24/04/2025

Phase-2
CODE-C

Aakash
Medical | IIT-JEE | Foundations

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FINAL TEST SERIES for NEET-2025

MM : 720 **Test - 9** **Time : 180 Mins.**

Answers

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

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Hints and Solutions

PHYSICS

(1) **Answer :** (2)
Solution:
9.99 – 0.0099 = 9.9801 m
Least number of significant figures are 3 hence 9.98 will be correct.

(2) **Answer :** (3)
Solution:
For half height
$10^2 = u^2 - \frac{2gh}{2}$ ...(i)
Total maximum height
$0 = u^2 - 2gh$ ...(ii)
$10^2 = \frac{2gh}{2}$
h = 10 m

(3) **Answer :** (4)
Solution:
$v = \sqrt{\frac{2GM}{R}} = \sqrt{\frac{2G}{R}\frac{4}{3}\pi^3\rho} = R\sqrt{\frac{8\pi G}{3}\rho}$
$\frac{v_e}{v_P} = \frac{R_e}{R_P}\sqrt{\frac{\rho_e}{\rho_P}} = \frac{1}{2}\sqrt{\frac{1}{2}} = \frac{1}{2\sqrt{2}}$

(4) **Answer :** (2)
Solution:
Viscous force = weight – upthrust
= $mg - V\rho_L g$
$\Rightarrow Vdg - V\frac{d}{2}g = V\frac{d}{2}g = \frac{mg}{2}$

(5) **Answer :** (2)
Solution:
$\frac{R_{\max}}{4} = H_{\max}$ (at θ = 45°)
∴ Coordinates of max height (100, 50)

(6) **Answer :** (2)
Solution:
$\text{Force} = \frac{Change\ in\ momentum}{\Delta t}$
$= \left|\frac{0-mu}{\Delta t}\right| = \frac{150\times10^{-3}\times20}{0.1}$
= 30 N

(7) **Answer :** (3)
Solution:
$K = \frac{P^2}{2m},\ P = \sqrt{2mE}$
$\frac{P_1}{P_2} = \sqrt{\frac{M_1}{M_2}} = \sqrt{\frac{1}{9}} = \frac{1}{3}$

(8) **Answer :** (1)
Solution:
K_2 (radius of gyration of disc $= \frac{R}{2}$ about its diameter)
K_1 (Radius of gyration of disc about an axis passing through its centre and normal to its plane $= \frac{R}{\sqrt{2}}$.

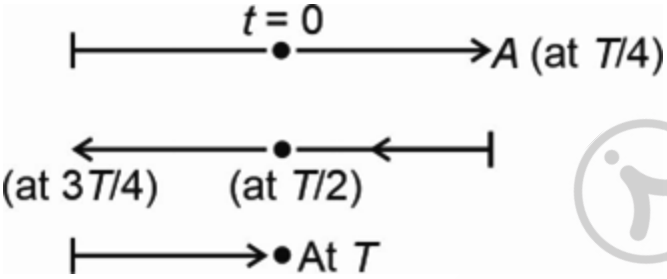
(9) **Answer :** (1)
Solution:
Heat loss by steam at 100°C = Heat gain by ice at 0°C
(Q_1) heat loss by 1 g of steam = mL = 540 cal

(Q_2) heat gain by ice to become water at 0°C = mL = (1) (80) cal
(Q_3) heat gain by water at 0°C to reach 100°C = $mc\Delta Q$
= (1) (1) (100) = 100 cal
Since $Q_1 >> Q_2 + Q_3$
∴ Final temperature of mixture is 100°

(10) **Answer :** (2)
Solution:
$\Delta Q = \Delta U + \Delta W$
$\Delta W = \Delta Q - \Delta U$
= 110 – 40 = 70 J

(11) **Answer :** (2)
Solution:
Density of gas $= \frac{m}{V} = \rho$
$\frac{\rho}{P} = \frac{m}{VP} = \frac{m}{nRT} = X$
XT = constant
At 10°C 283X = constant
At 110°C 383X' = constant
$X' = \frac{283}{383}X$

(12) **Answer :** (3)
Solution:



Total distance = 4A

(13) **Answer :** (3)
Solution:
$y = A\sin(kx - \omega t)$
A = amplitude = 1 m, $\lambda = 2\pi\, m$, $\nu = \frac{1}{\pi}\text{Hz}$
$K = \frac{2\pi}{\lambda} \Rightarrow K = 1,\ \omega = 2\pi\nu = 2\pi\left(\frac{1}{\pi}\right) = 2$
∴ $y = 1\sin(x - 2t)$

(14) **Answer :** (3)
Solution:
$F_m = qvB\sin\theta$
• Magnetic force on a moving charged particle can be non-zero. It depends. on 'θ'.
• When charged particle enters uniform magnetic field with uniform speed, its kinetic energy remains same.
• Magnetic force can change linear momentum of a charged particle.
• A charged particle at rest does not feel magnetic force on it.

(15) **Answer :** (2)
Solution:
In SHM
KE = PE
$\frac{1}{2}m\omega^2(A^2 - y^2) = \frac{1}{2}m\omega^2 y^2$
$y = \frac{A}{\sqrt{2}}$
At y = 0 PE = 0
$\text{KE} = \frac{1}{2}m\omega^2 A^2$ (Maximum)
TE = KE + PE $= \frac{1}{2}m\omega^2 A^2$

(16) **Answer :** (3)
Solution:

$v_{rms} = \frac{V_0}{\sqrt{2}}$

$V_0 = \sqrt{2} V_{rms}$

(17) Answer : (3)

Solution:

As $\vec{E} \perp \vec{B} \perp \vec{V}$

$\therefore \ \vec{E} \cdot \vec{B} = 0$

Also $\vec{V} = \vec{E} \times \vec{B}$

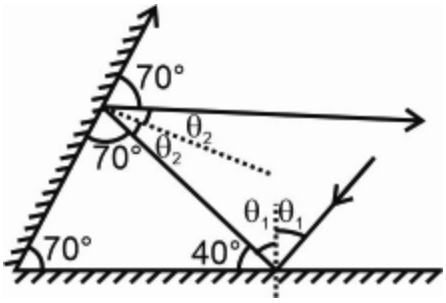
$\therefore \ \vec{E} = \left(-\hat{j} + \hat{k}\right), \ \vec{B} = \left(-\hat{j} - \hat{k}\right)$

$\vec{E} \cdot \vec{B} = \left(-\hat{j} + \hat{k}\right) \cdot \left(-\hat{j} - \hat{k}\right)$

= 1 – 1 = 0

(18) Answer : (4)

Solution:



$\theta_2 = 20°$

$\theta_1 + 40 = 90°$

$\theta_1 = 50°$

(19) Answer : (3)

Solution:

Since $R >> L$, the given arrangement can be treated as electric dipole.

