from the base of the skull and constitutes the main framework of the trunk of human body.

(142) Answer : (3)
Solution:

Tetany – Rapid spasms (wild contractions) in muscles due to low Ca^{++} in body fluid.
Thyrocalcitonin – Hormone secreted by the parafollicular cells of thyroid gland. It is a hypocalcemic hormone.

(143) Answer : (4)
Solution:
Binding of ATP to myosin head causes dissociation of actin-myosin complex.

(144) Answer : (2)
Solution:



(145) Answer : (4)

Solution:

When a stimulus is applied at a site on the polarised membrane, the membrane at that site becomes freely permeable to Na^+. This leads to a rapid influx of Na^+ into the axoplasm followed by the reversal of the polarity at that site.

(146) Answer : (4)

Solution:

The PNS is divided into two divisions called somatic neural system and autonomic neural system. The somatic neural system relays impulses from the CNS to skeletal muscles.

(147) Answer : (2)

Solution:

The inner parts of cerebral hemispheres and a group of associated deep structures like amygdala, hippocampus, *etc,* form a complex structure called the limbic lobe or limbic system.

(148) Answer : (2)

Solution:

Androgens regulate the development, maturation and functions of male accessory sex organs like epididymis, prostate, *etc*. These hormones stimulate muscular growth, growth of facial and axillary hair, aggressiveness, *etc.* They also stimulate the process of spermatogenesis and influence libido in males. These hormones produce anabolic (synthetic) effects on protein and carbohydrate metabolism.

(149) Answer : (1)

Solution:

Estradiol is a lipid-soluble hormone and it does enter inside the target cells and binds to the intracellular receptors.

(150) Answer : (3)

Solution:

Progesterone supports pregnancy, acts on the mammary glands and stimulates the formation of alveoli and milk secretion. Development of secondary sexual characters and growth of ovarian follicles are the functions of estrogen.

(151) Answer : (3)

Solution:

CCK acts on both pancreas and gall bladder and stimulates the secretion of pancreatic enzymes and bile juice, respectively.

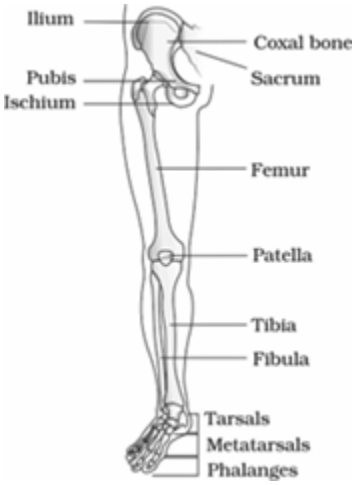
(152) Answer : (1)

Solution:

Chemical synapses possess wide synaptic cleft but electrical synapses do not. Transmission of a nerve impulse is unidirectional.

(153) Answer : (2)

Solution:



(154) Answer : (3)

Hint:

Myosin is formed by many meromyosin

Solution:

Each myosin protein is a polymeric protein formed by many monomeric proteins called meromyosin which is differentiated into two parts (i) head with short arm and (ii) tail. Head and short arm together is called cross arm of meromyosin and projects outwards at a regular distance and angle from each other from the surface of myosin filaments.

(155) Answer : (3)

Solution:

ACTH stimulates the synthesis and secretion of steroid hormones called glucocorticoids.

ACTH is secreted by the pars distalis region of the pituitary gland, commonly called anterior pituitary.

(156) Answer : (3)

Solution:

Red muscle fibres contain high amount of myoglobin and mitochondria.

White muscle fibres have high amount of sarcoplasmic reticulum and depend on anaerobic process for energy.

(157) Answer : (2)

Solution:

Each organised skeletal muscle in our body is made of a number of muscle bundles held together by a common collagenous connective tissue layer, called fascia.

(158) Answer : (2)

Hint:

Oxytocin is released by posterior pituitary

Solution:

MSH is released by pars intermedia. Progesterone released by corpus luteum supports pregnancy.

ADH is formed by hypothalamus.

(159) Answer : (2)

Hint:

Ability to resume its original shape.

Solution:

Excitability, contractility, extensibility and elasticity are properties of all types of muscle fibres. Muscle fibres can be skeletal, visceral or cardiac on the basis of their location.

(160) Answer : (2)

Hint:

Jaw bone is a single bone.

Solution:

Ethmoid and sphenoid are unpaired cranial bones. Sacrum (1) and coccyx (1) are fused bones in adult humans. Maxilla and zygomatic are paired facial bones. Mandible is an unpaired bone.

