25/04/2025

Phase-1
CODE-B

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 - I4** **Time : 180 Mins.**

Answers

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

❑ ❑ ❑

Hints and Solutions

PHYSICS

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

$F = \frac{9\times10^{9}\times2\times10^{-7}\times3\times10^{-7}}{(30\times10^{-2})^{2}}$

= 6 × 10^{-3} N

(2) **Answer :** (4)
Solution:
Electric field is in the direction in which potential decreases steepest and interior of a conductor cannot have excess charge in static situation.

(3) **Answer :** (4)
Solution:
Energy loss = $U_I - U_F = \frac{1}{2}CV^2 - \frac{1}{2}C_{eq}\cdot V_{eq}^2$

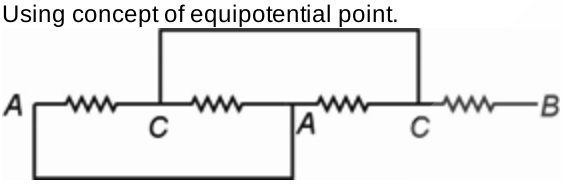
$= \frac{1}{2}\left(600\times10^{-12}\right)\cdot(200)^2 - \frac{1}{2}\left(1200\times10^{-12}\right)\cdot(100)^2$

$= \frac{1}{2}\left(600\times10^{-12}\right)\times\left(4\times10^{4}\right) - \frac{1}{2}\left(1200\times10^{-12}\right)\times10^{4}$

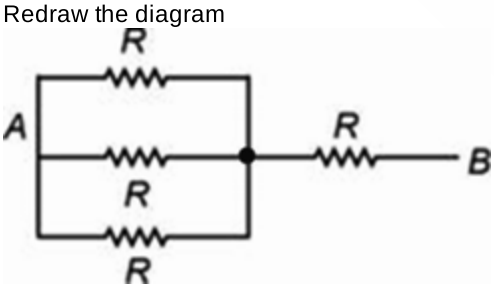
= 1200 × 10^{-8} – 600 × 10^{-8}

= 600 × 10^{-8} = 6 × 10^{-6} Joule

(4) **Answer :** (2)
Solution:
Using concept of equipotential point.



Redraw the diagram



$R_{AB} = \frac{R}{3} + R = \frac{4R}{3}$

(5) **Answer :** (1)
Solution:
$V_d = \frac{eE\tau}{m}$, as $V_d \propto \tau$ and $\tau \downarrow$ as $T \uparrow$

(6) **Answer :** (1)
Solution:
$F = IlB\sin\theta \Rightarrow \frac{f}{l} = IB\sin\theta$

$= 8\times1.5\times\frac{1}{2} = 6$ N/m

(7) **Answer :** (1)
Solution:
$r = \frac{\sqrt{2mk}}{qB}$

$r \propto \frac{\sqrt{m_p}}{e}$

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$T = \frac{2\pi r}{v} = \frac{2\pi m}{qB} \Rightarrow T \propto \frac{m}{q}$

(8) **Answer :** (2)
Solution:
$V_1 \propto A_1 \Rightarrow \frac{V_1}{V_2} = \frac{27}{125}$

(9) **Answer :** (4)
Solution:
$|e_{av}| = \left|L \cdot \frac{\Delta I}{\Delta t}\right|$
$\Rightarrow 200 = L \times \frac{5-0}{0.1}$
$\Rightarrow L = \frac{20}{5} = 4$ H

(10) **Answer :** (2)
Solution:
Induced emf $e = vBl$

(11) **Answer :** (3)
Solution:
Steel is preferred for permanent magnet as compared to soft iron as coercivity of steel is more as compared to soft iron.

(12) **Answer :** (4)
Solution:
$I = \sqrt{I_1^2 + I_2^2}\sin\left(\omega t + \phi\right)$
$I_{\text{rms}} = \sqrt{\frac{I_1^2 + I_2^2}{2}}$

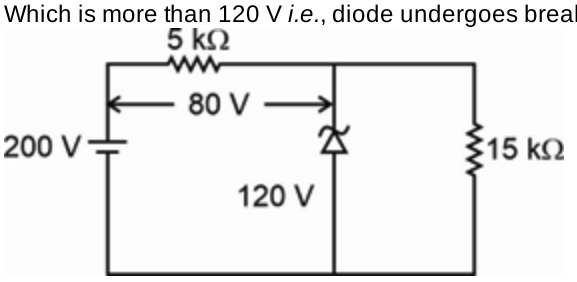
(13) **Answer :** (4)
Solution:
- $\oint \vec{E} \cdot \vec{dl} = \frac{-d\phi_B}{dt}$

This equation consists of non conservative electric field.

(14) **Answer :** (3)
Solution:
$T \propto \frac{r}{v} \propto \frac{n^3}{z^2}$

(15) **Answer :** (3)
Solution:
Photoelectric effect is explained with the help of particle-nature of light.

(16) **Answer :** (4)
Solution:
First assuming Zener diode does not undergo break down,
Then current in circuit
$= \frac{200}{20000} =$ 10 mA
Voltage drop across diode = $10 \times 10^{-3} \times 15 \times 10^3 = 150$ V
Which is more than 120 V *i.e.*, diode undergoes breakdown.



Current in 5 kΩ $= \frac{80}{5000} = 16$ mA
Current in 15 kΩ $= \frac{120}{15000} = 8$ mA
∴ Current through diode = 16 – 8 = 8 mA

(17) **Answer :** (4)

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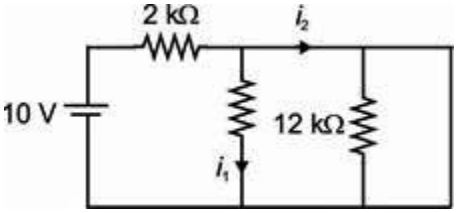
Solution:



$i_1 = 0$

$i_2 = \frac{10}{2\times10^3} = 5$ mA

(18) Answer : (2)
Solution:
The emitted photoelectrons have different K.E. as some energy is lost in collisions.

