

25/04/2024

Phase-I  
CODE-A



Medical | IIT-JEE | Foundations

Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

## FINAL TEST SERIES for NEET-2024

MM : 720

Test - II

Time : 3 Hrs. 20 Mins.

### Answers

1. (4)	41. (4)	81. (4)	121. (1)	161. (4)
2. (2)	42. (3)	82. (1)	122. (3)	162. (3)
3. (4)	43. (2)	83. (1)	123. (1)	163. (2)
4. (1)	44. (2)	84. (4)	124. (3)	164. (3)
5. (4)	45. (4)	85. (1)	125. (2)	165. (3)
6. (2)	46. (1)	86. (4)	126. (4)	166. (4)
7. (4)	47. (1)	87. (4)	127. (4)	167. (3)
8. (3)	48. (3)	88. (3)	128. (1)	168. (2)
9. (4)	49. (3)	89. (4)	129. (2)	169. (1)
10. (2)	50. (4)	90. (4)	130. (4)	170. (3)
11. (4)	51. (4)	91. (2)	131. (1)	171. (4)
12. (2)	52. (2)	92. (3)	132. (2)	172. (3)
13. (1)	53. (4)	93. (2)	133. (2)	173. (4)
14. (3)	54. (3)	94. (3)	134. (4)	174. (2)
15. (4)	55. (1)	95. (3)	135. (2)	175. (3)
16. (1)	56. (3)	96. (2)	136. (4)	176. (3)
17. (1)	57. (1)	97. (1)	137. (1)	177. (2)
18. (1)	58. (2)	98. (1)	138. (2)	178. (3)
19. (2)	59. (2)	99. (1)	139. (3)	179. (1)
20. (4)	60. (3)	100. (4)	140. (3)	180. (3)
21. (2)	61. (3)	101. (2)	141. (2)	181. (2)
22. (2)	62. (4)	102. (1)	142. (1)	182. (2)
23. (3)	63. (2)	103. (3)	143. (4)	183. (3)
24. (2)	64. (1)	104. (1)	144. (1)	184. (3)
25. (2)	65. (1)	105. (2)	145. (1)	185. (2)
26. (3)	66. (4)	106. (2)	146. (3)	186. (4)
27. (3)	67. (3)	107. (3)	147. (3)	187. (3)
28. (3)	68. (4)	108. (4)	148. (4)	188. (1)
29. (3)	69. (1)	109. (4)	149. (2)	189. (1)
30. (4)	70. (3)	110. (4)	150. (2)	190. (4)
31. (1)	71. (2)	111. (3)	151. (2)	191. (4)
32. (1)	72. (4)	112. (4)	152. (1)	192. (3)
33. (4)	73. (2)	113. (4)	153. (2)	193. (3)
34. (1)	74. (2)	114. (4)	154. (3)	194. (4)
35. (3)	75. (4)	115. (3)	155. (3)	195. (2)
36. (4)	76. (3)	116. (3)	156. (2)	196. (1)
37. (1)	77. (2)	117. (4)	157. (3)	197. (2)
38. (2)	78. (3)	118. (4)	158. (1)	198. (3)
39. (4)	79. (2)	119. (4)	159. (2)	199. (3)
40. (1)	80. (3)	120. (3)	160. (3)	200. (2)

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**FINAL TEST SERIES for NEET-2024**

NIM : 720

**Test - II**

Time : 3 Hrs. 20 Mins.

