

PACE-IIT & MEDICAL

ANSWER KEY FOR MOCK TEST- 32 (FOR 2020 ASPIRANTS) (23rd June 2020)

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

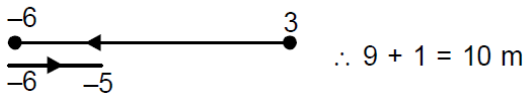
SOLUTIONS

1. (4) Unit is ampere per metre
 2. Correct option is (4)

Solution:

$$v_{\max} = \frac{a_1 a_2}{a_1 + a_2} t = \frac{2 \times 3}{2 + 3} \times 10 = 12 \text{ m/s}$$

3. Answer (2)



4. Answer (3)

$$y = 0 \Rightarrow t = \frac{4}{6}$$

$$R = \frac{16}{6} = \frac{8}{3} \text{ m}$$

5. Answer (3)

$$a_t = 6 \text{ m/s}^2$$

$$a_c = \frac{v^2}{R} = \frac{(6t)^2}{R} = \frac{144}{18} = 8 \text{ m/s}^2$$

$$a = \sqrt{6^2 + 8^2} = 10 \text{ m/s}^2$$

6. Answer (3)

$$\text{Power} \propto v^3$$

7. Answer (4)

$$\begin{aligned}
 F_{\max} &= \frac{\mu m_2 g}{m_1} (m_1 + m_2) \\
 &= \frac{5}{3} (30 + 10) = \frac{200}{3} \text{ N}
 \end{aligned}$$

8. Answer (4)

$$\omega^2 R \leq g\mu$$

$$\therefore T \geq 2\pi \sqrt{\frac{R}{g\mu}} \quad \therefore T \geq 2\pi$$

9. Answer (2)

$$K = \frac{p^2}{2m} \Rightarrow \frac{K_2}{K_1} = \frac{m_1}{m_2}$$

10. Answer (2)

$$a = \frac{g \sin \theta}{\frac{I_{cm}}{MR^2} + 1} = \frac{5}{7} g \sin \theta = \frac{25}{7} \text{ m/s}^2$$

11. Answer (4)

12. Answer (1)

$$50\% \times 75 \text{ cm} \times \frac{40}{3} = 5 \text{ m}$$

13. Answer (3)

$$\frac{x}{4} = \frac{1}{\sqrt{2}-1} \Rightarrow x = 10 \text{ min}$$

14. Correct option is (4)

Solution:

If projected velocity is less than escape velocity $v_{\text{projected}} = \frac{v_{\text{esc}}}{n}$ ($n > 1$) then the maximum height attained

by the body above the surface of the earth is $h = \frac{R}{n^2 - 1}$

In the given question, projected velocity is

$$v = \sqrt{gR} = \frac{\sqrt{2gR}}{\sqrt{2}} = \frac{v_{\text{esc}}}{\sqrt{2}} = \frac{v_{\text{esc}}}{n}, n = \sqrt{2}$$

Therefore, maximum height attained by the body is

$$h = \frac{R}{n^2 - 1} = \frac{R}{(\sqrt{2})^2 - 1} = R$$

15. Answer (3)

$$\text{Volume flow rate} \propto \frac{R^4}{L}$$

16. Answer (2)

$$(\alpha_1 - \alpha_2) \Delta \theta \times 100 = 10^{-5} \times 20 \times 100 = 0.02\%$$

17. Answer (2)

18. Answer (4)

19. Answer (3)

$$x = \frac{\frac{3R}{4}}{(21-1)} = \frac{3R}{80}$$

18. Correct option is (4)

Solution:

$$P V^{-1} = \text{constant}$$

$$P V^x = \text{constant}$$

Here, $x = -1$

Molar specific heat constant in polytropic process is

$$C = C_V + R / (1 - x)$$

$$C = (5R/2) + (R/2)$$

$$C = 3R$$

19. Answer (3)

$$x = \frac{\frac{3R}{4}}{(21-1)} = \frac{3R}{80}$$

20. Answer (3)

Maximum compression is twice the compression at equilibrium.

21. Answer (2)

$$1240 \left(\frac{330+20}{330-20} \right) = 1400 \text{ Hz}$$

22. **Correct option is (3)**

Solution:

Answer (3)

$$L_1 - L_2 = 10 \log \frac{I_1}{I_2} = 10 \log \frac{r_2^2}{r_1^2} = 10 \log 4 = 20 \log 2 = 20 \times 0.3 = 6 \text{ dB}$$