Electric field due to a dipole at any arbitrary point (R, θ) is

$E = \frac{P}{4\pi\varepsilon_0 R^3} \sqrt{3\cos^2\theta + 1}$

$E \propto \frac{1}{R^3}$

(20) Answer : (3)

Solution:

Electric field intensity E is zero within a conductor due to charge on its surface

$E = -\frac{dV}{dr}$

$\therefore V$ = constant i.e. remains same throughout.

(21) Answer : (3)

Solution:

R of bulb $= \frac{V^2}{P} = \frac{(200)^2}{100} = 400 \ \Omega$

P (consumption) $= \frac{V_S^2}{R} = \frac{160 \times 160}{400} = 64 \ \text{W}$

(22) Answer : (2)

Solution:

$B_{\text{ends}} = \frac{\mu_0 nI}{2} = \frac{4\pi \times 10^{-7} \times 100 \times 2.5}{2 \times 0.5}$

= 3.14×10^{-4} T

(23) Answer : (4)

Solution:

$R = \frac{\rho l}{A}$

m = mass = Ald (d is density)

$R = \frac{\rho l^2 d}{m}$; $R \propto l^2$ for given mass

$R_1 = l^2$

$R_2 = (1.1l)^2$

$R_2 = 1.21\ R_1$

Specific resistance ρ is material dependent constant.

(24) **Answer :** (3)

Hint:

Least count of screw gauge is pitch divided by number of divisions on circular scale.

Solution:

Reading = main scale reading + n(L.C)

= 1 mm + 52 (0.01) mm

= 1.52 mm

= 0.152 cm

(25) **Answer :** (2)

Solution:

Semiconductor has negative temperature coefficient of resistance and it behaves as insulator at absolute zero temperature.

(26) **Answer :** (2)

Hint:

$R = R_0 A^{\frac{1}{3}}$

Solution:

$\frac{R_1}{R_2} = \left(\frac{A_1}{A_2}\right)^{\frac{1}{3}}$

$\frac{R}{R_2} = \left(\frac{2}{16}\right)^{\frac{1}{3}}$

$\frac{R}{R_2} = \frac{1}{2}$

$R_2 = 2R$

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

Solution:

$\frac{1}{\lambda} = R\left[\frac{1}{4^2} - \frac{1}{n^2}\right]$

$\frac{9}{400}R = R\left[\frac{1}{4^2} - \frac{1}{n^2}\right]$

$\frac{1}{16} - \frac{9}{400} = \frac{1}{n^2}$

$\frac{25-9}{400} = \frac{1}{n^2} \Rightarrow \frac{1}{n} = \frac{4}{20} \Rightarrow n = 5$

(28) **Answer :** (2)

Solution:

Light of all wavelengths in vacuum travel with same speed, so

$c \propto \lambda^{\circ}$

(29) **Answer :** (2)

Hint:

Width of central maxima $= \frac{2\lambda D}{a}$

Solution:

$W_c = \frac{2\lambda D}{a} = \frac{2 \times 500 \times 10^{-9} \times 2}{1 \times 10^{-3}} = 2 \times 10^{-3}\ \text{m}$

= 2.0 mm

(30) **Answer :** (3)

Hint:

$\boxed{\omega = \frac{\mu_V - \mu_R}{\mu_y - 1}}$

Solution:

μ_V , μ_R and μ_y are refractive indexes for violet light, red light and yellow light. It is different for different materials therefore dispersive power depends on material.

(31) **Answer :** (3)

Solution:

In absence of losses,
$P_{in} = P_{out}$

(32) Answer : (2)
Solution:
Magnetic field can apply force on a moving charge. A steady current carrying wire generate only magnetic field.

(33) Answer : (2)
Solution:
For diamagnetic material net magnetic dipole moment of an atom is zero.

(34) Answer : (3)
Solution:
$V = E - Ir$
$i = \frac{3V}{3\Omega} = 1\ \text{A}$
$V = 1 - (1 \times 1) = 0$

(35) Answer : (4)
Solution:
Electric field at surface of conductor is always normal to the surface.

(36) Answer : (4)
Hint:
$B = \frac{-\Delta P}{\left(\frac{\Delta V}{V}\right)}$
Solution:
$\left(\frac{-\Delta V}{V}\right) = 0.001\% = 1 \times 10^{-5}$
$\Delta P = \left(\frac{-\Delta V}{V}\right).B = 1 \times 10^{-5} \times 2.1 \times 10^{9}$
$= 2.1 \times 10^{4}$
$= 21$ kPa

(37) Answer : (1)
Hint:
Frequency of n^{th} overtone $f_n = (2n+1)\frac{v}{4L}$
Solution:
$f_n = (2n+1)\frac{v}{4L}$
$f_2 = (2\times 2+1)\frac{v}{4L} = \frac{5}{4} \times \frac{340}{2} = \frac{1700}{8} = 212.5$ Hz

(38) Answer : (4)
Hint:
$T = 2\pi\sqrt{\frac{m}{k}}$
Solution:
On comparing with general SHM equation
$F = -kx$, we get
$k = \pi^2$
$\Rightarrow \quad T^2 = 4\pi^2\frac{m}{k} = 4\pi^2 \times \frac{4}{\pi^2} = 16$
$\Rightarrow T = 4$ s

(39) Answer : (3)
Hint:
$\gamma = 1 + \frac{2}{f}$
Solution:
$\gamma = 1 + \frac{2}{f}$
$= 1 + \frac{2}{6} = \frac{4}{3}$

(40) Answer : (4)
Hint:
$\eta \le 1 - \frac{T_2}{T_1}$
Solution:

$\eta \leq 1-\frac{300}{600}$

$\eta \leq \frac{1}{2}\,(or)\eta \leq 50\%$

(41) Answer : (1)

Hint:

Newton's law of cooling.