**Answers & Solutions****PHYSICS****SECTION-A**

- Answer (4)  
We know,  $[at^2] = [b]$   
 $\therefore \left[\frac{a}{b}\right] = \left[\frac{1}{t^2}\right] = [T^{-2}]$
- Answer (2)  
From the graph it is clear that, at  $t = 4$  s  
 $v = 0$   
 $0 = u - 10(4)$   
 $\therefore u = 40$  m/s
- Answer (4)  
We know,  
Range  $R = u\sqrt{\frac{2h}{g}}$   
 $R = 100\sqrt{\frac{2(20)}{10}} = 100\sqrt{4}$   
 $\therefore R = 200$  m
- Answer (1)  
We know,  
 $\omega = \text{constant}$   
 $\therefore \alpha = 0$   
 $\Rightarrow a_t = 0$   $[\because a_t = r\alpha]$   
Hence,  $\frac{a_t}{a_c} = 0$
- Answer (4)  
We know, maximum acceleration of 2 kg block  
 $a_{\max} = \mu g$   
 $a_{\max} = (0.4)(10) = 4$  m/s<sup>2</sup>  
 $\therefore (a_{\text{system}})_{\max} = 4$  m/s<sup>2</sup>  
Thus  $F = (6)(4) = 24$  N
- Answer (2)  
For vertical circular motion  
 $T_{\text{Top}} = 0$  and  $T_{\text{bottom}} = 6mg = 6(0.2)(10) = 12$  N  
 $v_{\text{Bottom}} = \sqrt{5gr} = \sqrt{5(10)(1)} = \sqrt{50}$  m/s  
 $v_{\text{Top}} = \sqrt{gr} = \sqrt{10}$  m/s
- Answer (4)  
We know,  
 $I = mr^2 = \frac{md^2}{4}$
- Answer (3)  
We know,  
 $\tau = \frac{d\vec{L}}{dt}$   
 $\therefore \Delta\vec{L} = \int \vec{\tau} \cdot dt$
- Answer (4)  
Here  $\frac{1}{2}mv^2 = \frac{1}{2}kx^2$   
 $\therefore x = v\sqrt{\frac{m}{k}} = 10\sqrt{\frac{0.25}{100}} = \frac{10}{20} = 0.5$  m  
 $x = 50$  cm
- Answer (2)  
Potential inside the spherical shell is constant  
 $= -\frac{GM}{a}$
- Answer (4)  
Mechanical strain is a unitless quantity.
- Answer (2)  
Pressure,  $P = \frac{F_{\perp}}{A} = \frac{20 \sin 30^\circ}{40 \times 10^{-4}} = \frac{1}{4} \times 10^4$   
 $P = 2500$  Pa

13. Answer (1)

We know, thrust experienced

$$F = v \left( \frac{dm}{dt} \right)$$

$$F = v \left( \frac{d}{dt} v \rho \right)$$

$$F = v^2 (a \rho)$$

$$F = 2gha\rho$$

14. Answer (3)

For adiabatic process,  $\Delta Q = 0$ 

$$W = -\Delta U$$

$$= -1 \times \frac{5}{2} R(-200) = 500R$$

15. Answer (4)

On comparing with equation of SHM, we get

$$\omega^2 = \frac{1}{16} \Rightarrow \omega = \frac{1}{4} \text{ rad/s}$$

$$\text{Thus } v_0 = A\omega = 0.4 \left( \frac{1}{4} \right) = 0.1 \text{ m/s}$$

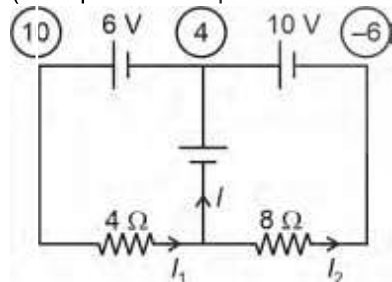
16. Answer (1)

$$f_0 = \frac{1}{2L} \sqrt{\frac{T}{\mu}} = \frac{1}{2(2)} \sqrt{\frac{100 \times 2}{20 \times 10^{-3}}}$$

$$f_0 = \frac{1}{4} \sqrt{10^4} = \frac{100}{4}$$

$$f_0 = 25 \text{ Hz}$$

17. Answer (1)

The given circuit can be modified as  
(With potential of points encircled)

$$\text{Here } I = I_1 - I_2 = \frac{10 - 0}{4} - \frac{0 - (-6)}{8}$$

$$= \frac{10}{4} - \frac{3}{4} = \frac{7}{4} \text{ A}$$

18. Answer (1)

$$W = F dx \cos 90^\circ = 0$$

$$\therefore \text{K.E.} = \text{constant}$$

Hence, speed remains same but direction of velocity keeps changing. Thus, momentum too keeps changing.

19. Answer (2)

We know,

$$\mu_r = 1 + \chi_m$$

$$\mu_r = 1 + 1000 = 1001$$

20. Answer (4)

To convert a galvanometer into ammeter a low resistance is connected in parallel with galvanometer.

