

PACE-IIT & MEDICAL

ANSWER KEY FOR MOCK TEST- 49 (FOR 2020 ASPIRANTS) (4th Sept 2020)

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

SOLUTIONS

① $\rightarrow ML^{-1}T^{-2}$ (1)

② $\rightarrow u_{rel} = 50 \text{ m/s}$ $a_{rel} = 0$ $h = 400 \text{ m}$

$t = 8 \text{ sec} \Rightarrow \text{height from surface} = 50(8) - \frac{1}{2}(10)(8)^2$
 $= 400 - 320 = 80 \text{ m}$ (3)

③ $\rightarrow V_{avg} = \frac{2}{\frac{1}{v_u} + \frac{1}{v_d}} = \frac{2v_u v_d}{v_d + v_u}$

④ $\rightarrow v = \beta x^{-2n} \Rightarrow a = v \frac{dv}{dx} = (\beta x^{-2n}) (-2n\beta x^{-2n-1})$
 $a = -2n\beta^2 x^{-4n-1}$ (2)

5. Correct option is (2)

Solution:

Square the current $i^2 = t^4$

$$\bar{i}^2 = \frac{\int_0^T t^4 dt}{T} = \frac{1}{5} \frac{[T^5]}{T} = \frac{T^4}{5}$$

$$i_{rms} = \sqrt{\bar{i}^2} = \frac{T^2}{\sqrt{5}}$$

⑥ To cancel horizontal component, we will require $\frac{1}{2}N$ force

(1)

⑦ $r = 4 (\sin 2nt + \cos 2nt)$ represent a circular motion of radius 4

⑧ $T = 1000(g+1) = 10800 \text{ N}$ $[g=9.8]$ (3)

⑨ $\mu ma \geq mg \Rightarrow a \geq \frac{g}{\mu}$ (3)

⑩ $a = \frac{mg - 2\mu mg}{3m} \Rightarrow a = \frac{g(1-2\mu)}{3}$ (3)

11. Correct option is (4)

Solution:

Let the velocity of the stone at lowest point is u ,
then -

$$\frac{\frac{mu^2}{\ell} + mg}{\frac{mu^2}{\ell} - 5mg} = 4 \Rightarrow u^2 = 7g\ell$$

from conservation of energy :-

$$\frac{1}{2}mu^2 = mg(2\ell) + \frac{1}{2}mv^2$$

$$v = \sqrt{3g\ell} = 10 \text{ m/s}$$

12. Correct option is (2)

Solution:

$$I_{\text{net}} = \frac{E_{\text{net}}}{R_{\text{net}}}$$

(13) Area = $4 \times 2 + \frac{1}{2}(5 \times 2) = 8 + 5 = 13 \text{ J}$ (3)

14. Correct option is (2)

Solution:

$$V = -\frac{GM}{R} + \left(-\frac{Gm}{x}\right) = -G\left[\frac{M}{R} + \frac{m}{x}\right]$$

(15) - (2)

(16) - (2)

(17) $r \rightarrow r/2 \Rightarrow \omega \rightarrow 2\omega \Rightarrow KE \rightarrow 4KE$ (3)

(18) $mg \frac{L}{2} = \frac{ml^2}{3} \alpha \Rightarrow \alpha = \frac{3g}{2L}$ (1)

(19) → (3)

20. (1)

21. (2)

22. (4)

23. (2)

$$\textcircled{\lambda} \rightarrow \eta = 1 - \frac{400}{500} = \frac{1}{5} = \frac{W}{Q_{ab}}$$
$$W = \frac{6}{5} = 1.2 \text{ Kcal} \quad (3)$$

25. **Correct option is (4)**

Solution:

Potential of both spheres are same so no charge will flow.