(19) Answer : (1)
Solution:

Use $\boxed{E = -13.6\frac{z^2}{n^2}}$ for H-like atom

Ionization energy from ground state of He^+ atom = $4E$

As total energy in ground state of He^+ atom = $-4E$
⇒ P.E. in ground state = $-8E$

⇒ Ionization energy in first excited state of He^+ atom = E
⇒ K.E. = E

(20) Answer : (2)
Solution:

$\mu = \frac{\text{Real depth}}{\text{Apparent depth}} \Rightarrow \mu = \frac{H_0}{H}$

(21) Answer : (4)
Solution:
$\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{30} - \frac{1}{20} = \frac{2-3}{60}$
$= -\frac{1}{60}$
$F = -60$ cm

(22) Answer : (4)
Solution:
Distance of n^{th} bright fringe from central bright fringe
$y = \frac{n\lambda D}{d}$

(23) Answer : (4)
Solution:
$I_R = I_1 + I_2 + 2I_1I_2\cos\varphi$ ...(i)
and phase difference
$\Delta\phi = \frac{2\pi\cdot(x)}{\lambda}$ ...(ii)
here
$I_1 = I_2 \rightarrow I_0$
and $\phi_1 = \frac{2\pi\times\lambda}{\lambda} = 2\pi$
$\phi = \frac{2\pi}{\lambda}\cdot\frac{\lambda}{3} = \frac{2\pi}{3}$
and now use equation (i) for required result

(24) Answer : (4)
Solution:
Preceeding zeros are insignificant

(25) Answer : (3)
Solution:
Heat and work have same units but different nature all together.

(26) Answer : (3)

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Hint:
Use gallileo's ratio
Solution:
In the last second, the distance travelled is $\frac{7h}{16}$
where *h* is height of tower.
In first second = h/16
In 2nd second = 3h/16
In 3rd second = 5h/16
In 4th second = 7h/16
⇒ time of fall = 4 s

(27) Answer : (4)
Solution:
Acceleration vector always acts in downward direction, if air friction is neglected.

(28) Answer : (3)
Solution:
$H = \frac{u^2 \sin^2\theta}{2g} = \frac{(u_y)^2}{2g} = \frac{(4)^2}{2\times 10} = 0.8$ m

(29) Answer : (2)
Solution:
Contact force = $\sqrt{N^2 + f^2} = \sqrt{(20)^2 + (20)^2}$
$= 20\sqrt{2}$ N

(30) Answer : (3)
Solution:
Change in momentum = Area below the *F* versus *t* graph in that interval
$= \left(\frac{1}{2}\times 2\times 6\right) - (2\times 3) + (4\times 3)$
= 6 – 6 + 12 = 12 N s

(31) Answer : (4)
Solution:
Work done $W = \vec{F}\cdot\vec{d} = F\cdot d\cdot\cos\theta$
For θ = 0° ⇒ work is maximum
θ = 90° ⇒ work is zero

(32) Answer : (1)
Solution:
In an inelastic collision, only linear momentum remain conserved.

(33) Answer : (2)
Solution:
$I_{\text{Solid sphere about dia}} = \frac{2}{5}MR^2$

(34) Answer : (3)
Solution:
$\vec{\tau} = \vec{r}\times\vec{F}$
Torque is perpendicular to both $\vec{r}$ and $\vec{F}$
Hence $P = \vec{\tau}\cdot\vec{F} = \tau F\cos 90^\circ = 0$

(35) Answer : (2)
Solution:
$\because\ v = \sqrt{\frac{GM}{R}}$
$\frac{v_1}{v_2} = \sqrt{\frac{R_2}{R_1}} = \sqrt{\frac{4R}{R}} = 2:1$

(36) Answer : (1)
Solution:

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$\omega = \frac{2\pi}{T} = \frac{2\pi}{4} = \frac{\pi}{2}$

$a_{max} = \omega^2 A = \frac{\pi^2}{4} \times 2 = \frac{\pi^2}{2}$ m/s^2

(37) Answer : (4)

Solution:

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

$$\Rightarrow f = 5$$

$$\therefore C_v = \frac{f}{2}R = \frac{5}{2}R = 2.5R$$

(38) Answer : (4)

Hint:

$\lambda_m \propto \frac{1}{T}$

Solution:

$\frac{\lambda_{m_1}}{\lambda_{m_2}} = \frac{T_2}{T_1}$

$\lambda_{m_2} = \frac{5000 \times 4000}{2000}$

= 10000 Å

(39) Answer : (2)

Solution:

Particles on either side of a node have a phase difference equal to π.

(40) Answer : (2)

Hint:

Area under the *P* – *V* curve with volume axis gives the work done in the process.

Solution:

Area $= \frac{1}{2} \times [5] \times (6) = 15$ J

(41) Answer : (3)

Hint:

$\Delta Q = \Delta U + W$

Solution:

$1 = \frac{\Delta U}{\Delta Q} + \frac{W}{\Delta Q}$

$\frac{W}{\Delta Q} = 1 - \frac{\Delta U}{\Delta Q}$

$= 1 - \frac{nC_V \Delta T}{nC_P \Delta T}$

$= 1 - \frac{1}{\gamma}$

For polyatomic gas, $\gamma = \frac{4}{3}$

$\frac{W}{\Delta Q} = 1 - \frac{1 \times 3}{4}$

$\frac{W}{\Delta Q} = \frac{1}{4}$

(42) Answer : (1)

Solution:

Hint: Equation of continuity

Sol.: $A_i v_i = A_1 v_1 + A_2 v_2$

$\Rightarrow Av = 6 \times \frac{A}{3} + 4 \times \frac{A}{2}$

$\Rightarrow v = 2 + 2 = 4$ m/s

(43) Answer : (3)

Hint:

$$\text{Stress} = \frac{\text{Normal Restoring Force}}{\text{Area}}$$

Solution:

Stress = $\frac{25 \times 10}{5 \times 10^{-6}}$

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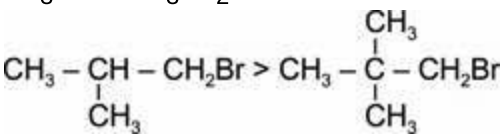
Stress = 5×10^7 N/m^2

(44) Answer : (4)
Solution:
For uniform hollow sphere, field intensity inside the sphere is zero while potential remains constant.