21. Answer (2)

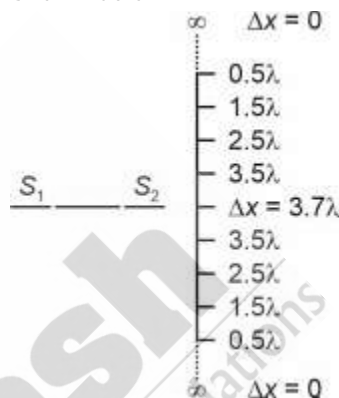
$$\text{We know, power factor} = \cos \phi = \frac{R}{Z}$$

$$\text{For } L - R \text{ circuit, } Z = \sqrt{X_L^2 + R^2}$$

$$\therefore \cos \phi = \frac{R}{\sqrt{(2\pi f L)^2 + R^2}}$$

22. Answer (2)

Respective path difference at various points are shown below.



$$\therefore \text{Number of minima} = 4 + 4 = 8$$

23. Answer (3)

We know,

$$B.E. = \Delta m (c^2)$$

$$\therefore B.E. \propto \Delta m \text{ i.e., mass defect}$$

Also higher the value of B.E./A more stable is the nucleus.

24. Answer (2)

From the graph its clear that

$$90^\circ - c = 50^\circ \Rightarrow c = 90^\circ - 50^\circ = 40^\circ$$

$$\text{Or } 180^\circ - 2c = 100$$

$$\Rightarrow 2c = 80$$

$$\therefore c = 40^\circ$$

25. Answer (2)

$$\lambda_{\min} = \frac{hc}{E} = \frac{hc}{eV}$$

$$\lambda_{\min} = \frac{12400}{40 \times 10^3} \text{ \AA}$$

$$\lambda_{\min} = 0.31 \text{ \AA}$$

26. Answer (3)

$$\frac{v^2}{rg} = \frac{[LT^{-1}]^2}{[L \times LT^{-2}]} = [L^0 T^0 M^0]$$

27. Answer (3)

$$I_{\max} = (\sqrt{I} + \sqrt{4I})^2$$

$$= 9I$$

$$I_{\min} = (\sqrt{4I} - \sqrt{I})^2$$

$$= I$$

$$\frac{I_{\max} - I_{\min}}{I_{\max}} = \frac{9I - I}{9I}$$

$$= \frac{8}{9}$$

28. Answer (3)

$$I = \frac{M}{\text{Volume}}$$

$$\therefore \text{Unit of } I \text{ is } = \frac{\text{Am}^2}{\text{m}^3}$$

$$= \text{A/m}$$

29. Answer (3)

Frequency of electric field and magnetic field in the EM waves will be same.

30. Answer (4)

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

Capacitance of the plate depends on surface area of the plate, medium between the plates and distance between the plates.

31. Answer (1)

For Normal adjustment:

$$M'_{\infty} = \frac{f_o}{f_e}$$

$$10 = \frac{f_o}{f_e}$$

$$L_{\infty} = f_o + f_e$$

$$110 = 10f_e + f_e$$

$$f_e = 10 \text{ cm}$$

For least distance of distinct vision

$$M_D = \frac{f_o}{f_e} \left( 1 + \frac{f_e}{D} \right)$$

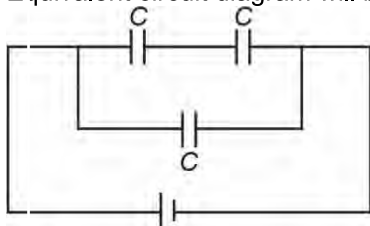
$$= 10 \left( 1 + \frac{10}{25} \right)$$

$$= \frac{10 \times 35}{25}$$

$$= 14$$

32. Answer (1)

Equivalent circuit diagram will be



$$C_{\text{eff}} = \frac{3\epsilon_0 A}{2d}$$

$$= \frac{3}{2} \times 10 = 15 \mu\text{F}$$

33. Answer (4)

$$P = \frac{V^2}{R_{\text{eff}}}$$

$$\Rightarrow 300 = \frac{(20)^2}{(4R/4 + R)}$$

On solving  $R = 2 \Omega$

34. Answer (1)

$$M = 0.8 \text{ H}$$

$\therefore$  Average induced emf in secondary

$$|e| = \frac{M \Delta I}{\Delta t}$$

$$= 0.8 \times \frac{0.6}{0.1}$$

$$= 4.8 \text{ V}$$

35. Answer (3)

Using Brewster's law

$$\tan \theta_p = \mu$$

$$\Rightarrow \text{Hence, } \mu = \tan 60^\circ$$

$$= \sqrt{3} = 1.732$$

## SECTION-B

36. Answer (4)

Focal length of a lens

$$\frac{1}{f} = (\mu - 1) \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$$

On increasing value of  $\lambda$  value of  $\mu$  decreases.