23. Answer (4)

$$A + A + \frac{A}{\sqrt{2}} = 2.7 \text{ cm}$$

24. Answer (2)

25. Answer (1)

$$T = 2\pi \sqrt{\frac{M}{dAg}}$$

26. Answer (4)

27. Answer (4)

$$E_x = \frac{-\partial V}{\partial x} = -y^2 z^3 = -(2)^2 (-1)^2 = 4$$

$$E_y = \frac{-\partial V}{\partial y} = -x2yz^3 = -(1)2(2)(-1)^3 = 4$$

$$E_z = \frac{-\partial V}{\partial z} = -xy^2 3z^2 = -(1)(2)^2 3(-1)^2 = -12$$

28. Answer (3)

$$U = \frac{1}{2} CV^2 = \frac{1}{2} (2)(12)^2 = 144 \mu\text{J}$$

29. Answer (4)

$$\frac{x^2(200)}{(2x)^2(300)} = \frac{40W}{x} \Rightarrow x = 240 \text{ W}$$

30. Answer (3)

31. Answer (4)

32. Answer (1)

33. Answer (3)

$$F = iLB = \frac{B^2 L^2 V}{R}$$

34. Answer (3)

$$i = \frac{10}{5} = 2 \text{ A} \quad \therefore P = i^2 R = 2^2 \times 5 = 20 \text{ W}$$

35. Answer (2)

$$I_D = \epsilon_0 \frac{d\phi_E}{dt} = \epsilon_0 \frac{d}{dt} \left(\frac{V}{d} A \right) = C \cdot \frac{dV}{dt}$$

$$= 10 \times 200 = 2000 \mu\text{A} = 2 \text{ mA}$$

36. Answer (2)

$$2 \left[6 + \frac{8}{\mu} \right] = 24 \Rightarrow \mu = \frac{8}{6} = \frac{4}{3}$$

37. Answer (2)

$$D = f_1 - f_2 = 30 \text{ cm}$$

38. Answer (2)

$$(1.40 - 1)5^\circ = (1.50 - 1)A \Rightarrow A = 4^\circ$$

39. Answer (4)

40. Answer (4)

$$(x + 1)520 = (x)780 \quad \Rightarrow x = \frac{520}{260} = 2$$

41. Answer (3)

$$\text{Momentum} = \frac{h}{\lambda}$$

42. Answer (2)

$$\frac{1}{\lambda} = RZ^2 \left[\frac{1}{2^2} - \frac{1}{3^2} \right]$$

$$\frac{1}{x} = RZ^2 \left[\frac{1}{1^2} - \frac{1}{3^2} \right]$$

$$\therefore \frac{x}{\lambda} = \frac{36}{8} = \frac{5}{32} \quad \therefore x = \frac{5\lambda}{32}$$

43. Answer (2)

$$N_0 = 80\%$$

$$N = 20\%$$

\therefore time interval = 2 half lives = 4 years.

44. Answer (4)

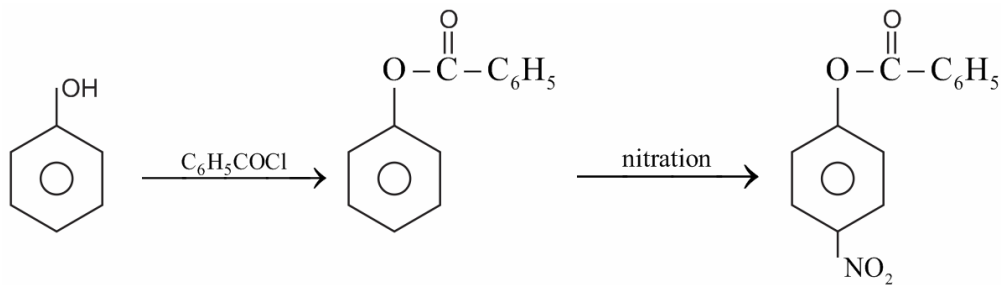
45. Answer (4)

$$z = \overline{xy} + x\overline{y}$$

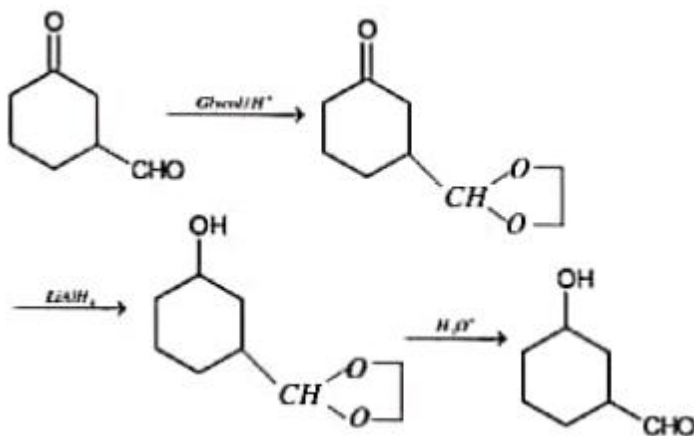
46. (1)

In aqueous NaOH, $C_6H_5-CH_2Br$ readily undergoes ionization to form stable benzyl cation ($C_6H_5-CH_2^+$) and hence favours the progress of reaction by S_N^1 mechanism.