Rate of loss of heat ∝ cooling difference in temperature

Solution:

$\frac{30}{6} = K \times 45$ ...(i)

$\frac{20}{t} = K \times 30$ ...(ii)

Divide (i) by (ii)

$\frac{5t}{20} = 1.5 \;\Rightarrow\; t = 6 \text{ minutes}$

(42) Answer : (3)

Solution:

For mechanical equilibrium of any body.

$\Sigma \overrightarrow{F} = 0 \; and \; \Sigma \overrightarrow{\tau} = 0$

(43) Answer : (2)

Solution:

$m_1u_1 + m_2u_2 = (m_1 + m_2)\,v$

$v = \frac{2\times5+0}{5} = 2$ m s^{-1}

(44) Answer : (3)

Solution:

For minimum time swimmer swims perpendicular to the direction of river flow.

(45) Answer : (3)

Solution:

Sol.: Static friction is a self-adjusting force, it can be greater than, less than or equal to kinetic friction.

Limiting friction = $(F_S)_{max} = \mu_S N$

Kinetic friction = $\mu_k N$

CHEMISTRY

(46) Answer : (1)

Solution:

As_2O_3 is amphoteric

Na_2O basic

Cl_2O_7 is acidic

N_2O is neutral

(47) Answer : (3)

Solution:

Cathode rays travel from negative electrode (cathode) to positive electrode (anode)

(48) Answer : (2)

Solution:

$\frac{hC}{\lambda} = \frac{hC}{\lambda_0} + KE$

$\frac{6.626\times10^{-34}\,Js\times3\times10^{8}\,ms^{-1}\times6.02\times10^{23}}{300\times10^{-9}\,m}$

= E_{min} + KE

3.97×10^5 J mol^{-1} – 2.97×10^5 J mol^{-1} = E_{min}

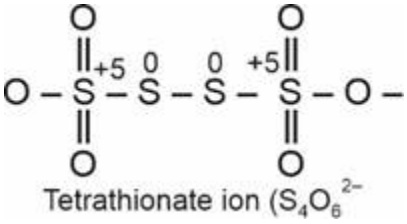
$E_{min} = 1.0 \times 10^5$ J mol^{-1}

(49) Answer : (2)

Solution:

Conjugate acid has one extra proton and conjugate base has one less proton.

(50) **Answer :** (3)
Solution:



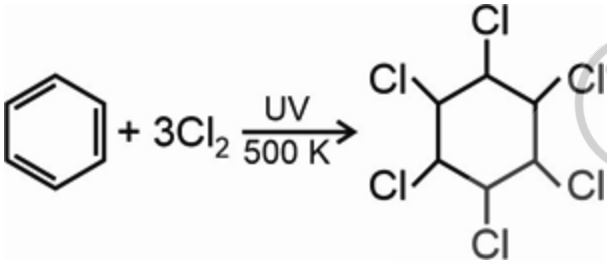
(51) **Answer :** (1)
Solution:
One of the technological applications of fractional distillation is to separate different fractions of crude oil in petroleum industry.

(52) **Answer :** (3)
Solution:
All anthracene, aniline, tropane and phenanthrene are aromatic structures.

$$\frac{\text{Benzenoid compound}}{\text{Anthracene, tropane, phenanthrene}}$$

$$\frac{\text{Non}-\text{Benzenoid compound}}{\text{Tropane}}$$

(53) **Answer :** (4)
Solution:



(54) **Answer :** (2)
Solution:
$\Delta T_{b(complex)} = \Delta T_{b(glucose)}$
$iKb_m = iKb_m$
$i \times 1 = 3 \times 1 \times 1$
$i = 3$ [$\because$ product of 3 ions]
$\therefore x = 5$
$[Cr(NH_3)_5Cl]Cl_2$

(55) **Answer :** (4)
Solution:
Benzene + Toulene = Ideal solution
Acetone + Ethyl alcohol = Positive deviation
Carbon tetrachloride + Chloroform = Positive deviation
Acetone + Aniline = Negative deviations

(56) **Answer :** (3)
Solution:
Iron catalysts are used in Haber's process. In Wacker's process, oxidation of ethyne to ethanal is catalysed by $PdCl_2$.

(57) **Answer :** (4)
Solution:
Enthalpy of atomisation is determined by number of electrons available for bonding to make stronger interatomic interactions.

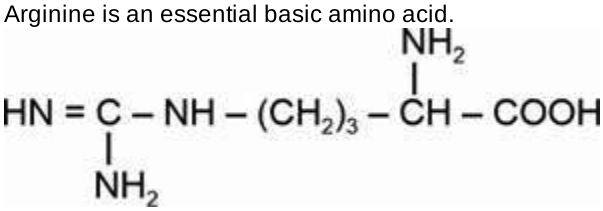
(58) **Answer :** (2)
Solution:
Phosphinic acid $\rightarrow H_3PO_3$

Pyrophosphoric acid → H_3PO_2

Phosphonic acid → $H_4P_2O_7$

Pyrophosphorous acid → $H_4P_2O_5$

(59) Answer : (3)
Solution:
Arginine is an essential basic amino acid.



(60) Answer : (4)
Solution:
α-sulphur is stable below the transition temperature i.e. 369 K.

(61) Answer : (2)
Solution:
Sucrose is dextrorotatory.
Amylose is a water soluble component of starch.

(62) Answer : (3)
Solution:
Hoffmann bromamide degradation reaction is used for preparation of primary amines by treating an amide with bromine in an aqueous or ethanolic solution of sodium hydroxide.
Gabriel pthalimide reaction is used for synthesis of primary amines.

(63) Answer : (1)
Solution:
$2CuSO_4 + K_4[Fe(CN)_6] \rightarrow Cu_2[Fe(CN)_6] + 2K_2SO_4$
Hexacyanoferrate(III)
(chocolate brown ppt)

(64) Answer : (2)
Solution:

Pb^{2+}, Cu^{2+}, As^{3+} – Group II

Al^{3+}, Fe^{3+} – Group III

Ba^{2+}, Ca^{2+}, Sr^{2+} – Group V

Mg^{2+} – Group VI

(65) Answer : (3)
Solution:

Amines	**– pK_b**
N-Methylmethanamine	– 3.27
Benzenamine	– 9.38
Pherylmethanamine	– 4.70
N-methylaniline	– 9.30

(66) Answer : (1)
Solution:
Mole fraction is the ratio of moles of a given component of the mixture to the total number of moles of mixture. So, it is a unitless quantity and does not depend on temperature.
Molality is the number of moles of solute present in 1 kg of solvent. So, it does not depend on temperature.