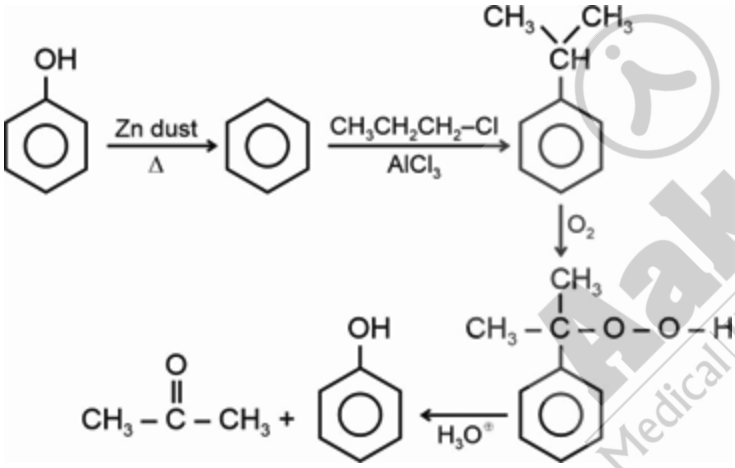
(45) Answer : (4)
Solution:
$g' = \frac{GM}{(R+h)^2} \Rightarrow g' = \frac{9}{\left(1+\frac{h}{R}\right)^2}$ and $g' = \frac{g}{2} \Rightarrow h = \left(\sqrt{2}-1\right)R$

CHEMISTRY

(46) Answer : (3)
Solution:
Correct order of relative rate of S_N2 reaction is
$CH_3 - Br > CH_3CH_2Br >$



(47) Answer : (2)
Solution:



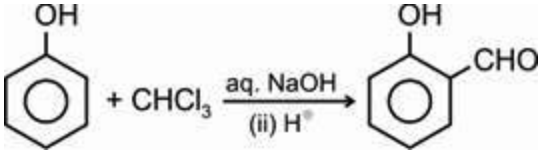
(48) Answer : (2)
Solution:
1. Cannizzaro reaction

$$HCHO \xrightarrow{50\%\ NaOH} HCOO^- Na^+ + CH_3OH$$

2. Aldol – condensation

$$CH_3CHO \xrightarrow[\Delta]{dil.\ NaOH} CH_3 - CH = CH - CHO$$

3. Reimer – Tiemann reaction



4. Kolbe's reaction

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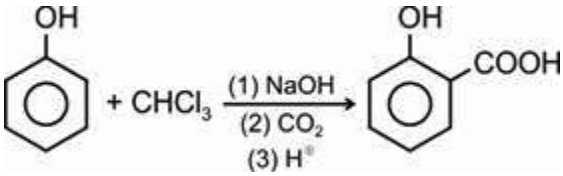
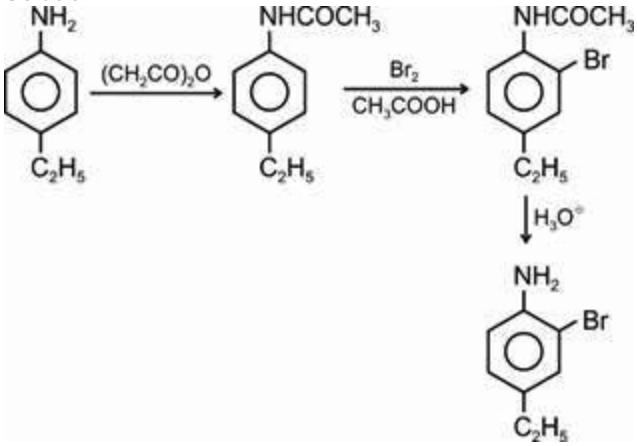
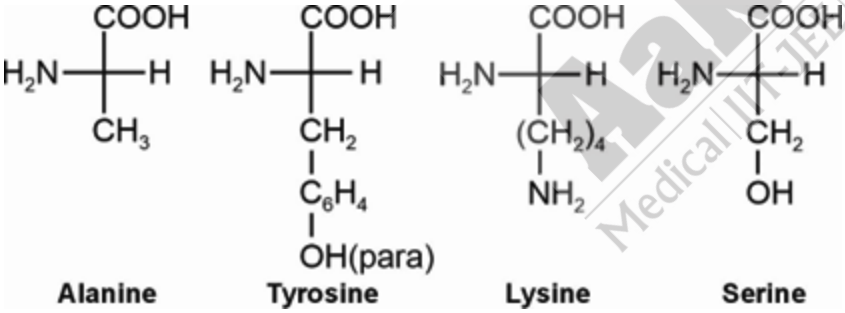


(49) Answer : (2)
Solution:



(50) Answer : (1)
Solution:
a. Gabriel synthesis is used for the preparation of primary amines
b. Sandmeyer reaction is used for the synthesis of benzene chloride.
c. Williamson synthesis is used for the preparation of ether.
d. Chromyl chloride oxidised methyl group to a chromium complex, which on hydrolysis give corresponding benzaldehyde this reaction is called Etard reaction

(51) Answer : (3)
Solution:



Lysine contain two – NH_2 groups Therefore it is a basic amino acid

(52) Answer : (1)
Solution:

	Ion	Number of unpaired electrons (n)	Spin only magnetic moment $\mu = \sqrt{n(n+2)}\ BM$
a.	Ti^{3+}	1	$\mu = \sqrt{3}$ BM
b.	Cr^{2+}	4	$\mu = \sqrt{24}$ BM
c.	Mn^{2+}	5	$\mu = \sqrt{35}$ BM
d.	Fe^{2+}	4	$\mu = \sqrt{24}$ BM

(53) Answer : (1)
Solution:
Homoleptic complex contains only one kind of ligands and Heteroleptic complex contains more than one kind of ligands.

(54) Answer : (2)
Solution:

$C_6H_{12}O_6(S) + 6O_2(g) \rightarrow 6\,CO_2(g) + 6H_2O(l)$

$\Delta H = \Delta U + \Delta n_g RT$

$\Delta n_g = 0$

$\Delta H = \Delta U$

$\Delta U = -651$ kcal

(55) Answer : (2)

Solution:

$$\underset{c-c\alpha}{BOH} \rightleftharpoons \underset{c-c\alpha}{B^{\oplus}} + \underset{c\alpha}{OH^{\ominus}}$$

$[OH]^- = C\alpha$

$= C\sqrt{\frac{K_b}{C}}$

$= \sqrt{K_b C}$

$= \sqrt{10^{-10} \times 10^{-2}} = 10^{-6}\,\text{mol L}^{-1}$

(56) Answer : (2)

Solution:

$$\underset{44.8\,L}{H_2(g)} + \underset{22.4\,L}{Cl_2(g)} \rightarrow 2\,HCl(g)$$

Number of moles $\frac{44.8}{22.4} = 2$ $\frac{22.4}{22.4} = 1$

Since, Cl_2 possesses minimum number of moles, thus it is the limiting reagent. 1 mole of Cl_2 gives 2 moles of HCl.