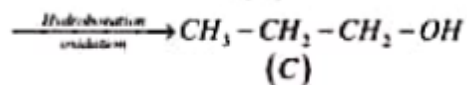
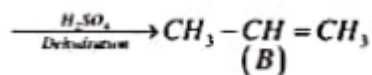
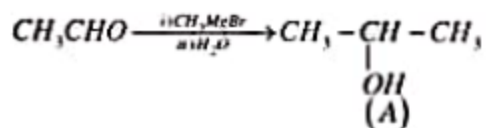
47. (1)



48. (3)



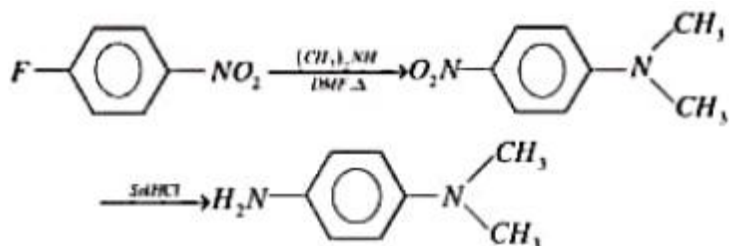
49. (2)



50. (4)

$\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ on oxidation gives $\text{C}_6\text{H}_5\text{CHO}$ and so cannot give iodoform test. No methyl keto group.

51. (1)



52. (2)

$$\frac{r_1}{r_{\text{N}_2}} = \sqrt{\frac{2}{M_1}} = \frac{1}{6}$$

$$\Rightarrow \text{M. W} = 72$$

53. (4)

If positive $\Delta_f H$ value increases, stability of formed compound decreases.

54. (1)

$$= \Delta G^\circ = RT \ln K_{\text{ng}}$$

$$= -2.303 RT \log K_\infty$$

$$= -8.314 \times 300 \times 2.303 (-14)$$

$$= 80417 \text{ J/mole}$$

55. (3)

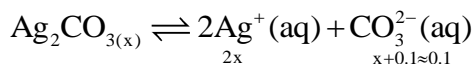
The gaseous mixture contains 40% Cl_2 and 40% PCl_3 , since they are produced in 1 : 1 mole ratio, the PCl_5 % is $100 - 2 \times 40 = 20\%$. For ideal gas mole % = Volume %

$$\text{PCl}_5 = P_{\text{PCl}_5} = 2 \times 0.40 = 0.8 \text{ atm}$$

$$\text{PCl}_3 = 2 \times 0.2 = 0.4 \text{ atm}$$

$$K_p = \frac{P_{\text{PCl}_5} \cdot P_{\text{Cl}_2}}{P_{\text{PCl}_3}} = \frac{0.8 \times 0.8}{0.4} = 1.6 \text{ atm}$$

56. (1)
Let solubility of Ag_2CO_3 in presence of Na_2CO_3 is x



$$K_{sp} = [\text{Ag}^+]^2[\text{CO}_3^{2-}]$$

$$4 \times 10^{-13} = (2x)^2 \times 0.1$$

$$x = 10^{-6}$$

57. (1)

$$\text{Rate} = K[\text{A}_2]^a[\text{B}_2]^b$$

$$0.04 = K(0.2)^a(0.2)^b \quad \dots \text{(i)}$$

$$0.04 = K(0.1)^a(0.4)^b \quad \dots \text{(ii)}$$

$$0.08 = K(0.2)^a(0.4)^b \quad \dots \text{(iii)}$$

$$\frac{\text{(i)}}{\text{(iii)}} \Rightarrow \frac{1}{2} = \left(\frac{1}{2}\right)^b; b = 1$$

$$\frac{\text{(i)}}{\text{(ii)}} \Rightarrow 1 = 2^a \times \left(\frac{1}{2}\right)^b; a = 1$$

58. (1)

$$9 \text{ gm} \rightarrow 1\text{F}$$

$$1.8 \text{ g} \rightarrow ?$$

$$= \frac{1.8 \times 1}{9} = 0.2\text{F}$$

2 faraday liberates \rightarrow 22.4 litres of Cl_2 at STP

0.2 faraday liberates \rightarrow ?

$$= \frac{0.2 \times 22.4}{2} = 2.24\text{L}$$

59. (4)

$$\Delta G^\circ = -nFE'_{\text{cell}}$$

$$\Delta G^\circ = (-3 \times 96500 \times 1.50)$$

$$= -434.25 \text{ KJ}$$

60. (4)

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

$$T = (1 + 3 \times 0.9) \times 0.52 \times 0.1$$

$$T = 373.19 \text{ K}$$

61. (4)

No. of X particles per unit cell = 4

No. of Y particles = 4. No. of Z particles = 8

Along one body diagonal $2x$ atoms from 2 corners, one Y particles and $2Z$ particles will be removed.