26. **Correct option is (1)**

27. **Correct option is (2)**

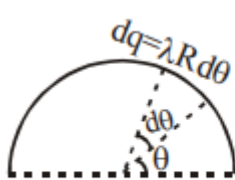
Solution:

App. depth =

$$\frac{h}{3\mu_1} + \frac{h}{3\mu_2} + \frac{h}{3\mu_3} = \frac{h}{3} \left(\frac{1}{\mu_1} + \frac{1}{\mu_2} + \frac{1}{\mu_3} \right)$$

28. **Correct option is (2)**

Solution:



$$q = \int_0^{\pi} \lambda R d\theta \quad \lambda = \lambda_0 \cos\theta$$

$$q = \lambda_0 R \int_0^{\pi} \cos\theta d\theta$$

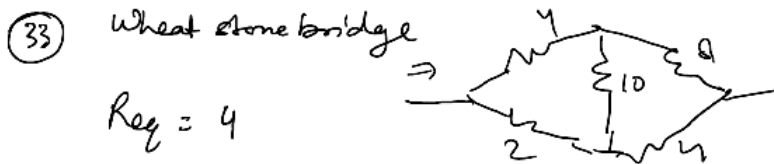
$$q = \lambda_0 R (\sin\theta)_0^{\pi} = 0$$

29. (3)

$$(30) \quad 1950 = f \left(\frac{340 - 10}{340 + 10} \right) \Rightarrow f = 2068 \text{ Hz}$$

(31) (3)

$$(32) \quad U = \frac{1}{4\pi\epsilon_0} \left(\frac{-q^2}{(b\sqrt{3})/2} \right) = \frac{-4q^2}{\sqrt{3}\pi\epsilon_0 b}$$



(34) (3)

35. (3)

36. (3)

$$(37) \quad \left| \frac{-d\phi}{dt} \right| = \mathcal{E} = iR$$

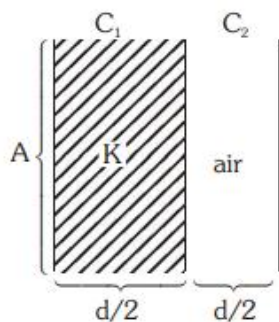
$$\int d\phi = \int iR dt$$

$$\Delta\phi = R \int i dt = R (\text{area of } i \text{ vs } t \text{ graph})$$

$$= 10 \left(\frac{1}{2} \times 4 \times 0.1 \right) = 2 \text{ weber} \quad (2)$$

38. Correct option is (3)

Solution:



$$C = \frac{\epsilon_0 A}{d}$$

$$C_1 = \frac{\epsilon_0 KA}{d/2} = \frac{2\epsilon_0 KA}{d}$$

$$C_2 = \frac{\epsilon_0 A}{d/2} = 2 \left(\frac{\epsilon_0 A}{d} \right)$$

C_1 & C_2 are in series combination

Hence

$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} = \frac{d}{2 \epsilon_0 A} \left(\frac{1}{K} + \frac{1}{1} \right)$$

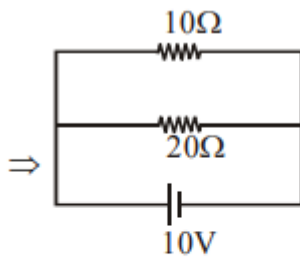
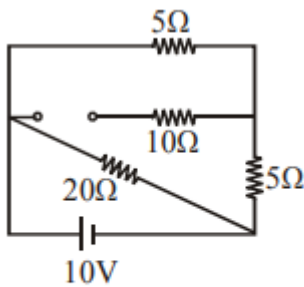
$$\frac{1}{C_s} = \frac{d}{2 \epsilon_0 A} \left(\frac{K+1}{K} \right)$$