(57) Answer : (3)

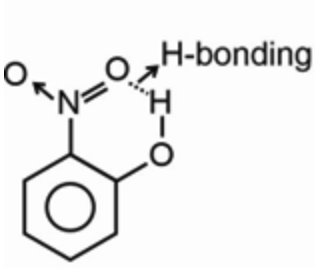
Solution:

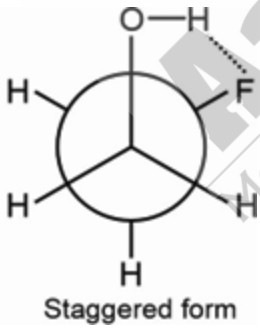
We know that

$\Delta E = 13.6\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$ where $n_2 > n_1$, $n_2 = 4$ to $n_1 = 3$ will give least energetic photon.

(58) Answer : (2)

Solution:





Intramolecular hydrogen bonding is present in o-nitrophenol and 2-Fluoroethanol.

(59) Answer : (1)

Solution:

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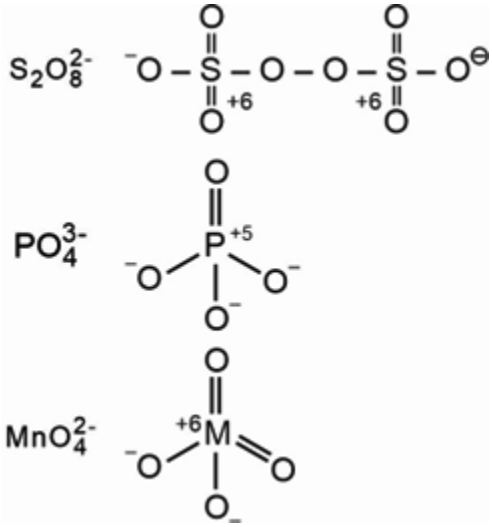
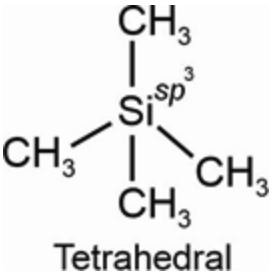
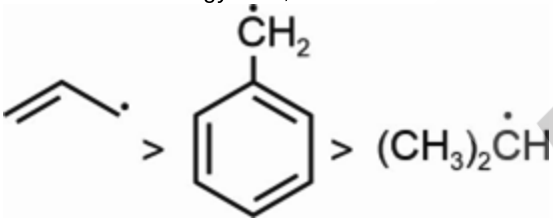


(60) **Answer :** (2)
Solution:



(61) **Answer :** (1)
Solution:
Based on the energy data, the correct order of stability of the free radical will be.



(62) **Answer :** (3)
Solution:
Ammonical silver nitrate solution gives white precipitate with terminal alkynes. It will not react with non-terminal alkynes.
Therefore ammonical silver nitrate can be used to distinquish between but-1-yne and but-2-yne.

(63) **Answer :** (1)
Solution:

Water is reduced at the cathode and oxidized at the anode instead of Na^+ and SO_4^{2-} ion respectively

Cathode : $2H_2O + 2e^- \rightarrow H_2 + 2\,OH^-$

Anode : $H_2O \rightarrow 2H^+ + \frac{1}{2}\,O_2 + 2e$

(64) **Answer :** (3)
Solution:
Depression in freezing point depends on the number of particle.
In calligative properties ions behave like particle

$Al_2(SO_4)_3$ provides five ions on ionisation as $Al_2(SO_4)_3 \rightarrow 2Al^{3+} + 3\,SO_4^{2-}$
Therefore lowest freezing point is possible for $Al_2(SO_4)_3$ only.

(65) **Answer :** (2)
Solution:

Rate constant K = 6×10^{-4} M s^{-1} therefore this is a zero order reaction

Hence,
$[a_0] - [a_t] = Kt$

$6 - [a_t] = 6 \times 10^{-4} \times 20 \times 60$

$6 - [a_t] = 0.72$

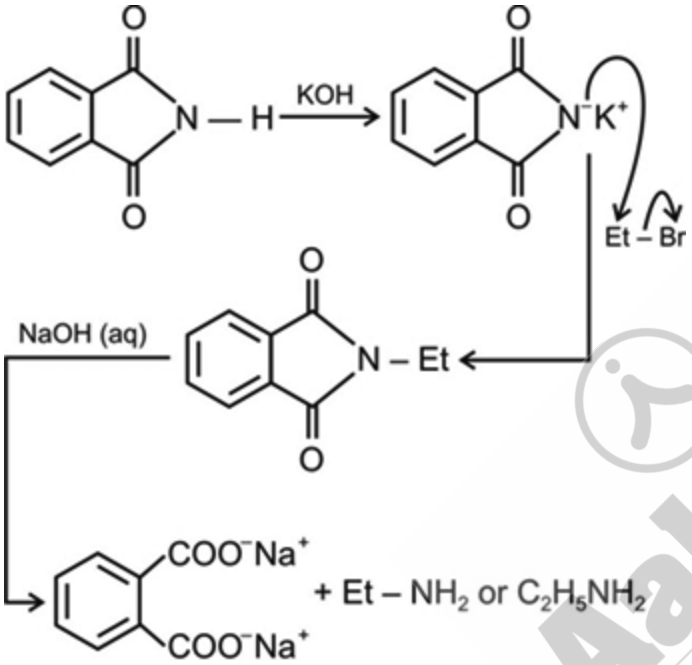
$[a_t] = 6 - 0.72$

$= 5.28$ M

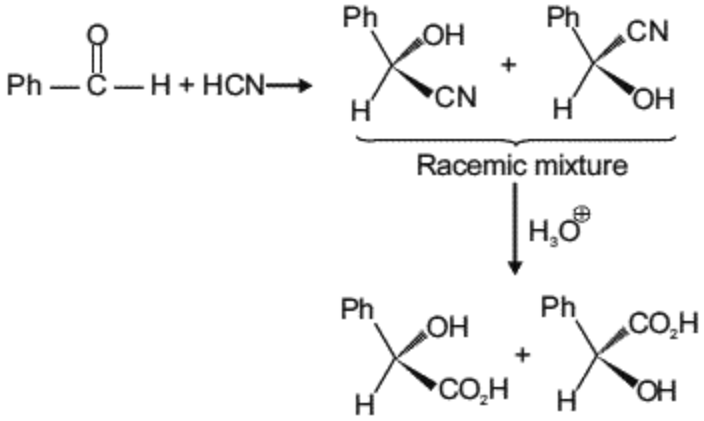
$[P] = 0.72$ M

(66) Answer : (4)
Solution:
Insulin is a globular proteins.