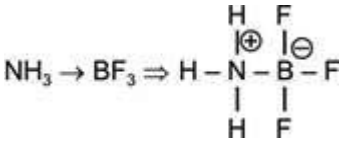
(67) Answer : (1)
Hint:
Smaller is the size of atoms, smaller is the bond length
Solution:
Atomic size order: C > O > H
Correct order of bond length:

C–C > C–O > C–H > O–H

Bond type	Bond length (pm)
C–C	154
C–O	143
C–H	107
O–H	96

(68) Answer : (2)

Solution:



Hybridisation of B in BF_3 is sp^2

Hybridisation of N in NH_3 is sp^3.

Hybridisation of B in BH_3 ← NH_3 is sp^3

Hybridisation of N in NH_3 → BF_3 is sp^3

(69) Answer : (4)

Hint:

For salt of weak acid and weak base

$pH = 7 + \frac{1}{2}[pK_a - pK_b]$

Solution:

⇒ $7.005 = 7 + \frac{1}{2}[4.76 - pK_b]$

⇒ 0.005 × 2 = 4.76 – pK_b

⇒ pK_b = 4.76 – 0.01

= 4.75

(70) Answer : (2)

Solution:

The process is adiabatic hence, q = 0

The process is irreversible hence

w = –PΔV

= –3 × (8.7 – 4.2)

= –3 × 4.5 = –13.5 L-atm

ΔU = q + w

ΔU = w [∵ q = 0]

ΔU = –13.5 × 101.3 = –1.367 kJ

(71) Answer : (2)

Hint:

For sparingly soluble salt

$$A_xB_y(s) \rightleftharpoons \underset{xs}{xA^{y+}}(aq) + \underset{ys}{yB^{x-}}(aq)$$

$$Ksp = [A^{y+}]^x[B^{x-}]^y$$

$$Ksp = (xs)^x(ys)^y = x^x \cdot y^y \cdot (s)^{x+y}$$

Where 's' is solubility of sparingly soluble salt.

Solution:

$$AB_2(s) \rightleftharpoons \underset{s}{A^{2+}}(aq) + \underset{2s}{2B^-}(aq)$$

$$Ksp = (s)(2s)^2 = 4s^3$$

$$A_2B_3(s) \rightleftharpoons \underset{2s}{2A^{3+}}(aq) + \underset{3s}{3B^{2-}}(aq)$$

$$Ksp = (2s)^2(3s)^3 = 108s^5$$

$$AB(s) \rightleftharpoons \underset{s}{A^+}(aq) + \underset{s}{B^-}(aq)$$

$\mathrm{Ksp} = (\mathrm{s})(\mathrm{s}) = \mathrm{s}^2$

$\mathrm{AB_3(s)} \rightleftharpoons \underset{\mathrm{s}}{\mathrm{A^{3+}(aq)}} + \underset{3\mathrm{s}}{3\mathrm{B^-(aq)}}$

$\mathrm{Ksp} = (\mathrm{s})(3\mathrm{s})^3 = 27\mathrm{s}^4$

(72) Answer : (3)
Hint:
Heat evolved during neutralization of 1 g eqv. of strong acid and 1 g. eqv. of strong base is 13.7 kcal/equivalent.
Solution:

	$\mathrm{NaOH(aq)}$	+	$\mathrm{HCl(aq)}$	$\rightarrow$	$\mathrm{NaCl(aq)}$	+	$\mathrm{H_2O}$
Initially	100×0.2		75×0.4		–		–
	$= 20$ meq		30 meq				
Finally	0		10 meq		20		

Heat released = $20 \times 10^{-3} \times 13.7 \times 10^3$
= 274 cal

(73) 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 = $2 \times 0.2 = 0.4$

(74) Answer : (4)
Hint:
At anode, oxidation takes place while at cathode reduction takes place.
Solution:

$\mathrm{NaCl}\left(\mathrm{aq}\right) \xrightarrow{\mathrm{H_2O}} \mathrm{Na^+}\left(\mathrm{aq}\right) + \mathrm{Cl^-}\left(\mathrm{aq}\right)$

At cathode: $\mathrm{H_2O\,(l) + e^- \rightarrow \frac{1}{2}H_2}\left(\mathrm{g}\right) + \mathrm{OH^-}\left(\mathrm{aq}\right)$

At anode: $\mathrm{Cl^-}\left(\mathrm{aq}\right) \rightarrow \frac{1}{2}\mathrm{Cl_2}\left(\mathrm{g}\right) + \mathrm{e^-}$

$\therefore$ $H_2(g)$ is obtained at cathode during electrolysis of aqueous NaCl.

(75) Answer : (3)
Solution:
Activation energy = Threshold energy – Reactant energy
= d – a

(76) Answer : (3)
Hint:
Arrhenius equation :
$\ln k = \ln A - \frac{E_a}{RT}$
Solution:
Compare equation, $\ln k = 2 - \frac{200}{T}$
with Arrhenius equation
$\ln A = 2$ and $\frac{E_a}{R} = 200$
$\Rightarrow A = e^2$ and $E_a = 200\ R$

(77) Answer : (4)
Solution:
$[Co(H_2O)_6]^{3+}$ and $[Co(C_2O_4)_3]^{3-}$ are inner orbital complex having hybridisation d^2sp^3
$[CoF_6]^{3-}$ and $[MnCl_6]^{3-}$ are outer orbital complex having hybridisation sp^3d^2

(78) Answer : (1)
Solution:

$[NiCl_4]^{2-}$ has tetrahedral geometry and 2 unpaired electrons.

(79) **Answer :** (2)
Solution:
Amide does not form oxime.