37. Answer (1)

$$\lambda_0, \text{ sodium} = \frac{12400}{2.0} = 6200 \text{ \AA}$$

$$\lambda_0, \text{ copper} = \frac{12400}{4.0} = 3100 \text{ \AA}$$

Hence, for light of wavelength 4600 Å, sodium is suitable.

38. Answer (2)

$$E_n = -Rch \frac{z^2}{n^2}$$

For  $\text{He}^+$  in ground state

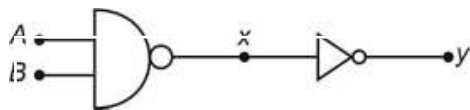
$$E_1 = -RCH \frac{2^2}{1^2} = -54.4$$

$$\Rightarrow RCH = 13.6$$

$\therefore$  For  $\text{Li}^{++}$  in first excited state ( $n = 2$ )

$$E = -13.6 \times \frac{3^2}{2^2} = -30.6 \text{ eV}$$

39. Answer (4)



$$X = \overline{AB}$$

$$y = \overline{\overline{X}} = \overline{\overline{AB}}$$

$$= AB$$

40. Answer (1)

$$y = y_1 + y_2$$

$$= (A + \overline{A}) + A \cdot \overline{A}$$

$$= 1 + 0$$

$$= 1$$

41. Answer (4)

Nuclear reactions obey the law of conservation of mass-energy, charge and momentum.

42. Answer (3)

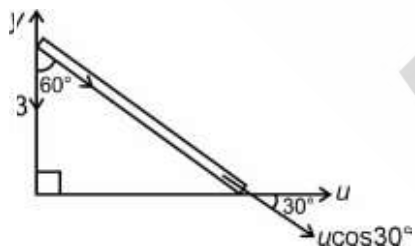


$$\frac{5\lambda}{2} = 10$$

$$\lambda = 4 \text{ m}$$

$$\text{So } v = f\lambda \Rightarrow f = \frac{v}{\lambda} = \frac{20}{4} = 5 \text{ Hz.}$$

43. Answer (2)



$$3 \cos 60^\circ = v \cos 30^\circ$$

$$3 \times \frac{1}{2} = v \times \frac{\sqrt{3}}{2}$$

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

44. Answer (2)

$$\text{For open pipe, } f_0 = \frac{v}{2L}$$

$$\text{For closed pipe, } f_0 = \frac{v}{4L}$$

The first overtone in an open organ pipe have frequency  $f = \frac{v}{L}$ .

45. Answer (4)

$$T = 2\pi\sqrt{\frac{m}{k}} \text{ remains unchanged}$$

$$kx_0 \leftarrow \text{Block} \rightarrow qE$$

Mean position shifts rightward.

46. Answer (1)

$$\text{The stress in the wire} = \frac{\text{Tension}}{\text{Area of cross-section}}$$

To avoid breaking, this stress should not exceed the breaking stress.

Let the tension in the wire be  $T$ .

The equations of motion of the two blocks are

$$T - 10 \text{ N} = (1 \text{ kg})a$$

$$20 \text{ N} - T = (2 \text{ kg})a$$

Eliminating 'a' from these equations

$$T = \left(\frac{40}{3}\right) \text{ N}$$

$$\text{Stress} = \frac{(40/3) \text{ N}}{\pi r^2}$$

If the minimum radius needed to avoid breaking is  $r$ , then

$$\Rightarrow \frac{1}{3\pi} \times 10^9 = \frac{40/3}{\pi r^2}$$

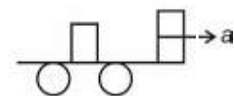
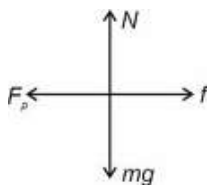
$$r = 2 \times 10^{-4} \text{ m}$$

47. Answer (1)

Magnetic susceptibility of diamagnetic material is negative which is independent on temperature.