So effective no. of X particles in a unit cell

$$= 4 - \frac{1}{8} \times 2 = \frac{15}{4}$$

Effective no. of Y particles in a unit cell

$$= 4 - 1 = 3$$

Effective no. of 'Z' particles in a unit cell

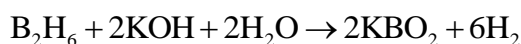
$$= 8 - 2 = 6$$

$$X : Y : Z, \quad \frac{15}{4} : 3 : 6, \quad 5 : 4 : 8$$

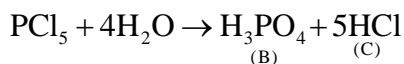
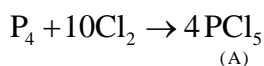
62. (1)

$\text{Fe}(\text{OH})_3$ is a positive sol. Hence, greater the charge on anion more is the coagulation power.

63. (3)



64. (3)



65. (4)

Three geometrical isomers are possible, but SCN^- is an ambidentate ligand, so two linkage isomers are possible for each geometrical isomers.

66. (3)

It is due to stable $3d^3$ configuration

67. (1)

$\text{C}_2\text{O}_4^{2-}$ and 'en' bidentate ligands ' O_2^- ' is monodentate ligand

68. (1)

'4' monodentate ligands and one bidentate ligands are present so coordination number is '6'

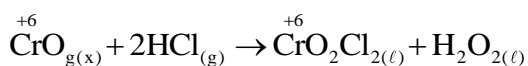
$\text{Cr}^{3+} \rightarrow 3d^3 \rightarrow$ No. of 'd' electrons = 3

No. of unpaired 'd' electron = 3

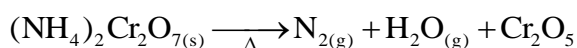
69. (2)

Molecular forces more for fibres and less for rubbers

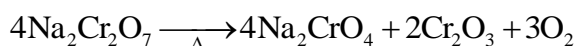
70. (4)



71. (2)

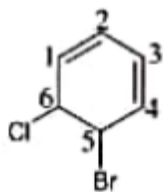


(orange solid) (diamagnetic) (green)



(orange solid) (yellow) (green) (para)

72. (1)



73. (3)

Compound (ii) has chiral carbon and compound (iii) is allene

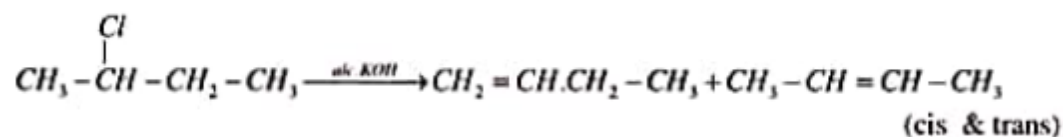
74. (4)

Carboxylic acid is more acidic than phenol
Phenol is more acidic than alcohol

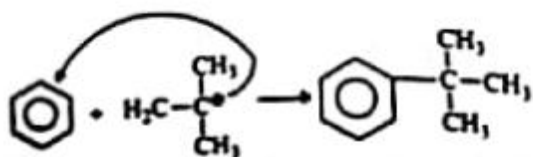
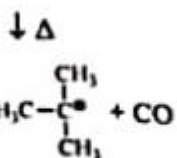
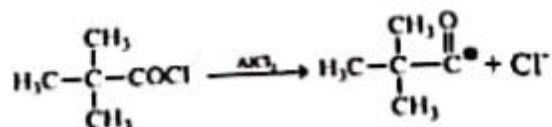
75. (1)

Phenolic compounds give colour test with neu. FeCl_3

76. (3)



77. (2)



78. (1)

In fructose keto group is converted into aldehyde through enolisation in presence of base

79. (2)

A nona peptide contains nine amino acids and '8' peptide linkages

80. (4)

2-nitrophenol is steam volatile whereas 4-nitrophenol is not steam volatile

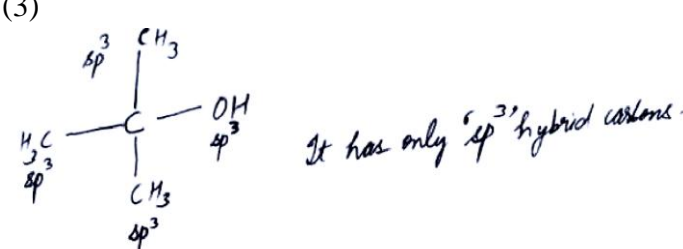
81. (1)
 $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$ one mole of BaCl_2 reacts with one mole of H_2SO_4 . Hence 0.5 mole will react with 0.5 mole of H_2SO_4 i.e., BaCl_2 is limiting reagent.

82. (1)

$$E_{\mu^{2+}} = E_{\mu} \times Z^2 = \frac{E_{\mu^{2+}}}{E_{\mu}} = Z^2 = 3^2 = 9$$

83. (3)
 Size of isoelectronics decreases with increasing atomic number

84. (4)
 $\text{H}_3\text{N} + \text{H}^+ \rightarrow [\text{H}_3\text{N} \rightarrow \text{H}]^+$; it is a coordinate bond formation

85. (3)


86. (3)
 KO_2 has K^+O_2^- structure having one unpaired electron.