(80) **Answer :** (3)
Hint:

$NH_4NO_3 \xrightarrow{\Delta} 2H_2O + N_2O \uparrow$
Solution:

$NH_4NO_3 \xrightarrow{\Delta} 2H_2O + N_2O \uparrow$

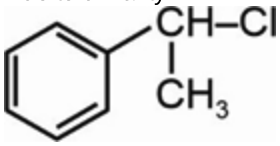
(81) **Answer :** (4)
Solution:
Vinyl halides don't undergo nucleophilic substitution reaction.
$\therefore CH_3 - CH = CH - O - CH = CH_2$ can't be prepared by Williamson's synthesis.

(82) **Answer :** (2)
Solution:

$$CH_3CH = CH_2 \xrightarrow[(ii)\ H_2O_2/OH^-]{(i)\ B_2H_6} CH_3CH_2CH_2 - OH$$

(83) **Answer :** (4)
Solution:
Vinyl halide will not gives SN^1 reaction because (1) Due to formation of unstable carbocation.
(2) Due to partial double bond character in C – X bond.

(84) **Answer :** (3)
Solution:
Due to chirality in



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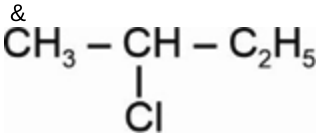
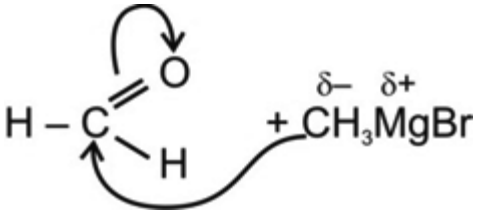


undergo racemization when hydrolysis reaction takes place.

(85) **Answer :** (1)
Hint:
Grignard reagent on reaction with formaldehyde followed by hydrolysis gives primary alcohol.
Solution:



$\rightarrow\ CH_3 - CH_2 - \overset{-}{O}\overset{+}{M}gBr \xrightarrow{H_3O^+} CH_3 - CH_2 - OH$

(86) **Answer :** (3)
Solution:

$$CH_3CH_2OH \xrightarrow{SOCl_2} \underset{A}{CH_3CH_2Cl} \xrightarrow{KCN} \underset{B}{CH_3CH_2CN}$$

$$\xrightarrow{H_2O/H^+} \underset{C}{CH_3CH_2COOH}$$

(87) **Answer :** (2)
Hint:
Answer (2)
Solution:
Answer (2)

Hint : $= \frac{\text{Mases obtained}}{\text{Mass calculated}} \times 100$

Sol. : $\underset{100}{CaCO_3}\left(s\right) \longrightarrow CaO\left(g\right) + CO_2\left(g\right)$

20 g $CaCO_3$ should give $\frac{56}{100} \times 20 = 11.2$ g of CaO.

$\therefore \%$

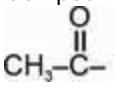
(88) **Answer :** (1)
Solution:

$$CH_3\,CH_2\,COOH \xrightarrow{SOCl_2} \underset{(A)}{CH_3\,CH_2\,COCl}$$

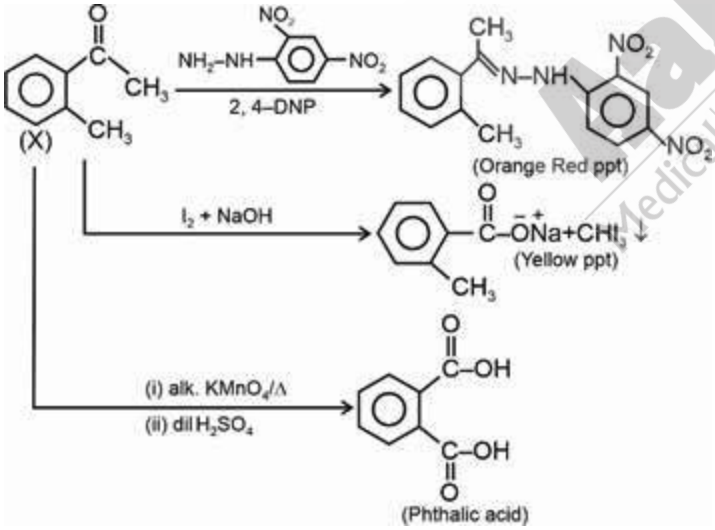
$$\xrightarrow[BaSO_4\,CaCO_3]{H_2,\ Pd} \underset{(B)}{CH_3\,CH_2\,CHO}$$

(89) **Answer :** (3)
Hint:
Silicones being surrounded by non-polar alkyl groups are water repelling in nature.
Solution:
Silicones are good electrical insulators, stable towards heat, nontoxic, resistant to chemicals.

(90) **Answer :** (3)
Hint:
Compound containing



group gives positive Iodoform test.
Solution:



BIOLOGY

(91) **Answer :** (2)
Solution:
Taxonomic groups/categories are distinct biological entities and not merely morphological aggregates.

(92) **Answer :** (1)
Solution:

In basidiomycetes, the asexual spores are generally not found, but vegetative reproduction by fragmentation is common. The members also lack sex organs.

(93) **Answer :** (3)
Solution:
Archaebacteria possess cell wall while mycoplasma completely lack cell wall.

(94) **Answer :** (1)
Solution:
Marchantia does not show the presence of protonema and leafy stage during its life cycle.

(95) **Answer :** (4)
Solution:
China rose shows twisted aestivation but makoi shows valvate aestivation.

(96) **Answer :** (2)
Solution:
Canna shows the presence of asymmetrical flowers.

(97) **Answer :** (2)
Solution:
Mango exemplifies drupe type of fruit.

(98) **Answer :** (1)
Solution:
Vessel is a long cylindrical tube-like structure made up of many cells, called vessel members, each with lignified walls and a large central cavity. The vessel cells are also devoid of protoplasm. Vessel members are interconnected through perforations in their common walls. The presence of vessels is a characteristic features of angiosperms.

(99) **Answer :** (3)
Solution:
Fascicular vascular cambium, interfascicular cambium and cork cambium are examples of lateral meristems.

(100) **Answer :** (3)
Solution:
Cristae – It represents infolding of inner membrane of mitochondria. Cisternae are flat disc shaped sacs found in Golgi bodies. Thylakoids are flattened membranous sacs found in chloroplast. Axoneme is the core of cilia and flagella.

(101) **Answer :** (4)
Solution:
Mesosomes are essentially infoldings of cell membrane of prokaryotes. They help in cell wall formation, DNA replication and distribution to daughter cells.