$$C_s = \frac{2 \epsilon_0 A}{d} \left(\frac{K}{K+1} \right)$$

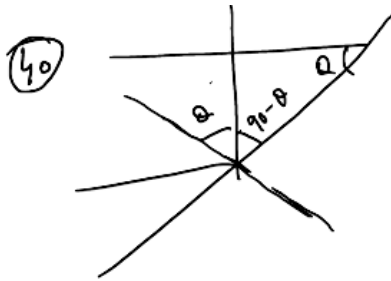
$$C_s = \frac{2CK}{K+1}$$

39. **Correct option is (4)**

Solution:



$$i = \frac{10}{R_{eq}} = \frac{10}{20/3} = 1.5 \text{ A}$$



for TIR
 $(1.56) \sin \theta > 1.32$
 $\sin \theta > \frac{1.32}{1.56}$
 $\sin \theta > \frac{11}{13}$

41 (3)

42. Correct option is (2)

Solution:

Distance between first and

$$\text{sixth minima} = \frac{5\lambda D}{a}$$

$$\Rightarrow \frac{5 \times 5 \times 10^{-7} \times 0.5}{a} = 0.5 \times 10^{-3}$$

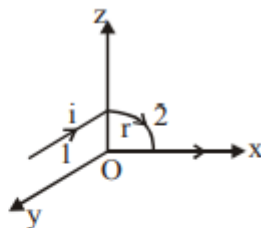
$$\Rightarrow a = 2.5 \text{ mm}$$

43. Correct option is (4)

Solution:

$$\vec{B}_0 = \vec{B}_1 + \vec{B}_2 + \vec{B}_3$$

Where $\vec{B}_1 = \frac{\mu_0 i}{4\pi r} (-\hat{i})$



$$\vec{B}_2 = \frac{1}{2} \left(\frac{\mu_0 i}{4r} \right) (-\hat{j})$$

$$\vec{B}_3 = 0$$

(Since, wire 3 passes through origin)

$$\therefore \vec{B}_0 = -\frac{\mu_0 i}{4r} \left[\frac{\hat{i}}{\pi} + \frac{\hat{j}}{2} \right]$$

Q14

$$T = \frac{1}{\lambda}$$

$$N = N_0 e^{-\lambda t}$$

After one mean life N_0 of nuclei remains

$$N = N_0 e^{-1} \Rightarrow N = \frac{N_0}{e}$$

$$\begin{aligned} \text{No of nuclei disintegrate} &= N_0 - N \\ &= N_0 - \frac{N_0}{e} \end{aligned}$$

$$\text{fraction} = 1 - \frac{1}{e} \quad \text{(B)} \quad \frac{e-1}{e} \quad (3)$$

45. Correct option is (1)

Solution:

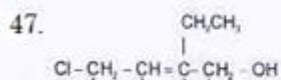
$$I = 10 \sin \omega t, \quad v = 10 \sin \left(\omega t + \frac{\pi}{4} \right)$$

so voltage leads to current by $\frac{\pi}{4}$

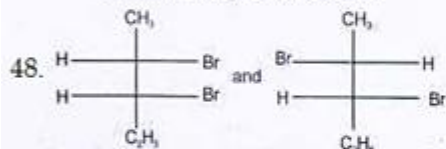
so circuit can be combination of inductance & Resistor

Combination of L, C & R.

46. In Kjeldahl's method nitrogen containing organic compound is heated with H_2SO_4 in presence of copper salt as catalyst to convert nitrogen to $(NH_4)_2SO_4$.

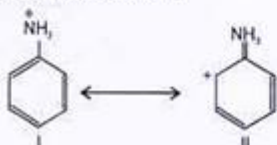


4-chloro-2-ethyl but 2-en-1-ol



are diastereomers because these stereoisomers are not mirror image of each other.

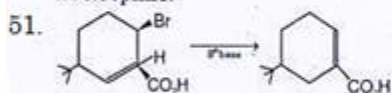
49. Among the given species $C_6H_5\overset{\cdot}{N}H_3$ does not exert a resonance effect.