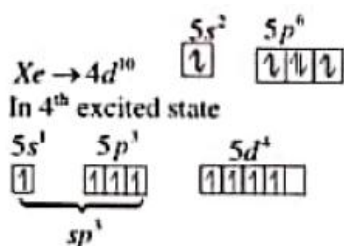
87. (1)
 10 vol. H_2O_2 means that 1 ml H_2O_2 gives 10 ml O_2 . Thus 50 ml H_2O_2 will give 500 ml O_2

88. (2)
 Rain water combines with oxides of sulphur forms H_2SO_4

89. (1)
 G.E.W. of $\text{N}_2 = \frac{M}{6} = \frac{28}{6} = E_2$, G.E.W. of $\text{NH}_3 = \frac{M}{3} = \frac{17}{3} = E_1$

$$E_1 - E_2 = \frac{17}{3} - \frac{28}{6} = \frac{34 - 28}{6} = \frac{6}{6} = 1$$

90. (3)
 XeO_4 contains 8 bonds so '8' unpaired electrons required



91. (Based on characteristics, all living organisms can be classified into different taxa. This process of classification is taxonomy. Hence, characterisation, identification, classification and nomenclature are the processes that are basic to taxonomy.)
92. (The colonies of cyanobacteria are generally surrounded by gelatinous sheath. Some of these organisms can fix atmospheric nitrogen in specialised cells called heterocysts, e.g., *Nostoc* and *Anabaena*.)
93. (In diatoms the cell walls form two thin overlapping shells, which fit together as in a soap box.)
94. (Numerical Taxonomy, carried out using computers is based on all observable characteristics. Number and codes are assigned to all the characters and the data are then processed. Cytotaxonomy that is based on cytological information like chromosome number, structure, behaviour. Chemotaxonomy uses the chemical constituents of the plant to resolve confusions, are also used by taxonomists these days.)
95. (The plant shown in figure is *Ginkgo* with a dwarf shoot, a long shoot and seeds.)
96. (Centrioles are absent in plant cells. The middle lamella is the layer mainly of calcium pectate which holds the different neighbouring cells together.)
97. (Depending on the ease of extraction, membrane proteins can be classified as integral and peripheral. Peripheral proteins lie on the surface of membrane while the integral proteins are partially or totally buried in the membrane.)
98. (Nuclear DNA or genetic material of the cell is present in nucleus which condenses as chromosomes during cell division. Mitochondria and plastids also have their own DNA.)
99. (The stage between the two meiotic divisions is called interkinesis and is generally short lived. There is no replication of DNA during interkinesis. Interkinesis is followed by prophase II of meiosis.)
100. (After each round of division in 1 minute, the number of cells will double.)
101. (A middle prominent vein, which is known as the midrib. Veins provide rigidity to the leaf blade and act as channels of transport for water, minerals and food materials. The shape, margin, apex, surface and extent of incision of lamina varies in different leaves.)
102. (In epigynous flowers, the margin of thalamus grows upward enclosing the ovary completely and getting fused with it, the other parts of flower arise above the ovary. Hence, the ovary is said to be inferior as in flowers of guava and cucumber, and the ray florets of sunflower.)
103. (When more than one carpel is present, they may be free (as in lotus and rose) and are called apocarpous. They are termed syncarpous when carpels are fused, as in mustard and tomato.)
104. (In the spring season, cambium is very active and produces a large number of xylary elements having vessels with wider cavities. The wood formed during this season is called spring wood or early wood. In winter, the cambium is less active and forms fewer xylary elements that have narrow vessels, and this wood is called autumn wood or late wood.)
105. (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 feature of angiosperms.)