(102) **Answer :** (4)
Solution:
Theodore Schwann concluded that the presence of cell wall is a unique character of the plant cells.

(103) **Answer :** (1)
Solution:
The complex formed by a pair of synapsed homologous chromosomes is called a bivalent.

(104) **Answer :** (4)
Solution:
The complete disintegration of the nuclear envelope marks the start of the metaphase.

(105) **Answer :** (3)
Solution:
DNA replication occurs only once during S-phase of cell cycle.

(106) **Answer :** (1)
Solution:
The first human-like being the hominid, was called *Homo habilis*. Their brain capacities were in between 650-800 cc. They probably did not eat meat. *Homo erectus* had a large brain around 900 cc. The Neanderthal man had a brain size of 1400 cc.

(107) **Answer :** (2)
Solution:
Rheumatoid arthritis is an auto-immune disorder. Vaccine provides artificial active acquired immunity. Anti-toxin contains pre-formed antibodies and it provides artificial passive acquired immunity. Virus-infected cells secrete proteins called interferons which protect non-infected cells from further viral infections.

(108) Answer : (3)

Solution:

Sphenopsids (horsetails) are descendants of Psilophyton. Ferns are also descendants of Psilophyton but they were not much abundant during the in Carboniferous period. Lycopods were descendants of Zosterophyllum.

(109) Answer : (1)

Solution:

The morula continues to divide and transforms into blastocyst as it moves further into the uterus. The blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast is called inner cell mass.

(110) Answer : (3)

Solution:

Antennal glands or green glands perform the excretory function in crustacean like prawns. Nephridia help to remove nitrogenous wastes and maintain a fluid and ionic balance. Malpighian tubules are the excretory structure of most of the insects including cockroaches. Protonephridia or flame cells are the excretory structures in the platyhelminths, rotifers, some annelids and the cephalochordates-*Amphioxus*.

(111) Answer : (3)

Solution:

Stimulation of renin secretion will increase the secretion of aldosterone by adrenal cortex, which causes increased reabsorption of sodium and water from the distal parts of the tubule.

(112) Answer : (2)

Solution:

Neural system provides a point to point rapid coordination among organs. The neural coordination is fast but short-lived. Both neural system and endocrine system are essential for homeostasis.

(113) Answer : (1)

Solution:

In natural methods of contraception, side effects are almost nil, chances of failure of these methods are also high. IUDs, implants and oral contraceptive pills have comparatively low failure rate than natural methods of contraception.

(114) Answer : (4)

Solution:

Administration of progestogen alone or progestogen-estrogen combinations or IUDs within 72 hours of coitus have been found to be very effective as emergency contraceptives as they could be used to avoid possible pregnancy due to rape or casual unprotected intercourse.

(115) Answer : (4)

Solution:

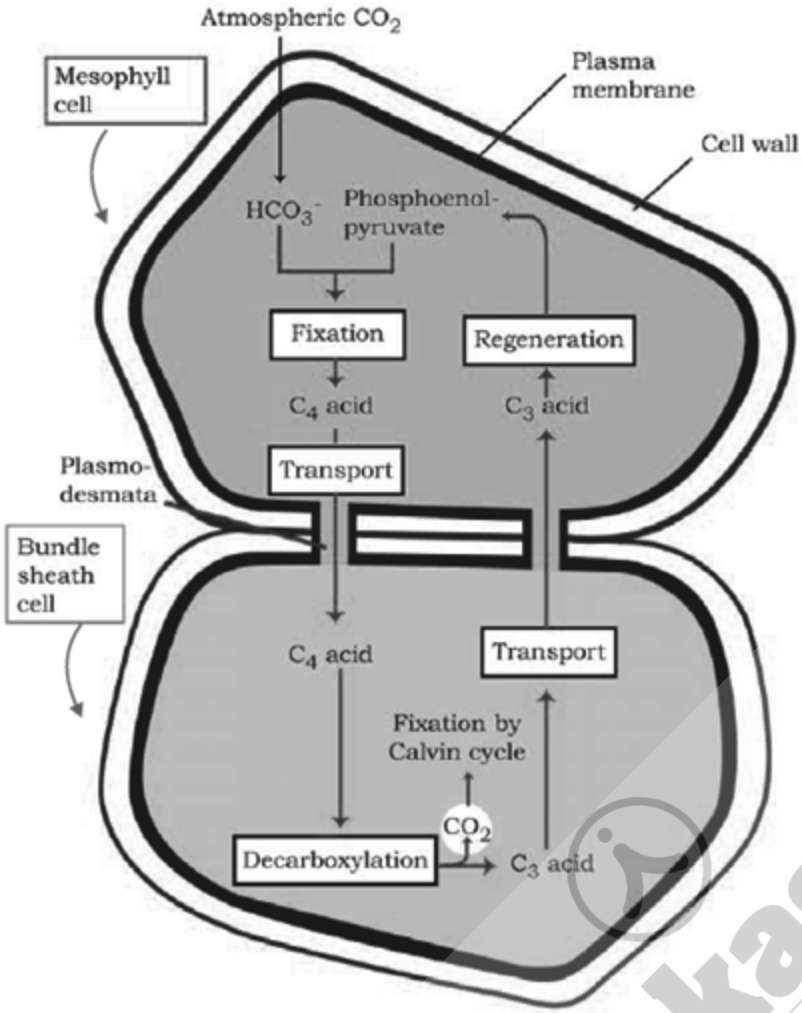
Infective stage of *Plasmodium* for human is sporozoites while for mosquito it is gametocytes. The parasites initially multiply within liver cells and then attack the red blood cells.

(116) Answer : (2)

Solution:

The correct sequential order is as follow:

c → e → b → d → a



(117) Answer : (1)

Solution:

Maize is a C_4 plant and tomato is a C_3 plant. At low light conditions, neither C_3 nor C_4 plants respond to high CO_2 conditions.

(118) Answer : (1)

Solution:

In fermentation, there is a net gain of two molecules of ATP for each molecule of glucose degraded to pyruvic acid whereas 38 molecules of ATP are generated under aerobic conditions.

(119) Answer : (2)

Solution:

Pyruvic acid decarboxylase and alcohol dehydrogenase are utilized during alcoholic fermentation.

(120) Answer : (1)

Solution:

Ustilago is known as smut fungi.