48. Answer (3)

For block



$$F_p \leq \mu mg$$

$$\Rightarrow ma \leq \mu mg$$

$$\Rightarrow a \leq \mu g = 4 \text{ m s}^{-2}$$

49. Answer (3)

$$\vec{F} = m\vec{g}$$

$$= 5[4\hat{i} + 5\hat{j}] = 20\hat{i} + 25\hat{j}$$

$$|\vec{F}| = \sqrt{400 + 625} = \sqrt{1025} \approx 32 \text{ N}$$

50. Answer (4)

$$1 \text{ centipoise} = 10^{-2} \text{ g cm}^{-1} \text{ s}^{-1} \\ = 0.001 \text{ kg m}^{-1} \text{ s}^{-1}$$

# CHEMISTRY

## SECTION-A

51. Answer (4)

Mass of urea = 15 g

Mass of water = 85 g

$$m = \frac{\frac{15}{85}}{\frac{1000}{60}} = \frac{15}{85} \times \frac{1000}{60} = 2.94 \text{ m}$$

52. Answer (2)

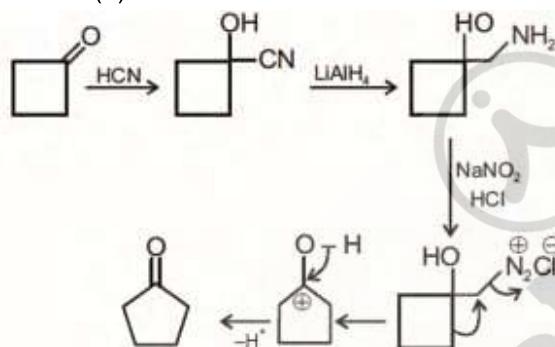
Higher is the negative electron gain enthalpy, higher is the electron affinity.

Electron affinity:  $\text{Cl} > \text{F} > \text{S} > \text{O}$ .

53. Answer (4)

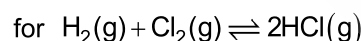
Compounds which are cyclic, planar and follow Huckel's rule are aromatic in nature.

54. Answer (3)



55. Answer (1)

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

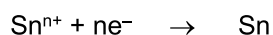


$$\Delta n_g = 0$$

$$\therefore K_P = K_C$$

56. Answer (3)

$$Q = I \times t = 2 \times 5 \times 60 \times 60 = 36000 \text{ C.}$$



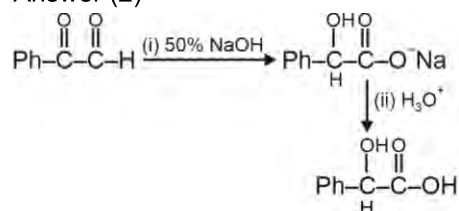
$$n \times 96500 \text{ C} \quad 119 \text{ g} \quad \therefore n = 2$$

$$36000 \text{ C} \quad 22.2 \text{ g}$$

57. Answer (1)

Sodium acetate is a salt of weak acid and strong base.

58. Answer (2)



59. Answer (2)

Mn can show variable oxidation states ranges from +2 to +7

60. Answer (3)

For 1st order reaction,

$$k = \frac{2.303}{t} \log \frac{[A]_0}{[A]}$$

for 99% completion,

$$k = \frac{2.303}{32} \log \frac{100}{1}$$

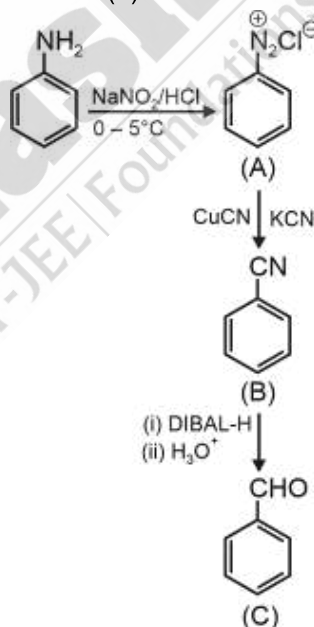
$$= \frac{2.303}{32} \times 2 = 0.144$$

for 99.9% completion,

$$0.144 = \frac{2.303}{t} \log \frac{100}{0.1}$$

$$t = \frac{2.303}{0.144} \times 3 = 47.9 \approx 48 \text{ min}$$

61. Answer (3)



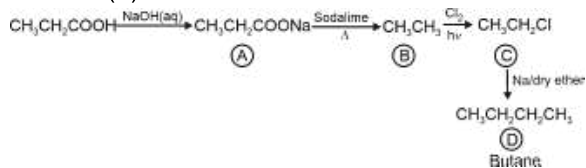
62. Answer (4)

The basic character of hydroxides of lanthanoids decreases with decrease in cationic size.