106. (All statements are correct.)
107. (In flaccid cell, water potential is equal to solute potential and pressure potential of flaccid cell is zero.)
108. (Cell wall and intercellular space represents apoplast while symplast is interconnected system of protoplasm of adjacent cells through plasmodesmata.)
109. (Ammonia is first oxidised to nitrite by the bacteria *Nitrosomonas* and/or *Nitrococcus*. The nitrite is further oxidised to nitrate with the help of the bacterium *Nitrobacter*. These steps are called nitrification. *Thiobacillus* and *Pseudomonas* are denitrifying bacteria.)
110. (Joseph Priestley discovered oxygen. Ingenhousz showed that sunlight is essential to the plant process that somehow purifies the air fouled by burning candles or breathing animals. Julius von Sachs found that the green parts in plants is where glucose is made, and that the glucose is usually stored as starch. Cornelius van Neil based on his studies of purple and green bacteria, demonstrated that photosynthesis is essentially a light-dependent reaction in which hydrogen from a suitable oxidisable compound reduces carbon dioxide to carbohydrates.)
111. (The diagram shown Z-scheme of light reactions or non-cyclic electron transfer. "A" and "D" are PS-II and PS-I, respectively. "B" is an electron acceptor while "C" indicates NADPH which is formed due to addition of electrons to NADP^+ .)
112. (The breakdown of proton gradient that leads to the synthesis of ATP. The gradient is broken down due to the movement of protons across the membrane to the stroma through the transmembrane channel of the CF_0 of the ATP synthase. The ATP synthase enzyme consists of two parts: one called the CF_0 is embedded in the thylakoid membrane and forms a transmembrane channel that carries out facilitated diffusion of protons across the membrane. The other portion is called CF_1 and protrudes on the outer surface of the thylakoid membrane on the side that faces the stroma. The breakdown of the gradient provides enough energy to cause a conformational change in the CF_1 particle of the ATP synthase, which makes the enzyme synthesise several molecules of energy packed ATP.)
113. (F_1 is peripheral membrane protein while F_0 is integral membrane protein of ATP synthase. Pyruvate dehydrogenase complex is present in mitochondrial matrix which performs oxidative decarboxylation of pyruvate. Cytochrome bc_1 is a part of complex III located on inner mitochondrial membrane.)
114. (Electron carriers are located on the inner mitochondrial membrane in a specific sequence and function during terminal electron transport in aerobic respiration. The cytochrome proteins are important electron carriers. These carriers are arranged in the order $\text{Co.Q} \rightarrow \text{cyt.b,c}_1 \rightarrow \text{cyt.c} \rightarrow \text{cyt.a,a}_3$.)
115. (Although the aerobic process of respiration takes place only in the presence of oxygen, the role of oxygen is limited to the terminal stage of the process. Yet, the presence of oxygen is vital, since it drives the whole process by removing hydrogen from the system. Oxygen acts as the final hydrogen acceptor.)
116. (There are certain seeds which fail to germinate even when external conditions are favourable. Such seeds are understood to be undergoing a period of dormancy which is controlled not by external environment but are under endogenous control or conditions within the seed itself.)

117. (H.H. Cousins (1910) confirmed the release of a volatile substance from ripened oranges that hastened the ripening of stored unripened bananas. Later this volatile substance was identified as ethylene, a gaseous PGR. Ethylene is highly effective in fruit ripening.)
118. (Leaves are the sites of perception of length of photoperiod. Hence, the SDP with at least one intact leaf exposed to the photoperiod of less than 15.6 hours will show induction of flowering. Defoliated plants or plants exposed to the photoperiod more than the critical photoperiod for the SDP will remain vegetative.)
119. (Gametes are haploid cells. The gametes in diploid organisms are produced by meiosis while in haploid organisms, they are produced by mitosis.)
120. (If both male and female flowers are present on the same plant such as castor and maize (monoecious), it prevents autogamy but not geitonogamy. In several species such as papaya, male and female flowers are present on different plants, that is each plant is either male or female (dioecy). This condition prevents both autogamy and geitonogamy.)
121. (A typical stamen has a long and slender stalk called the filament, and the terminal, generally bilobed structure, called the anther. The proximal end of the filament is attached to the thalamus or the petal of the flower.)
122. (The synergids have special cellular thickenings at the micropylar tip called filiform apparatus, which play an important role in guiding the pollen tubes into the synergid.)
123. (One copy of each allele will enter in one gamete.)
124. (The cross in the question can be considered to be $Tt \times tt$. This cross will produce 50%.)
125. (The monohybrid test cross, for example, can be $Tt \times tt$. This cross will have 1 : 1 ratio.)
126. (A typical nucleosome contains 200 bp of DNA helix. Hence, in a human somatic cell with 6.6×10^9 bp DNA, there will be 3.3×10^7 nucleosomes.)
127. (A typical nucleosome contains 200 bp of DNA helix.)
128. (The diagram shown is of transcription. 3' Poly-A tail, 5' G-cap and intron splicing are characteristics of eukaryotic transcription.)
129. (It has been possible to develop an iron-fortified rice variety containing over five times as much iron as in commonly consumed varieties.)
130. (Wheat variety, Atlas 66, having a high protein content, has been used as a donor for improving cultivated wheat.)
131. (*Trichoderma* is a fungus which produces cyclosporin A, an immunosuppressive agent. *Bacillus thuringiensis* spores are mixed in water and sprayed to vulnerable plants like brassicas and fruit trees. Baculoviruses are pathogens that attack insects and other arthropods. The majority of baculoviruses used as biological control agents are in the genus *Nucleopolyhedrovirus*. These viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications.)
132. (Beetle with red and black markings – the Ladybird, and Dragonflies are useful to get rid of aphids and mosquitoes, respectively.)