(121) Answer : (1)

Solution:

Being gymnosperm, both *Pinus* and *Cycas* are heterosporus. *Pinus* is monoecious but *Cycas* is dioecious. *Cycas* has unbranched stem but *Pinus* has branched stem. *Cycas* shows symbiotic association with N_2-fixing cyanobacteria but *Pinus* shows symbiotic association with fungi.

(122) Answer : (1)

Solution:

In pea flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals.

(123) Answer : (3)

Solution:
Label A represents sieve pores
Label B represents sieve tube element
Label C represents phloem parenchyma
Label D represents companion cells
Phloem parenchyma is absent in most of the monocotyledons.

(124) Answer : (4)
Solution:
In *Amoeba*, the contractile vacuole is important for osmoregulation and excretion.

(125) Answer : (3)
Solution:
The phase of karyokinesis in which reformation of ER takes place is telophase. This phase also shows decondensation of chromosomes.

(126) Answer : (2)
Solution:
Auxin was first isolated from human urine and it controls xylem differentiation and helps in cell division.

(127) Answer : (2)
Solution:
The ovule is a small structure attached to the placenta by means of a stalk called funicle.

(128) Answer : (4)
Solution:
Synergids are characterised by the presence of filiform apparatus.

(129) Answer : (2)
Solution:
1. When I^A and I^B are present together, they both express their own types of sugars, this is because of co-dominance.
2. The alleles I^A and I^B produce a slightly different form of the sugar, while i does not produce any sugar.

(130) Answer : (2)
Solution:
Male honey bees are haploid individuals and they produce gametes by mitosis.

(131) Answer : (3)
Solution:
Collar cells or choanocytes line the spongocoel and the water canals. Metagenesis or alternation of generation is exhibited by some cnidarians *e.g.*, *Obelia*. C tenophores are commonly known as sea walnuts or comb jellies.

(132) Answer : (3)
Solution:
Larynx is a cartilaginous box which helps in sound production and hence called the sound box. During swallowing, glottis can be covered by a thin elastic cartilaginous flap called epiglottis. The trachea, primary, secondary and tertiary bronchi and initial bronchioles are supported by incomplete cartilaginous rings. Alveoli are vascularised bag-like structures.

(133) Answer : (1)
Solution:
Each ovary is about 2 to 4 cm in length and is connected to the pelvic wall and uterus by ligaments. Each testis is oval in shape with a length of about 4-5 cm and a width of about 2-3 cm.

(134) Answer : (3)
Solution:
'X' is cellulose which is a homopolysaccharide of glucose. Plant cell wall is made of cellulose. Paper made from plant pulp and cotton fibre is cellulosic. Cellulose does not contain complex helices and hence cannot hold I_2 .

(135) Answer : (2)
Solution:
In members of the class Chondrichthyes, the skin is tough, containing minute placoid scales. Teeth are modified placoid scales which are backwardly directed. In member of the class Osteichthyes, skin is covered with cycloid/ctenoid scales.

(136) Answer : (2)
Solution:
Collagen forms intercellular ground substance. Adult human haemoglobin consists of 4 subunits. Two of these are identical to each other. Hence, two subunits of α-type and two subunits of β-type together constitute the human haemoglobin. When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor. Competitive inhibitors are often used for the control of bacterial pathogens.

(137) Answer : (2)

Solution:

If the pregnancy has lasted more than 12 weeks but fewer than 24 weeks, then opinion of two registered medical practitioners are required for MTP. Within the first 12 weeks of pregnancy, the opinion of one registered medical practitioner is required for MTP.

(138) Answer : (1)

Solution:

Given figure is the chemical structure of morphine. Opioids are the drugs which bind to specific opioid receptors present in our CNS and GIT.

(139) Answer : (2)

Solution:

Spiders and scorpions have book lungs. *Limulus* has book gills. *Delphinus* (common dolphin) has lungs as the respiratory organs.

(140) Answer : (4)

Solution:

CCK acts on both pancreas and gall bladder and stimulates the secretion of pancreatic enzyme and bile juice. Secretin acts on the exocrine pancreas and stimulates secretion of water and bicarbonate ions. Melatonin helps in maintaining the normal rhythm of sleep wake cycle and body temperature

(141) Answer : (1)

Solution:

Pneumotaxic centre is present in pons region of hind brain and it can moderate the functions of respiratory rhythm centre. Neural signals from this centre can reduce the duration of inspiration and thereby alter the respiratory rate.

(142) Answer : (1)

Solution:

Neurons are excitable cells because their membranes are in polarised state. The neural system of all animals is composed of highly specialised cells called neurons which can detect, receive and transmit different kinds of stimuli.

(143) Answer : (1)

Solution:

Adrenaline and noradrenaline are rapidly secreted in response to stress of any kind or during emergency situations and are called emergency hormones or hormones of flight or fight. Activation of sympathetic system releases catecholamines. These hormones increase alertness, pupillary dilation, piloerection (raising of hair), sweating, breakdown of glycogen resulting in hyperglycemia in blood.

(144) Answer : (4)

Hint:

Bones of hand

Solution:

Micturition is urination.
Piloerection is raising of hair (goosebumps).
Tetany is a skeletal disorder caused due to low calcium in body fluid.
Tetanus is caused due to the bacterium *Clostridium tetani*.
Metacarpals are commonly called palm bones.
Coagulation is clotting of blood.
Breathing is pulmonary ventilation.

(145) Answer : (2)

Solution:

Heart rate = 100 beats/min
Stroke volume = End diastolic volume – End systolic volume
= (100 – 50) mL
Stroke volume = 50 mL
Cardiac output = Heart rate × Stroke volume
= (100 × 50) mL
= 5000 mL

(146) Answer : (1)

Hint:

Identify the location of compound epithelium.

Solution:

Location	Type of epithelium
Moist surface of buccal cavity	Compound epithelium
Inner lining of stomach	Simple columnar epithelium

Inner lining of aorta and air sacs of lungs Simple squamous epithelium

(147) Answer : (3)
Solution:
In the tissues, where low pO_2, high pCO_2, high H^+ concentration (low pH) and higher temperature exist, the conditions are favourable for dissociation of oxygen from the oxyhaemoglobin.