(67) Answer : (2)
Hint:
Et—Br undergoes S_N2 reaction in Gabriel phthalimide synthesis of 1° amines.
Solution:



(68) Answer : (2)
Hint:
Formation of chiral cyanohydrin compound.
Solution:



(69) Answer : (1)
Hint:

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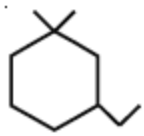


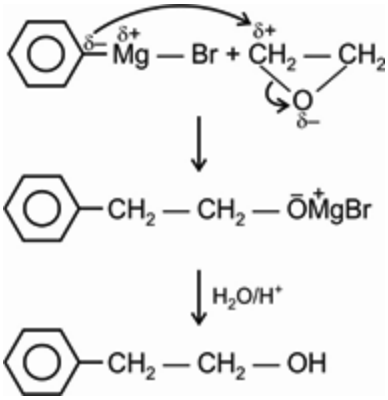
3-ethyl-1, 1-dimethylcyclohexane.

(70) Answer : (3)

Hint:

Opening of 3-member ring take place.

Solution:



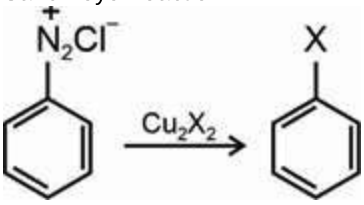
(71) Answer : (3)

Hint:

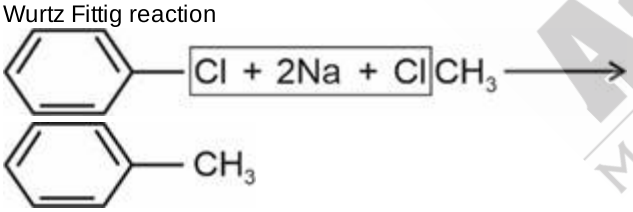
Swarts and Finkelstein reactions are halogen exchange reactions.

Solution:

Sandmeyer reaction



Wurtz Fittig reaction



Finkelstein reaction

$$R\text{–}Cl \xrightarrow[\text{dry acetone}]{NaI} RI$$

Swarts reaction.

$$R\text{–}Br \xrightarrow{AgF} RF$$

(72) Answer : (4)

Hint:

• CFSE = $-0.4\Delta_0 \times (t_{2g})_{electrons} + 0.6\Delta_0(e_g)_{electrons}$

Solution:

In $[Fe(H_2O)_6]^{3+}$, Fe is in +3 oxidation state.

Fe^{3+} has E.C. $t_{2g}^3 e_g^2$.

CFSE = $(-0.4\Delta_0 \times 3) + (0.6\Delta_0 \times 2) = 0$

$\therefore$ $[Fe(H_2O)_6]^{3+}$ has zero CFSE value.

(73) Answer : (3)

Hint:

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Complex compound with unpaired electron and dsp^2 hybridisation is square planar paramagnetic complex.

Solution:

Species	Hybridisation	Magnetic moment
$[Ni(CN)_4]^{2-}$	dsp^2	$\mu = 0$
$[Cu(NH_3)_4]^{2+}$	dsp^2	$\mu = \sqrt{3}$BM
$[Ni(CO)_4]$	sp^3	$\mu = 0$
$[PtCl_2(NH_3)_2]$	dsp^2	$\mu = 0$

(74) Answer : (4)

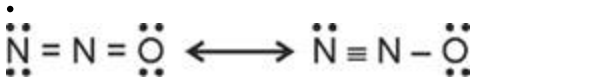
Hint:

N–N bond is present in N_2O_4

Solution:

• N_2O is a colourless, neutral gas

•



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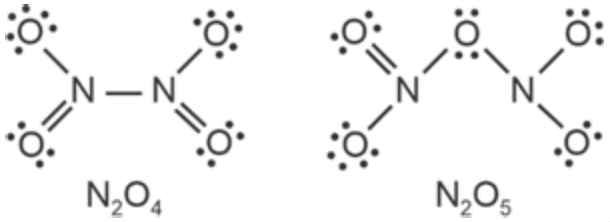


(75) Answer : (3)

Hint:

Catalyst catalyses only spontaneous reactions.

(76) Answer : (2)

Hint:

Oxidising power ∝ Reduction potential.

Solution:

Co^{3+} has highest reduction potential while Li^+ has lowest reduction potential.

(77) Answer : (2)

Hint:

$P_T = P_A^0 X_A + P_B^0 X_B$

Solution:

Mole % of A = 40%

$X_A = 0.4$

$X_B = 0.6$

$P_T = P_A^0 X_A + P_B^0 X_B$

$= 80 \times 0.4 + 30 \times 0.6$

$= 50$ cm Hg

(78) Answer : (4)

Solution:

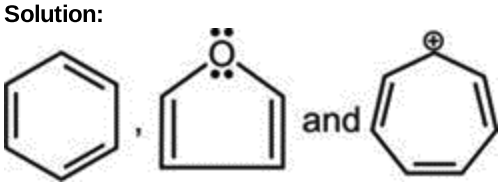
Potash Alum = $K_2SO_4 . Al_2(SO_4)_3 . 24H_2O$

Mohr's salt = $FeSO_4 . (NH_4)_2SO_4 . 6H_2O$

Ratio of water of crystallisation = 4 : 1

(79) Answer : (2)

Solution:



are aromatic compounds.

(80) **Answer :** (3)
Hint:
Chloroform and aniline can be separated by simple distillation.
Solution:
The fractions of crude oil in petroleum industry is separated using fractional distillation due to less difference in boiling points.
Glycerol can be separated from spent-lye using distillation under reduced pressure.
Aniline is separated by steam distillation from aniline-water mixture

(81) **Answer :** (2)
Solution:
$S_8 + 12\ OH^-(aq) \rightarrow 4S^{2-}(aq) + 2S_2O_3^{2-}(aq) + 6H_2O(l)$

(82) **Answer :** (1)
Hint:
$N = \frac{N_1V_1 + N_2V_2}{V_1+V_2}$
Solution:
pH = 2 pH = 3
$N_1 = 10^{-2}$ $N_2 = 10^{-3}$
$N = \frac{10^{-2} \times V + 10^{-3} \times V}{V+V} = \frac{0.011}{2} = 55 \times 10^{-4}$
$pH = -\log\left(55 \times 10^{-4}\right) = 2.26$

(83) **Answer :** (4)
Hint:
$\Delta G = \Delta H - T\Delta S$
Solution:
$\Delta G = -20 \times 10^3 - 300 \times 30$
$= -29 \times 10^3$ J = –29 kJ