133. (The diagram represents the response of internal environment of organisms to changing external environment. “A” indicates conformers; “B” indicates regulators while “C” represents partial regulators.)
134. (Allen’s rule states that mammals from colder climates generally have shorter ears and limbs to minimise heat loss.)
135. (“C” and “D” are both consumers of “A” and “B” and hence at higher trophic level than A and B. In an ecosystem, there is a sharp decrease in biomass at higher trophic levels.)
136. (Phytoplankton are pioneer species in hydrarch succession. These are followed by submerged plant stage then submerged free floating plant stage which is replaced by reed swamp stage which in turn is replaced by marsh-meadow stage. Marsh-meadow stage is replaced by scrub stage which is finally replaced by climax community of forest with mesic conditions.)
137. (For frugivorous (fruit-eating) birds and mammals in the tropical forests of different continents, the slope is found to be 1.15.)
138. (David Tilman performed long-term ecosystem experiments using outdoor plots. Tilman found that plots with more species showed less year-to-year variation in total biomass. He also showed that in his experiments, increased diversity contributed to higher productivity.)
139. (In human eye, cornea absorbs UV-B radiation, and a high dose of UV-B causes inflammation of cornea, called snow-blindness.)
140. (The diagram shows relative contribution of various greenhouse gases to total global warming. Maximum contribution of 60% is by carbon dioxide shown as “B” in the diagram followed by methane, 20% and N₂O, 6%.)
141. Epithelial tissue has a free surface, which faces either a body fluid or the outside environment and thus provides a covering or a lining for some part of the body. The cells are compactly packed with little intercellular matrix.
142. The cuboidal epithelium is commonly found in ducts of glands and tubular parts of nephrons in kidneys. Ciliated epithelium is mainly present in the inner surface of hollow organs like bronchioles and fallopian tubes. The columnar epithelium is found in the lining of stomach and intestine. The squamous epithelium is found in the walls of blood vessels and air sacs of lungs. Compound epithelium covers the dry surface of the skin, the moist surface of buccal cavity, pharynx, inner lining of ducts of salivary glands and of pancreatic ducts.
143. A is anterior aorta, B is alary muscles and C indicate chambers of heart in the circulatory system of cockroach.
144. Skin is moist and without scales. The members of subphylum Vertebrata possess notochord during the embryonic period. The notochord is replaced by a cartilaginous or bony vertebral column in the adult. All living members of the super class Agnatha and class Cyclostomata are ectoparasites on some fishes. They have cartilagenous exoskeleton. Some examples of Cyclostomates are *Petromyzon* (Lamprey) and *Myxine* (Hagfish).
145. Some of the Chondrichthyes have electric organs (e.g., *Torpedo*) and some possess poison sting (e.g., *Trygon*).
146. (Prawn, scorpion, dragonfly and silver fish belong to Phylum Arthropoda which is characterized by presence of chitinous exoskeleton and jointed appendages.)

147. (A: *Petromyzon*; B: *Scoliodon*; C: *Pristis* and D: *Hippocampus* are all marine. E: *Catla* is a freshwater fish.)
148. (Enzymes which catalyse oxidoreduction between two substrates are classified as oxidoreductases. Enzymes catalysing a transfer of a group other than hydrogen between a pair of substrate are classified as transferases. Isomerase bring about inter-conversions of optical, geometric or positional isomers. Hydrolases are the enzymes catalysing hydrolysis of ester, ether, peptide, glycosidic, C-C, C-halide or P-N bonds.)
149. (Substrate concentration at which the reaction attains half of its maximum velocity is called as Michelis-Menten constant or K_m .)
150. (They are first incorporated into small droplets called micelles which move into the intestinal mucosa. They are re-formed into very small protein coated fat globules called the chylomicrons which are transported into the lymph vessels (lacteals) in the villi.)
151. (The bile duct and the pancreatic duct open together into the duodenum as the common hepato-pancreatic duct which is guarded by a sphincter called the sphincter of Oddi.)
152. (Presence of residual volume of air in the lungs if baby died after birth can be detected by putting a piece of infant's lung in water. If it floats, it has residual air in it which is possible only if baby inspired and hence, after birth.)
153. (Binding of oxygen with haemoglobin is primarily related to partial pressure of O_2 . Partial pressure of CO_2 , hydrogen ion concentration and temperature are the other factors which can interfere with this binding.)
154. (The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole.)
155. (During each cardiac cycle two prominent sounds are produced which can be easily heard through a stethoscope. The first heart sound (lub) is associated with the closure of the tricuspid and bicuspid valves whereas the second heart sound (dub) is associated with the closure of the semilunar valves. These sounds are of clinical diagnostic significance.)
156. (The diagram shows longitudinal section of human kidney. "A" is the outer region, called cortex; "B" indicates medullary pyramid; "C" shows renal calyx and "D" shows renal pelvis.)
157. (Each kidney has nearly one million complex tubular structures called nephrons, which are the functional units. Each nephron has two parts – the glomerulus and the renal tubule.)
158. (Thin filaments are made up of actin. Meromyosin, a monomer of myosin, has ATPase activity. Troponin Increase in Ca^{+2} level during muscle contraction leads to the binding of calcium with a subunit of troponin on actin filaments and thereby remove the masking of active sites for myosin.)
159. (The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but join the seventh rib with the help of hyaline cartilage.)
160. (The inner layer is the retina and it contains three layers of neural cells – from inside to outside – ganglion cells, bipolar cells and photoreceptor cells. Visible light induces dissociation of the retinal from opsin resulting in changes in the structure of the opsin which produces a signal that generates action potentials in the ganglion cells through the bipolar cells. These action potentials (impulses) are transmitted by the optic nerves)
161. ("A" is scala media, "B" is basilar membrane, "C" is tectorial membrane and "D" is Scala tympani.)
162. (When a neuron is not conducting any impulse, i.e., resting, the axonal membrane is comparatively more permeable to potassium ions (K^+) and nearly impermeable to sodium ions (Na^+). When a stimulus is applied, the membrane at the site becomes freely permeable to Na^+ . This leads to a rapid influx of Na^+ followed by the reversal of the polarity at that site, i.e., the outer surface of the membrane becomes negatively charged and the inner side becomes positively charged. The polarity of the membrane at the site A is thus reversed and hence depolarised.)
163. (Prolactin regulates the growth of the mammary glands and formation of milk in them.)
164. (Estrogens produce wide ranging actions such as stimulation of growth and activities of female secondary sex organs, development of growing ovarian follicles, appearance of female secondary sex