63. Answer (2)

Field strength :  $\text{CO} > \text{CN}^- > \text{en}$ 

64. Answer (1)



65. Answer (1)

Extensive properties (Heat capacity) depends upon the size of matter present in the system.

66. Answer (4)

Reverse osmosis occurs when pressure more than osmotic pressure is applied to the solution side.

67. Answer (3)

**Bond Order**

$$O_2^- = 1.5$$

$$N_2^+ = 2.5$$

$$NO^+ = 3$$

$$NO = 2.5$$

68. Answer (4)

Platinised asbestos is used as catalyst in Ostwald's process to manufacture  $HNO_3$ .

69. Answer (1)

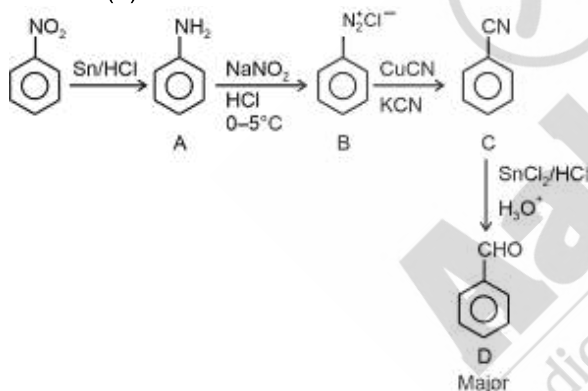
The EAN of  $V(CO)_6$  is 35 and to get stable noble gas configuration it can take one electron.

70. Answer (3)

$$W = -2.303 nRT \log \frac{V_f}{V_i}$$

(For isothermal expansion of ideal gas).

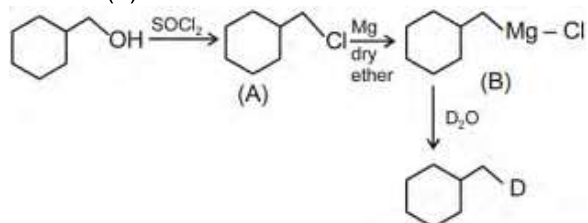
71. Answer (2)



72. Answer (4)

Methoxy group and  $-OH$  group attached to benzene ring are activating group.

73. Answer (2)



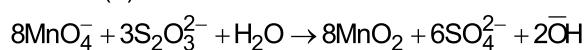
74. Answer (2)

- Keratin and myosin are fibrous proteins
- Insulin and albumins are globular proteins.

75. Answer (4)

Covalent character increases with increase in anionic size.

76. Answer (3)



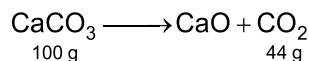
77. Answer (2)

Cellulose is a polymer of  $\beta$ -D-glucose units.

78. Answer (3)

$AlCl_3$  dimerises through halogen bridging (eg.  $Al_2Cl_6$ ) to complete its octet by accepting electron from halogen.

79. Answer (2)



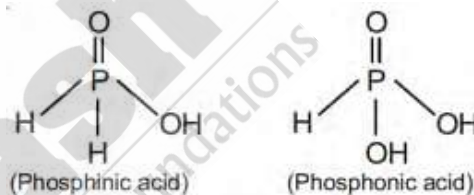
$$20\text{ g of } CaCO_3 \text{ produces } \frac{44}{100} \times 20\text{ g } CO_2$$

$$\text{i.e. } \frac{44}{100} \times 20\text{ g } CO_2$$

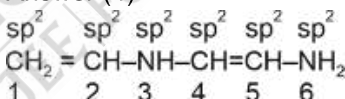
$$\text{Actual mass of } CO_2 = \frac{44}{5} \times \frac{75}{100} = \frac{33}{5}\text{ g}$$

$$\therefore \text{Moles of } CO_2 \text{ produced} = \frac{33}{5} \times \frac{1}{44} = \frac{3}{20}$$

80. Answer (3)



81. Answer (4)



82. Answer (1)

Rate of  $S_N1$  reaction  $\propto$  stability of carbocation.