(84) **Answer :** (3)
Hint:
$\overset{1}{C}H_2 = \overset{2}{C}H - \overset{3}{C} \equiv \overset{4}{C}H$
Solution:
$C_2 \Rightarrow sp^2$ hybridised
$C_3 \Rightarrow sp$ hybridised

(85) **Answer :** (2)
Hint:
IUPAC official name of an element having atomic number 102 is Nobelium
Solution:

Atomic number	IUPAC official name
102	Nobelium
104	Rutherfordium
105	Dubnium
108	Hassium

(86) **Answer :** (4)
Hint:
$\Delta x \times \Delta p \geq \frac{h}{4\pi}$
Solution:
$\Delta x \times m \times \Delta v \geq \frac{h}{4\pi}$
$\Delta x = \frac{h}{4\pi m \Delta v} = \frac{6.626 \times 10^{-34}}{4\pi \times \left(\frac{100}{\pi} \times 10^{-3}\right) 6.626 \times 10^{-24}}$
$\Delta x = 2.5 \times 10^{-10}\ m = 2.5\ \text{Å}$

(87) **Answer :** (3)
Hint:

$CaCO_3(s) + 2HCl_{(aq)} \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

Solution:

Millimoles of $CaCO_3 = \frac{\text{millimoles of HCl}}{2}$

Millimoles of HCl = 50 × 0.5 = 25 mmol

Millimoles of $CaCO_3 = \frac{25}{2}$ = 12.5 mmol

Moles of $CaCO_3 = \frac{12.5}{1000}$

Mass of $CaCO_3 = \frac{12.5}{1000} \times 100$

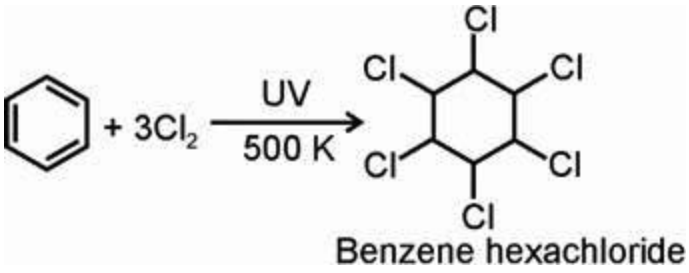
= 1.25 g

(88) **Answer :** (2)

Hint:

Under sunlight, three chlorine molecules add to benzene to produce benzene hexachloride.

Solution:



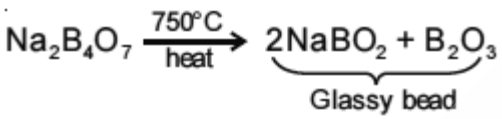
Benzene hexachloride

(89) **Answer :** (4)

Hint:

$4H_3BO_3 + Na_2CO_3 \rightarrow Na_2B_4O_7 + 6H_2O + CO_2$

Solution:



(90) **Answer :** (2)

Hint:

$K_P = K_C(RT)^{\Delta n_g}$

Solution:

$2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$

$\Delta n_g = (2 + 1) - (2) = 1$

$K_P = K_C(RT) = 2 \times 10^{10}\ RT$

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BIOLOGY

(91) **Answer :** (3)

Solution:

Anacardiaceae is the family of mango.

(92) **Answer :** (4)

Solution:

Mycoplasma are the smallest living organisms that can be pathogenic to animals or plants. They are facultative anaerobes.

(93) **Answer :** (4)

Solution:

Albugo candida causes white rust of mustard. It belongs to the class phycomycetes, the members of which have aseptate and coenocytic mycelium.

(94) **Answer :** (4)

Solution:

The members of Rhodophyceae store floridean starch as the food material whereas food is mainly stored in the form of starch in the members of Chlorophyceae.

(95) Answer : (3)
Solution:
Leafy stage of moss develop from secondary protonema as lateral bud.

(96) Answer : (4)
Solution:
Thread-like structures called root hair are found in the zone of maturation in the plant roots.

(97) Answer : (4)
Solution:
(i) In banyan tree, prop roots are adventitious roots.
(ii) Fruits, which are formed from an entire inflorescence are called composite fruits.

(98) Answer : (1)
Solution:
The given formula represents the family Liliaceae.
In the members of Liliaceae, seeds are endospermous and the inflorescence is cymose type.
Tepals are often united into tubes.

(99) Answer : (4)
Solution:
Phloem fibres are sclerenchymatous fibres which provide support to a plant.

(100) Answer : (2)
Solution:
Endodermis has suberin deposition in roots. Protoxylem is present towards periphery in roots.

(101) Answer : (1)
Solution:
Flagella are surface structures which help in motility in *Trypanosoma*.

(102) Answer : (4)
Solution:
Translation of mRNA takes place outside nucleus.

(103) Answer : (4)
Solution:
Ribosomes were discovered by George Palade. Eukaryotic ribosomes are of 80S type.

(104) Answer : (4)
Solution:
In the G_0 phase, a cell remains metabolically active but does not proliferate unless it is called on to do so.

(105) Answer : (3)
Solution:
Divided centrioles start moving to the opposite poles in the prophase of M-phase.

(106) Answer : (2)
Solution:
Nissl's granules are present in cyton and dendrites of neurons. They are absent in axon. Since, unipolar neurons do not possess dendrites, Nissl's granules are only present in their cyton.

(107) Answer : (1)
Solution:
pCO_2 in alveoli = 40 mmHg
pO_2 in deoxygenated blood = 40 mmHg
pCO_2 in oxygenated blood = 40 mmHg
Therefore, A = B = C

(108) Answer : (3)
Solution:
In humans, each rib is a thin flat bone connected dorsally to the vertebral column and ventrally to sternum. It has 2 articulation surfaces on its dorsal end and is hence called bicephalic.

(109) Answer : (1)
Solution:
RNAi involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of mRNA. Thus, it is a post transcriptional mechanism.

(110) Answer : (1)

Solution:
Menstrual cycle in human females extends from menarche to menopause. Labia majora are fleshy folds of tissues, which extend down from mons pubis and surround vaginal opening.

(111) Answer : (1)
Solution:
Restriction enzymes belong to a larger class of enzymes called nucleases. They are of two kinds; exonucleases and endonucleases. Exonucleases remove nucleotides from the ends of DNA whereas, endonucleases make cut at specific positions within the DNA.

(112) Answer : (3)
Solution:
If gene isolated from marrow cells producing ADA is introduced into cells at embryonic stages, ADA deficiency can be permanently cured.