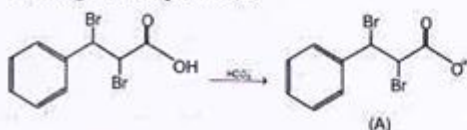
Structure II is not possible because in this structure nitrogen contains 10 valence electrons.

50. Nucleophile always attacks on electron deficient site. Presence of electron withdrawing groups such as CHO, NO_2 etc. decreases the electron density on benzene nucleus therefore these groups activate the ring towards nucleophilic attack. On the other hand presence of electron releasing groups such as R or OR increases the electron density, thus deactivates the nucleus towards nucleophilic attack. $-NO_2$ group activates the ring more than Cl towards nucleophilic attack

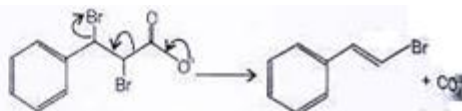
hence NO_2 -C₆H₄-Cl reacts readily with nucleophile.



52. HCO_3^- is a weak base. It removes H^+ from $-CO_2H$ forming the compound (A)

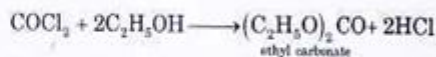
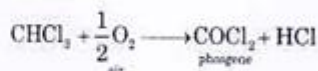


Compound (A) loses CO_2 and Br^- and gives the final product.



53. Alkyl halides are less soluble in water because they are polar but fail to form H-bonds with water.

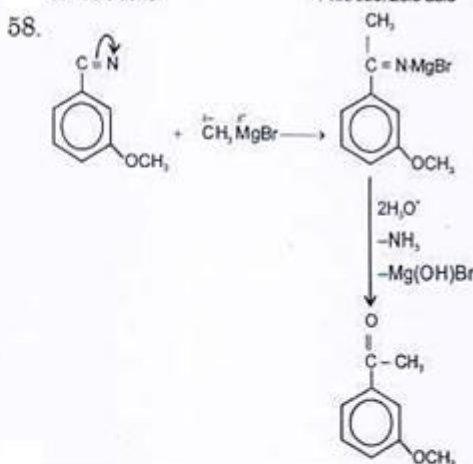
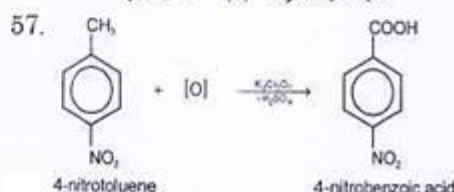
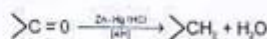
54. Ethyl alcohol converts phosgene to ethyl carbonate.



55. Greater the conjugation, greater the stability and hence larger the dehydration.

Therefore, III < II < I < IV

56. Reduction of $>CO$ compounds to alkanes ($>CH_2$ group) by Zn-Hg and HCl is known as Clemmensen reduction.



60. Polystyrene, PTEE, Neoprene are all addition polymers of only one type of monomers.

62. Co, in $CoCl_2$ has non-noble gas configuration so, it shows higher polarizing power and least ionic character.

63. VO_2^+ is paramagnetic and coloured due to the presence of unpaired electron in d-subshell of vanadium.

64.
$$\Delta E = Q \times \Delta T \times \frac{M}{m}$$
 Given, $\Delta T = 6.12 \text{ K}$, $m = 1 \text{ g}$
 $Q = 1.23 \text{ kJ}$, $M = 80$
 $\Delta E = 1.23 \times 6.12 \times 80$
 $= 602 \text{ KJ/mol}$