(161) Answer : (1)

Solution:

In old individuals, cell-mediated immunity provided by T-lymphocytes and humoral immunity provided by antibodies decrease progressively.

Thymus is degenerated in old individuals resulting in a decreased production of thymosins which play a major role in differentiation of T-lymphocytes and also promote the production of antibodies to provide humoral immunity.

(162) Answer : (4)

Solution:

The discs of white fibrous cartilage restrict the movement in cartilaginous joints due to which these joints show limited movement.

(163) Answer : (4)

Hint:

Floating ribs are not connected with sternum

Solution:

Lower end of femur along with upper end of tibia participates in knee joint formation. Fibula is connected with tibia. Similarly, lower end of humerus fits into sigmoid notch of ulna to form elbow joint. Radius articulates with ulna to form pivot joint. Floating ribs are so named because they are not connected ventrally with sternum. Each half of pectoral girdle consists of two bones *i.e.* a clavicle and a scapula. So, pectoral girdle consists of 4 bones – 2 clavicles and two scapulae.

(164) Answer : (1)

Hint:

Function which decreases blood glucose level

Solution:

Glycogenesis is not a function of cortisol. Glucagon and adrenaline are responsible for glycogenolysis which stimulates elevation of blood glucose by converting liver glycogen into glucose.

Cortisol stimulates gluconeogenesis, lipolysis and proteolysis.

(165) Answer : (4)

Solution:

TCT and PTH play a significant role in maintaining the calcium balance in our body.

(166) Answer : (2)

Solution:

The association areas of brain are responsible for complex functions like memory and communication.

Along with the hypothalamus, limbic lobe is involved in the regulation of sexual behaviour, expression of emotional reactions and motivation.

Three major regions make up the brain stem; mid brain, pons and medulla. Brain stem forms the connection between the brain and the spinal cord.

The dorsal portion of the midbrain consists of four round swellings called corpora quadrigemina.

Cerebellum has very convoluted surface in order to provide the additional space for many more neurons.

(167) Answer : (2)

Solution:

Non-myelinated nerve fibre is enclosed by Schwann cell that does not form a myelin sheath around the axon. Nodes of Ranvier are gaps present between two adjacent myelin sheaths.

(168) Answer : (4)

Solution:

Along with the hypothalamus, the limbic system is involved in the regulation of sexual behaviour, expression of emotional reactions and motivation.

(169) Answer : (2)

Solution:

Adrenal gland	Diabetes insipidus
Hypothalamus	Addison's disease
Pancreas	Diabetes mellitus
Pituitary gland	Acromegaly

(170) Answer : (4)

Solution:

Diabetes mellitus leads to the formation of ketone bodies.

(171) Answer : (4)

Solution:

Dendrites are the afferent part of a neuron, while axons are efferent part of a neuron.

(172) Answer : (3)

Solution:

The electrical potential difference across the resting plasma membrane of axon is called as the resting potential.

(173) Answer : (2)

Solution:

The JG cells of kidney produce a peptide hormone called erythropoietin which stimulates the formation of RBCs.

(174) Answer : (4)

Solution:

Adrenaline and nor-adrenaline (catecholamines) are called emergency hormones. Both hormones help to cope up with the emergency conditions. Parasympathetic neural signals reduce the rate of heart beat.

(175) Answer : (2)

Hint:

Belongs to the largest phylum of kingdom Animalia

Solution:

The neural organisation is very simple in lower invertebrates like *Hydra*, where it is composed of a network of neurons. The neural system is better organised in insects, where a brain is present along with a number of ganglia and neural tissues. The vertebrates have a more developed neural system.

(176) Answer : (3)

Solution:

Number of carpal bones in one forelimbs = 8 and number of tarsal bones in one hindlimb = 7

(177) Answer : (4)

Solution:

Tropomyosin and troponin are components of actin or thin myofilament.

(178) Answer : (3)

Hint:

Corticoids which are secreted by zona fasciculata of adrenal cortex.

Solution:

Glucocorticoids include 3 main hormones, cortisol, corticosterone and cortisone. Out of the three, cortisol is the most abundant. Glucocorticoids are immunosuppressive so they are also used in transplantation surgery to avoid tissue rejection by immune system of the recipient.

(179) Answer : (1)

Solution:

Both cerebral hemispheres are connected by a tract of nerve fibres called corpus callosum.

(180) Answer : (1)

Solution:

At the point of fusion of ilium, ischium and pubis, there is a cavity called acetabulum to which the thigh bone (femur) articulates.

Femur is the longest bone in the human body.