(113) Answer : (2)
Solution:
Myasthenia gravis – Auto-immune disorder affecting neuro-muscular junction leading to fatigue, weakening and paralysis of skeletal muscles.
Tetany – Rapid spasm (wild contractions) in muscle due to low Ca++ in body fluid.
Osteoporosis – Decreased bone mass and increased chances of fracture. Decreased levels of estrogen is a common cause.

(114) Answer : (4)
Solution:
Neutrophils – 60-65% of total WBCs; Lymphocytes – 20-25% of total WBCs; Monocytes – 6-8% of total WBCs; Eosinophils (Acidophils) – 2-3% of total WBCs; Basophils – 0.5 – 1% of total WBCs.

(115) Answer : (1)
Solution:
The increasing osmolarity towards the inner medullary interstitium is mainly caused by NaCl and urea.
NaCl is transported by ascending limb of Henle's loop which is exchanged with descending limb of vasa recta.
Small amounts of urea enter thin segment of ascending limb of Henle's loop which is transported back to the interstitium by the collecting tubules.

(116) Answer : (3)
Solution:
Process of synapsis takes place during the zygotene stage of meiosis.

(117) Answer : (4)
Solution:
Diffusion of protons through the ATP synthase channel causes the breakdown of the proton gradient.

(118) Answer : (3)
Solution:
Chlorophyll *a* was established as the main photosynthetic pigment as the graph showing the action spectrum of photosynthesis superimposes on the absorption spectrum of chlorophyll *a*.

(119) Answer : (3)
Solution:
Succinate dehydrogenase enzyme is attached to the inner membrane of mitochondria in eukaryotes.

(120) Answer : (3)
Solution:
Auxins cause bending of the tip of coleoptile of canary grass towards light.

(121) Answer : (1)
Solution:
Hilum represents the junction between funicle and ovule.

(122) Answer : (1)
Solution:
Datura (Solanaceae), wheat, coconut and maize are the examples of endospermous seeds.

(123) Answer : (2)
Solution:
Sickle cell anaemia is a blood disorder, which is caused due to a point mutation, which leads to the conversion of glutamate to valine.

(124) Answer : (2)

Solution:
Polygenic traits are generally controlled by three or more genes.

(125) Answer : (3)
Solution:
Histones are not found in prokaryotes.

(126) Answer : (2)
Hint:
Among animals, invertebrates form the most species-rich group.
Solution:
Among animals, insects form the most species-rich taxonomic group, making more than 70 per cent of the total.

(127) Answer : (4)
Solution:
The historic convention on Biological Diversity (The Earth Summit) was held in Rio de Janeiro in 1992.

(128) Answer : (4)
Hint:
Equation $\frac{dN}{dt} = rN$ describes geometric growth.
Solution:
Geometric growth results J-shaped curve.

(129) Answer : (3)
Hint:
Major component of biogas is CH_4 and statins are the products of an yeast.
Solution:
Statins are produced by the yeast - *Monascus purpureus*.
In the aeration tanks of sewage plants, flocs are the masses of bacteria associated with fungal filaments to form mesh like structures. Swiss cheese is ripened with the help of the bacterium, *Propionibacterium sharmanii.*

(130) Answer : (1)
Solution:
Purines found, both in DNA and RNA are Adenine and Guanine.

(131) Answer : (4)
Solution:
The insulin cannot be orally administered because, it is proteinaceous in nature and will get digested by different enzymes of stomach.

(132) Answer : (2)
Solution:
In male frogs, ureter acts as the urinogenital duct.

(133) Answer : (1)
Solution:
Both the types of loose connective tissues contain adipocytes. The nucleus of adipocytes is peripherally located as fat globule occupies the space inside.

(134) Answer : (4)
Solution:
The spermatids are transformed into spermatozoa by spermiogenesis. After spermiogenesis, sperm heads become embedded in Sertoli cells and are finally released from seminiferous tubules by process of spermiation.

(135) Answer : (3)
Solution:
Phylum Hemichordata consists of small group of worm-like coelomate marine animals *e.g*. *Balanoglossus* and *Saccoglossus*
Fertilisation is external in them with indirect development.
Respiration takes place through gills.

(136) Answer : (2)
Solution:
Cholesterol, lecithin and inulin will be obtained in acid-insoluble pool.
Lecithin contains a nitrogen containing choline group.
Adenine is found in acid-soluble pool.

(137) Answer : (1)

Solution:
Absence of ethidium bromide *i.e.*, staining dye will not allow the DNA fragments to be visible under the UV light.
Pure DNA fragments will not be visible without staining.

(138) Answer : (1)
Solution:
IRV – Inspiratory Reserve Volume = 2500 – 3000 mL
FRC – Functional Residual Capacity = 2100 – 2300 mL
RV – Residual Volume = 1100 – 1200 mL
ERV – Expiratory Reserve Volume = 1000 – 1100 mL

(139) Answer : (3)
Solution:
Erythropoietin, cortisol, thyroxine and testosterone play an important role in erythropoiesis *i.e.*, RBC formation.
Prolactin regulates production of milk in mammary gland while ANF secreted from atrial wall is a vasodilator which decreases blood pressure.

(140) Answer : (1)
Solution:
In cockroaches, blood from sinuses enter heart through ostia and is pumped anteriorly to sinuses again.

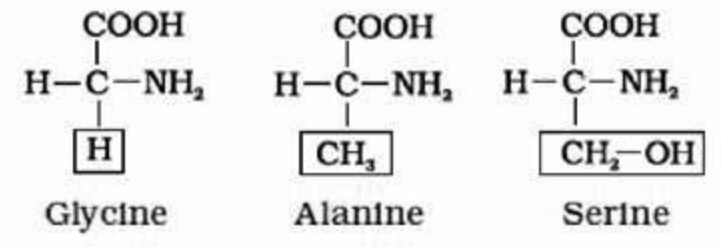
(141) Answer : (1)
Solution:
Only cardiac muscle fibres are branched.
Only skeletal muscle fibres are multinucleated.
Smooth muscle fibres are spindle shaped and they do not possess intercalated discs.

(142) Answer : (4)
Solution:
MTP can be performed to get rid of unwanted pregnancies either due to casual unprotected sex or failure of contraceptive used during coitus or rapes. MTPs are also essential in certain cases where continuation of the pregnancy could be harmful or even fatal either to the mother or to the foetus or both.

(143) Answer : (3)
Solution:
Australian marsupials are an example of adaptive radiation. A number of marsupials, each different from the other evolved from an ancestral stock, but all within the Australian island continent.

(144) Answer : (4)
Solution:
Heroin, commonly called smack is chemically diacetylmorphine, which is a white, odourless, bitter crystalline compound. It is obtained by acetylation of morphine.