65. One mole of $\text{HCl} = 1$ equivalent of HCl
 $= 1$ equivalent of $\text{NaOH} = x$
 One mole of $\text{H}_2\text{SO}_4 = 2$ equivalent of H_2SO_4
 $= 2$ moles of $\text{NaOH} = y$

$$y = 2x$$

$$x = \frac{1}{2}y$$

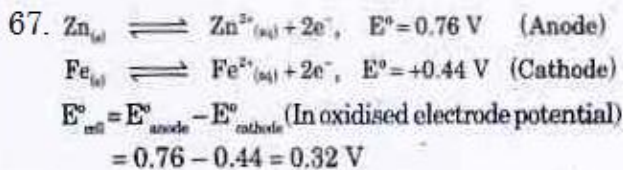
66.
$$m \text{ of } \text{O}_2 = \frac{E}{96500} \times C \times t$$

$$= \frac{8}{96500} \times 5 \times 193 = 0.08 \text{ g}$$

$\therefore 32 \text{ g } \text{O}_2$ contains volume at NTP = 22400 cm^3

$\therefore 0.08 \text{ g } \text{O}_2$ contains volume at NTP

$$= \frac{22400 \times 0.08}{32} = 56 \text{ cm}^3$$



68. Brownian movement is due to collision of molecules of dispersion medium and dispersed phase.

69.
$$\text{pOH} = -\log K_b + \log_{10} \frac{\text{NH}_4\text{Cl}}{\text{NH}_4\text{OH}}$$

$$= -\log 10^{-10} + \log_{10} \left[\frac{1}{10} \right] = 10 - 1 = 9$$

$$\text{pH} = 14 - \text{pOH} = 5$$

70.
$$\lambda = \frac{h}{mV}$$

If an electron of charge e^- be accelerated by a potential V then

$$\text{K.E.} = Ve$$

Kinetic energy is also written as $\frac{1}{2}mV^2$ hence

$$\frac{1}{2}mV^2 = Ve$$

$$V = \sqrt{\frac{2Ve}{m}}$$

$$\lambda = \frac{h}{m \sqrt{\frac{2Ve}{m}}} = \frac{h}{\sqrt{2meV}}$$

71. $\therefore 400 \text{ ml}$ of gold sol require starch = 960 mg

$\therefore 10 \text{ ml}$ of gold sol require starch

$$= \frac{960}{400} \times 10 = 24$$

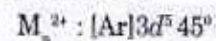
72. **Sweetner** **Sweetness Value**

Alitame	2000
Aspartame	180
Saccharine	300
Sucralose	650

Hence, aspartame has the lowest sweetness value.

73. The magnetic moment (μ) = $\sqrt{n(n+2)}$

where n = Number of unpaired electron. The atomic number of Mn is 25



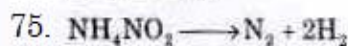
Number of unpaired electron = 5

$$\mu = \sqrt{5(5+2)}$$

$$= \sqrt{35}$$

$$= 5.9 \text{ BM}$$

74. Gun metal is an alloy of Cu (88%), Sn (10%) and Zn (2%). It is used in making of gears, bearings and castings.

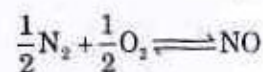


$$\text{Rate} = k[\text{NH}_4\text{NO}_2]$$

The order of reaction is one, hence it is a first order reaction.



$$K_1 = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]} \quad \dots\text{I}$$



$$K_2 = \frac{[\text{NO}]}{[\text{N}_2]^{1/2}[\text{O}_2]^{1/2}} \quad \dots\text{II}$$

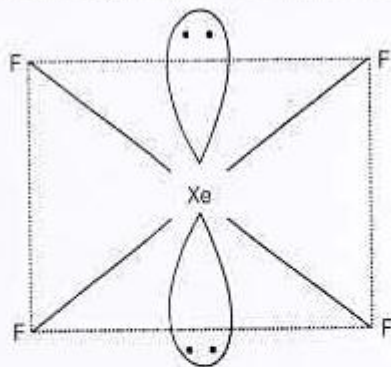
$$K_2^2 = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]} \quad \dots\text{III}$$