(148) Answer : (2)
Solution:
Fibrins are formed by the conversion of inactive fibrinogens in the plasma by the enzyme thrombin. Thrombins, in turn are formed from another inactive substance present in the plasma called prothrombin. An enzyme complex, thrombokinase, is required for the above reaction. This complex is formed by a series of linked enzymatic reactions (cascade process) involving a number of factors present in the plasma in an inactive state. An injury or a trauma stimulates the platelets in the blood to release certain factors which activate the mechanism of coagulation.

(149) Answer : (1)
Solution:
Due to dehydration, osmolarity of blood will increase. An excessive loss of fluid from the body can activate osmoreceptors which stimulate the hypothalamus to release antidiuretic hormone (ADH) or vasopressin from the neurohypophysis.

(150) Answer : (4)
Solution:
Central canal is present in the centre of spinal cord.

(151) Answer : (4)
Hint:
Neuroendocrine organ of the body.
Solution:
Hypothalamus possesses the centre for controlling hunger, thirst and temperature (thermoregulation).

(152) Answer : (3)
Hint:
Thin and flexible articular membrane.
Solution:
Exoskeleton for each segment consists of a dorsal tergum, a ventral sternum and lateral pleuron; these plates are joined to each other by a thin and flexible articular membrane known as arthrodial membrane.

(153) Answer : (2)
Solution:
Special venous connection between liver and intestine as well as the kidney and lower parts of the body are present in frogs. The former is called hepatic portal system and the latter is called renal portal system.

(154) Answer : (2)
Solution:
Obelia (cnidarian) and *Ctenoplana* (ctenophore) are diploblastic (have only two germ layers-ectoderm and endoderm) animals. *Taenia* (platyhelminth) is a triploblastic (contains three germ layers – ectoderm, mesoderm and endoderm) organism.

(155) Answer : (1)
Solution:
The loss of deleterious recessive genes through deaths of homozygotes (Hb^S/Hb^S) is being balanced by gain resulting from successful reproduction by heterozygotes in malaria prone areas.

(156) Answer : (1)
Hint:
Phenylketonuria is an inborn error of metabolism.
Solution:
Phenylketonuria is an autosomal recessive trait.

(157) Answer : (4)
Hint:
3' end of tRNA is attached with amino acid.
Solution:
This tRNA has UAC in anticodon loop which means that it will bind to AUG.

(158) Answer : (3)
Solution:
Two nucleotides are linked through 3′–5′ phosphodiester linkage to form a dinucleotide. In a nucleotide 5′C have phosphate group and 3′C have hydroxyl group.

(159) Answer : (2)
Solution:
In a transcription unit terminator is downstream to structural gene.

(160) Answer : (3)
Solution:
In prokaryotic cells, the DNA in nucleoid is organised in large loops held by proteins.
Prokaryotes do not have a defined nucleus, but the DNA is not scattered throughout the cell.
In eukaryotes, negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.

(161) Answer : (3)
Solution:
Treatment of waste water is carried out by heterotrophic moicrobes.

(162) Answer : (1)
Solution:
Barnacles growing on the back of a whale benefits by getting shelter. Whale remains unaffected. Hence, this shows commensalism.

(163) Answer : (3)
Solution:
Calotropis growing in abandoned fields produces highly poisonous cardiac glycosides and that is why you never see any cattle or goats browsing on this plant.

(164) Answer : (1)
Solution:
Pyramid of energy is always upright and can never be inverted because when energy flows from a particular trophic level to the next trophic level, some energy is always lost as heat at each step.

(165) Answer : (3)
Solution:
Dodo was extinct from Mauritius.

(166) Answer : (3)
Hint:
A single species might show high diversity at the genetic level over its distributional range.
Solution:
Rauwolfia vomitoria exhibits genetic diversity which shows different concentration of active chemical that the plant produces.

(167) Answer : (2)
Solution:
Fruit and leaf drop at early stages can be prevented by the application of auxins.

(168) Answer : (1)
Solution:
i gene is a regulatory gene which codes for repressor protein.

(169) Answer : (3)
Solution:
Full potential of penicillin as an antibiotic is established by Chain and Florey.

(170) Answer : (4)
Solution:
Most productive ecosystem are coral reef, tropical rain forest, sugarcane field etc.

(171) Answer : (4)
Solution:
Many fungi belonging to the genera *Microsporum*, *Trichophyton* and *Epidermophyton* are responsible for ringworms.
Disease 'X' is ringworm. Amoebiasis is characterised by stools with excess mucous and blood clots.

(172) Answer : (1)
Solution:
ori site is a DNA sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within the host cells. This sequence is also responsible for controlling the copy number of the linked DNA.

(173) Answer : (1)
Hint:
Exclude the institute where 'Saheli' was developed.
Solution:

The Indian Government has set up organisations such as GEAC (Genetic Engineering Approval Committee), which will make decisions regarding the validity of GM research and the safety of introducing GM-organisms for public services. The European Federation of Biotechnology has given a definition of biotechnology. Central Drug Research Institute prepared 'Saheli', a non-steroidal pill.
US Patent and trademark office gave patent rights on Basmati Rice in 1997.

(174) Answer : (3)
Solution:
Three disulphide bonds are present in a mature insulin (two interchain disulphide bonds between 'A' and 'B' chains and one intrachain disulphide bond within 'A' chain).

(175) Answer : (1)
Solution:
The method of RNAi involves silencing of a specific mRNA due to formation of dsRNA molecule formed by binding of complementary RNA (anti-sense RNA) molecule to the original mRNA of the nematode.

(176) Answer : (3)
Solution:
Chelone and *Calotes* are reptiles but *Columba* is a bird.

(177) Answer : (2)
Solution:
Electrophoresis uses an electric field to move the negatively charged DNA through an agarose gel matrix towards a positive electrode.

(178) Answer : (3)
Solution:
Globular proteins have 3° structure.

(179) Answer : (2)
Hint:
Day of ovulation = Number of days in Menstrual cycle –14.
Solution:
LH induces ovulation which usually occurs on 21^{st} day in the 35 day cycle.
Day of ovulation = 35 – 14 = 21^{st} day.

(180) Answer : (2)
Hint:
Algae have cell wall similar to plants.
Solution:
For lysing the cell wall of algae, cellulase and pectinase can be used because cell wall of green algae is similar to cell wall of plants.