83. Answer (1)

Ceric ammonium nitrate is used to test alcohols.

84. Answer (4)

Uracil is present in RNA

85. Answer (1)

In pyrosilicate two units share one oxygen atom.

**SECTION-B**

86. Answer (4)

For  $l = 2$ ,

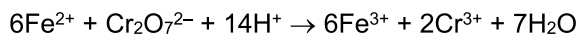
$$\begin{aligned} \text{Orbital angular momentum} &= \hbar \sqrt{l(l+1)} \\ &= \hbar \sqrt{2(2+1)} \\ &= \sqrt{6} \hbar \end{aligned}$$

For  $l = 3$ ,

$$\begin{aligned} \text{Orbital angular momentum} &= \hbar \sqrt{3(3+1)} \\ &= \hbar \sqrt{12} \end{aligned}$$

$$\therefore \text{Ratio} = \sqrt{6} : \sqrt{12} = 1 : \sqrt{2}$$

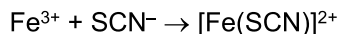
87. Answer (4)



$\therefore$  1 mol  $\text{Cr}_2\text{O}_7^{2-}$  can oxidise 6 mol  $\text{Fe}^{2+}$  ions

$\therefore$  2 mol  $\text{Cr}_2\text{O}_7^{2-}$  can oxidise 12 mol  $\text{Fe}^{2+}$  ions

88. Answer (3)



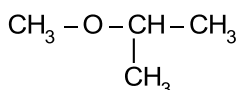
89. Answer (4)

$$\frac{w_{\text{H}_2\text{O}}}{w_{\text{Na}_2\text{SO}_4}} = \frac{55.9}{44.1} = \frac{x}{142}$$

$$\therefore x = 180 \text{ g}$$

$\Rightarrow$  10 mole water

90. Answer (4)



IUPAC name is 2-methoxypropane.

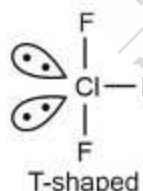
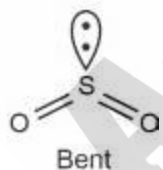
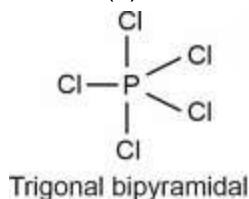
91. Answer (2)

On monochlorination 2 compounds will have chiral centres, hence 4 optically active compounds.

92. Answer (3)

Pressure does not have any significant effect on solubility of solids in liquids because solids and liquids are highly incompressible.

93. Answer (2)



TG : @RAJHARSH77  
BOTANY

## SECTION-A

101. Answer (2)

Ecosystems are not exempt from the second law of thermodynamics as they need a constant supply of energy to synthesise the molecules, they require, to counteract the universal tendency towards increasing disorderliness.

94. Answer (3)

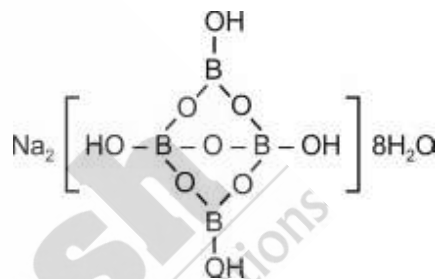
(Ions)	(Magnetic moment in BM)
$\text{Sc}^{3+}$	0
$\text{Ti}^{3+}$	1.73
$\text{Ti}^{2+}$	2.84
$\text{V}^{2+}$	3.87

95. Answer (3)

Among isomeric alkanes, with the increase in number of branched chains, the molecule attains the shape of a sphere. This results in smaller area of contact and therefore weak intermolecular forces between spherical molecules.

96. Answer (2)

Structure of borax



97. Answer (1)

Carbylamine test is given by  $1^\circ$  amines only.

98. Answer (1)

For a given substance, the crystalline solid state is the state of lowest entropy and the gaseous state is state of highest entropy.

99. Answer (1)

Greater is the reduction potential, greater is the oxidising power.

100. Answer (4)

Mischmetall contains 95% lanthanoid and 5% iron and traces of S, C, Ca and Al. Many trivalent lanthanoids are coloured in aqueous and solid states.