Hence, from equation I and III

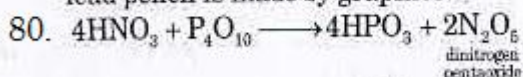
$$K_1 = K_2^2$$

$$K_2 = \sqrt{K_1}$$

78. XeF_4 has sp^3d^2 hybridisation. The shape of XeF_4 molecule is square planar. It has two lone pairs.



79. Percentage of lead in lead pencil is zero because lead pencil is made by graphite.



81. Number of mol. of He = $\frac{0.4}{4} = 0.1$

Number of mol. of oxygen = $\frac{1.6}{32} = 0.05$

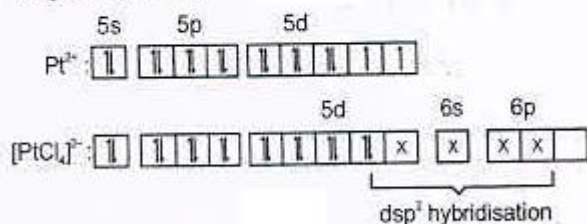
Number of mol of nitrogen = $\frac{1.4}{28} = 0.05$

Total mol. in the 10.0 L cylinder at 27°C
 $= 0.1 + 0.05 + 0.05 = 0.2 \text{ mol}$

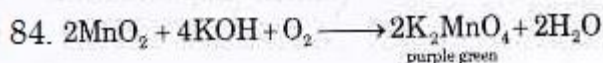
$$P = \frac{nRT}{V}$$

$$= \frac{0.2 \times 0.082 \times 300}{10} = 0.492 \text{ atm}$$

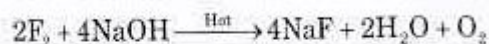
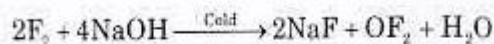
82. $[\text{PtCl}_4]^{2-}$ has dsp^2 hybridisation hence its geometry is square planar.



83. In $\text{K}_2[\text{Ni}(\text{EDTA})]$ there are five rings in the structure and thus it is the most stable complex.



85. Disproportionation reactions give both oxidised and reduced products from the same species. F_2 reacts with NaOH to give only the reduced product F^- .



86. Mixture of O_2 and H_2 in 1 : 4 ratio is used by deep sea divers for respiration because He does not dissolve in blood at high deep sea pressure.

87. The efficiency of an enzyme in catalysing a reaction is due to its capacity to form a strong enzyme substrate complex.

88. $k = \frac{2.303}{t} \log \frac{a}{a-x}$

$$\log \frac{a}{a-x} = \frac{kt}{2.303}$$

$$= \frac{2.2 \times 10^{-5} \times 60 \times 90}{2.303}$$

$$= 0.0516$$

Hence $\frac{a}{a-x} = 1.127$

$$\frac{a-x}{a} = 0.887$$

or $1 - \frac{x}{a} = 0.887$

$$\frac{x}{a} = 0.113 = 11.3 \%$$

89. The magnetic character of B_2 molecule are similar to O_2 molecule because both of them contain two unpaired electron.

90. The radius ratio $\left(\frac{r_+}{r_-}\right)$ of KF is 0.98 and it lies in the range of 0.732 – 1.00 and co-ordination number equal to 8. Hence, It is of CsCl type.

91. (3) Mercuric chloride is the poisoning agent used in the technique of herbarium sample preparation
92. (4) page no. 20, 2.2 Kingdom Protista
93. (3) page no. 24 1st and 2nd paragraph
94. (4) NCERT XI page 37,38
95. (1) NCERT XI page 43
96. (1) cell plate
97. (2) ncert xii -122
98. (1) chitin
99. (1) ncert xii -123