(145) Answer : (1)
Hint:
Serine is an alcoholic amino acid.
Solution:



(146) Answer : (1)
Solution:
In nearly all animal tissues, specialised junctions provide both structural and functional links between its individual cells.
Three types of cell junctions are found in the epithelial tissues.
Cell junctions present in some smooth muscle fibres hold them together and they are bundled together in a connective tissue sheath.
Cell junctions fuse the plasma membranes of cardiac muscle cells and make them stick together.

(147) Answer : (1)
Solution:
According to the Chargaff's rule,
[A] = [T]

[G] = [C]
A = 30%, since adenine always combines with thymine, so percentage of thymine = 30%
Therefore, [G + C] = 100% – 60% = 40%
So % of cytosine = $\frac{40}{2} = 20$•
% of purine = [G] + [A] = 50%

(148) Answer : (2)
Hint:
CO_2 is end product of metabolism in tissues.
Solution:
If a person holds his breathe *i.e.*, fresh air is not inhaled, then fresh supply of O_2 is arrested. Concentration of CO_2 however continues to rise in blood producing an urge to breathe.

(149) Answer : (4)
Solution:
Fats are absorbed through lymph in the lacteals present in the intestinal villi.

(150) Answer : (3)
Solution:
The osmolarity of fluid in cortex is 300 mOsmol L^{-1} whereas osmolarity of inner medullary interstitium is 1200 mOsmol L^{-1}.

(151) Answer : (2)
Solution:
Removal of troponin - tropomyosin complex exposes the binding site of actin. So, myosin head already attached with ADP and Pi binds with actin on the myosin binding site.

(152) Answer : (1)
Solution:
Epinephrine and norepinephrine have the similar mode of action.

(153) Answer : (2)
Solution:
The layer of cells which covers the cerebral hemisphere is called cerebral cortex and is thrown into prominent folds. The cerebral cortex is referred to as the grey matter due to its greyish appearance. The neuronal cell bodies are concentrated here giving the colour.

(154) Answer : (3)
Solution:
One trimester is of 3 months.
After one month of pregnancy' heart is formed. Foetus develops limbs and digits by the end of second month. By the end of first trimester, most of major organ systems are formed.

(155) Answer : (3)
Hint:
Cyanosis is present in pneumonia due to accumulation of CO_2 in blood.
Solution:
In severe cases of pneumonia, the lips and finger nails may turn gray to bluish in colour.

(156) Answer : (1)
Solution:
In bacteria, many times the translation can begin much before the mRNA is fully transcribed because mRNA does not require any processing to become active.

(157) Answer : (3)
Solution:
Hydrogen bond is formed during base pairing.
Dinucleotides have a phosphodiester bond.

(158) Answer : (2)
Solution:
Meselson and Stahl used *E.coli* for proving the semiconservative replication of DNA.

(159) Answer : (3)
Solution:
Honeybees exhibit haplodiploid type of sex determination. Male bees are haploid and have 16 chromosomes only.

(160) Answer : (4)
Solution:
Paramecium and *Plasmodium* both are unicellular.

Both belong to the group protozoa.

(161) Answer : (1)
Solution:
Ulothrix produces motile gametes while *Spirogyra*, *Gelidium* and *Polysiphonia* produce non-motile gametes.

(162) Answer : (4)
Hint:
Muliathi is a medicinal plant of fabaceae.
Solution:
In Maize, seed coat is membranous and fused with the fruit wall. The outer covering of endosperm separates the embryo by an aleurone layer.

(163) Answer : (3)
Solution:
Open vascular bundles are found in dicot stem.

(164) Answer : (4)
Solution:
SER is the major site of lipid synthesis. RER is actively involved in protein synthesis.
Golgi complex principally performs the function of packaging material.
Lysosome is a part of endomembrane system.

(165) Answer : (1)
Solution:
Condensation of chromosomal material occurs in prophase.

(166) Answer : (4)
Solution:
1ATP is synthesised during the conversion of PEP to pyruvic acid.

(167) Answer : (3)
Solution:
Males can never be the carriers of X-linked disorders, such as colour blindness.

(168) Answer : (3)
Solution:
LAB improves the nutritional quality of curd by increasing the content of vitamin B_{12}

(169) Answer : (2)
Solution:
Humification leads to accumulation of a dark coloured amorphous substance called humus.

(170) Answer : (4)
Solution:
Amino acids are activated in the presence of ATP and linked to their cognate tRNA – a process commonly called as charging of tRNA or aminoacylation of tRNA.

(171) Answer : (1)
Solution:
$q^2 = .09$
$q = \sqrt{.09}$
q = 0.3
p + q = 1
p = 0.7
$p^2 = 0.7 \times 0.7 = .49 = 49\%$

(172) Answer : (2)
Solution:
Seed ferns evolved from progymnosperms during the Carboniferous period of the Paleozoic era.

(173) Answer : (2)
Hint:
Oxytocin causes strong uterine contractions
Solution:
Foetal ejection reflex triggers release of oxytocin from the maternal pituitary. Oxytocin acts on the uterine muscles and causes stronger uterine contractions, which in turn stimulates further increased secretion of oxytocin.

(174) Answer : (4)

Solution:
Our skin is the main physical barrier which prevents entry of microorganism. Interferon-cytokine barriers; PMNL, macrophages – cellular barriers; saliva – physiological barriers.

(175) Answer : (3)
Solution:
Members of class Reptilia (*Vipera*), Aves (*Pavo*) and Mammalia (*Rattus*) exhibit internal fertilisation.

(176) Answer : (3)
Solution:
Neophron – Class Aves
Apis – Class Insecta
Chelone – Class Reptilia
Hyla is an amphibian that exhibits external fertilization. *Panthera* is a viviparous mammal. *Adamsia* does not exhibit metamerism.

(177) Answer : (4)
Solution:
The members of order Crocodilia as well as class Aves and Mammalia possess four chambered heart. Rest of the members of class Reptilia have three chambered heart.

(178) Answer : (2)
Solution:
In a bioreactor, cells are maintained in their physiologically most active phase–log/exponential phase.

(179) Answer : (3)
Solution:
Due to insertional inactivation, tet^R gene will get inactivated. Thus, recombinants won't survive on tetracycline containing medium. Transformants will grow only on the ampicillin containing medium. Non-transformants will be susceptible to antibiotics as *E.coli* does not carry any antibiotic resistance gene.

(180) Answer : (1)
Solution:
Taq polymerase is stable at high temperature (>90°C)

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