- characters (e.g., high pitch of voice, etc.), mammary gland development. Estrogens also regulate female sexual behaviour.)
165. (In females, LH induces ovulation of fully mature follicles (graafian follicles) and maintains the corpus luteum, formed from the remnants of the graafian follicles after ovulation.)
 166. (Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each fetal ovary; no more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division and get temporarily arrested at that stage, called primary oocytes. At puberty only 60,000-80,000 primary follicles are left in each ovary. The primary follicles continue their further development from puberty onwards to give rise to functional ova during regular menstrual cycles.)
 167. (The sperms from seminiferous tubules enter rete testis, then into vasa efferentia from where they are transferred to epididymis, vas deferens, ejaculatory duct and are finally released in the urethra.)
 168. (The blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called the inner cell mass. The trophoblast layer then gets attached to the endometrium and the inner cell mass gets differentiated as the embryo.)
 169. (MTPs are considered relatively safe during the first trimester, i.e., upto 12 weeks of pregnancy. Second trimester abortions are much more riskier. Lactational amenorrhea (absence of menstruation) method is based on the fact that ovulation and therefore the cycle do not occur during the period of intense lactation following parturition. This method has been reported to be effective only upto a maximum period of six months following parturition. IUDs are ideal contraceptives for the females who want to delay pregnancy and/or space children. It is one of most widely accepted methods of contraception in India. Administration of progestogens 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.)
 170. (Infertility cases either due to inability of the male partner to inseminate the female or due to very low sperm counts in the ejaculates, could be corrected by artificial insemination (AI) technique. In this technique, the semen collected either from the husband or a healthy donor is artificially introduced either into the vagina or into the uterus (IUI – intra-uterine insemination) of the female.)
 171. (The structure shown in the diagram is of a cannabinoid molecule. Generally taken by inhalation and oral ingestion, these are known for their effects on cardiovascular system of the body.)
 172. (The yellowish fluid colostrum secreted by mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. The foetus also receives some antibodies from their mother, through the placenta during pregnancy. These are some examples of passive immunity.)
 173. (Bacteria like *Streptococcus pneumoniae* and *Haemophilus influenza* are responsible for the disease pneumonia in humans which infects the alveoli (air filled sacs) of the lungs. As a result of the infection, the alveoli get filled with fluid leading to severe problems in respiration.)
 174. (Comparative anatomy and morphology shows similarities and differences among organisms of today and those that existed years ago. Whales, bats, Cheetah and human (all mammals) share similarities in the pattern of bones of forelimbs. Forelimbs of man and wings of bat are homologous organs.)
 175. (Figure shows adaptive radiation of marsupials of Australia showing divergent evolution.)
 176. (The alien piece of DNA has to become a part of a chromosome, which has the ability to replicate. In a chromosome there is a specific DNA sequence called the origin of replication, which is responsible for initiating replication. Therefore, for the multiplication of any alien piece of DNA in an organism it needs to be a part of a chromosome(s) which has a specific sequence known as ‘origin of replication’.)
 177. (The bacterial cells are made competent by treating them with a specific concentration of a divalent cation, such as calcium. The treatment increases the efficiency with which DNA enters the bacterium through pores in its cell wall.)
 178. (In mammals, including humans, insulin is synthesised as a pro-hormone (like a pro-enzyme, the pro-hormone also needs to be processed before it becomes a fully mature and functional hormone)

which contains an extra stretch called the C peptide. This C peptide is not present in the mature insulin and is removed during maturation into insulin.)

179. (Gene therapy is the insertion of genes into an individual's cells and tissues to treat diseases especially hereditary diseases. It does so by replacing a defective mutant allele with a functional one. Introduction of gene for adenosine deaminase in persons suffering from Severe Combined Immuno-deficiency (SCID).)
180. (Out-crossing is the practice of mating of animals within the same breed, but having no common ancestors on either side of their pedigree up to 4-6 generations.)