100. (4) ncert xii 119
101. (1) Single seeded, dry, non dehiscent fruits in which pericarp is united with seed is known as caryopsis
102. (2) NCERT pg no 110
103. (4) NCERT pg no 111
104. (3) page no.88, 1st paragraph
105. (4) NCERT XII-100,101,102
106. (3) SP and DPD
107. (4) NCERT XII -104
108. (3) Pg. no. 198
109. (1) Pg. no. 196
110. (2) NCERT pg no 208, 220, 212, 213, HSC 63
111. (1) NCERT pg no 220, HSC 72
112. (1) NCERT XII -92
113. (1) the various intermediates of aerobic respiration pathways
114. (2) NCERT XII -88
115. (2) Definition of terms - Pasteur effect , floating respiration, climacteric respiration
116. (4) NCERT XI page 246
117. (1) Verndisation
118. (3) NCERT XI page 251, 252
119. (4) NCERT XI PG 248
120. (2) NCERT XII 187
121. (4) Secondary nucleus
122. (2) 37
123. (1) page no 90 , 91
124. (3) ncert xii-174
125. (3) page no 90, 5.6.3 Chromosomal disorders
126. (4) NCERT XII, 250,251
127. (2) NCERT XII, Pg. no.107
128. (4) NCERT XII, Pg. no. 232
129. (4) NCERT XII page 173
130. (1) NCERT XII page 177
131. (3) NCERT pg no 187
132. (2) Amylase stimulates germination of barley seeds. It catalyzes conversion of starch to simple sugars which are consumed by embryo during germination
133. (1) composed of all living organisms present on earth which interact with the physical environment
134. (3) NCERT XII 264
135. (4) NCERT-XII Pg.no.255
136. (2) NCERT-XII Pg.no.264
137. (3) NCERT XII page 279
138. (1) NCERT XII page 261 , 263
139. (2) NCERT pg no 273
140. (1) NCERT XII -273
141. (1) Melatonin- Pineal gland
142. (2) Blood lacks collagen, Osteocytes present in lacunae, Striated muscle fibers are unbranched.
143. (2) XI NCERT pg 112, 114
144. (4) XI NCERT pg 114
145. (2)
146. (2) XII NCERT pg 49
147. (2) Blastocyst embeds in uterus from its embryonic pole.
148. (4) XII NCERT pg 149

149. (2) XII NCERT pg 153
150. (4) Droplet infection spreads pneumonia.
151. (2) Pg 54 1st para
152. (2) Aquatic mammals also respire by lungs.
153. (1) Pg 55 2nd para
154. (1) XI NCERT pg 326
155. (3) Eustachian tube is a part of middle ear.Cerebellum is a part of hindbrain.Blind spot is devoid of rods and cones.
156. (1) Postganglionic nerve fibers of sympathetic system synthesize adrenaline.
157. (3) Glucose after its renal threshold value is reached which is 180mg/100ml of blood .starts appearing in urine.
158. (3) Pg338,2nd para
159. (3) dopamine inhibits the secretion of dopamine
160. (2) Inbreeding is mating of more closely related individuals within the same breed for 4- 6 generations
161. (4) Patella = knee cap
162. (4) XI NCERT pg 105
163. (4) XII NCERT pg 64, 3rd para
164. (1) Herpes is a viral infection, rest 3 are bacterial.
165. (2) NCERT XII, Page 138, Figure 7.9.
166. (3) NCERT XII, Page 131
167. (4) XII NCERT pg 208
168. (3) XII NCERT pg 198
169. (1) XII NCERT pg 209
170. (2) XII NCERT pg 210
171. (4) Any puncture in the thoracic cavity results in collapsing of lungs.
172. (4) Stomach has small amount of lipase.
173. (1) Simple protein- polymer of amino acids.
174. (3) DCT present in cortex region of kidney.
175. (2) Cardiac output is stroke volume multiplied by heart rate
176. (1)
177. (3) Auerbach's plexus and Meissner's plexus are autonomic plexus (ANS)
178. (1) XI NCERT pg 144,145
179. (3) The fluid collected in the urinary space contains all constituents of blood except RBCs, WBCs, platelets, lipids and some plasma proteins.
180. (2) XI NCERT pg 281