102. Answer (1)

Placentation	–	Plants
Axile	–	Okra
Basal	–	Wheat
Parietal	–	Cabbage
Free central	–	Primrose



103. Answer (3)  
China rose belongs to Malvaceae family and exhibits valvate aestivation in calyx
104. Answer (1)  
The peripheral region of the secondary xylem, is lighter in colour and is known as the sapwood. It is involved in the conduction of water.
105. Answer (2)  
ER divides the intracellular space into two distinct compartments, i.e., luminal (inside ER) and extra luminal (cytoplasm) compartments.
106. Answer (2)  
The beginning of diplotene is recognised by the dissolution of the synaptonemal complex except at the site of crossovers i.e., chiasmata. Disappearance of nucleolus is observed during diakinesis. Crossing over takes place during pachytene. Formation of tetrad occurs during zygotene.
107. Answer (3)  
Xanthophyll imparts yellow colour in the chromatogram.
108. Answer (4)  
Cytochrome c is a small protein attached to the outer surface of the inner membrane.
109. Answer (4)  
A sigmoid curve is a characteristic of living organism growing in a natural environment.
110. Answer (4)  
Sickle cell anaemia is a qualitative disorder but  $\beta$ -thalassemia is a quantitative disorder.
111. Answer (3)  
In a bacterial cell, the process of translation can begin much before the mRNA is fully transcribed because mRNA processing is not required and nuclear membrane is absent in prokaryotic cell. Hence, transcription and translation is coupled in bacteria.
112. Answer (4)  
In over 60% of angiosperms, pollens are shed at two-celled stage.
113. Answer (4)  
Interphase has 3 stages  $G_1$ , S and  $G_2$
- In  $G_1$  phase synthesis of nucleotides, ATPs, amino acids and RNAs occurs.
  - In S phase cell doubles its DNA amount.
  - In  $G_2$  phase duplication of mitochondria and chloroplast occurs.
114. Answer (4)  
Centriole shows cartwheel appearance, with 9+0 arrangement of peripheral fibrils of tubulin protein.
115. Answer (3)  
Heartwood is not living, comprises dead elements with highly lignified walls.
116. Answer (3)  
*Sequoia* is the tallest gymnosperm.
117. Answer (4)  
Kingdom plantae includes multicellular, photosynthetic, eukaryotic organisms.
118. Answer (4)  
Viroids are free RNA particles. Viruses have capsid but viroids do not have it.
119. Answer (4)  
Bryophytes lack well developed vascular tissues.
120. Answer (3)  
Gulmohur and Bean have zygomorphic flowers.
121. Answer (1)  
Red and green colour blindness occurs in about 8% of males and only about 0.4% of females. This is because the genes that lead to red-green colour blindness are on the X-chromosome.
122. Answer (3)  
Honey bees exhibit haplodiploid sex-determination system which has special characteristic features such as the males produce sperms by mitosis, they do not have father and thus cannot have sons, but have a grand father and can have grandsons.
123. Answer (1)  
In seagrasses, female flowers remain submerged in water and the pollen grains are released inside the water.
124. Answer (3)  
Allelic sequence variation has traditionally been described as a DNA polymorphism if more than one variant (allele) at a locus occurs in human population with a frequency greater than 0.01.
125. Answer (2)  
Repetitive sequences have no direct coding functions, but they shed light on chromosome structure, dynamics and evolution.
126. Answer (4)  
The repressor gene of the *lac* operon is synthesised (all-the-time-constitutively) from the *i* gene.
127. Answer (4)  
Statins produced by the yeast *Monascus purpureus* have been commercialised as blood-cholesterol lowering agents. It acts competitively by inhibiting the enzyme responsible for synthesis of cholesterol.

128. Answer (1)  
Thermoregulation is energetically expensive for many organisms. Small animals are rarely found in polar regions.
129. Answer (2)  
Biodiversity hotspots are the regions characterised by high levels of species richness and high degree of endemism.
130. Answer (4)  
As we go higher from species to kingdom the number of common characteristics goes on decreasing. Lower the taxa, more are the characteristics that the members within the taxon share.
131. Answer (1)  
Protein rich layer named pellicle is present in euglenoids.
132. Answer (2)  
*Spirogyra* shows haplontic life cycle.
133. Answer (2)  
Stilt roots arise from the lower nodes of stem as in maize and sugarcane.
134. Answer (4)  
Cytoskeleton in a cell is involved in many functions such as mechanical support, motility, maintenance of the shape of the cell. Photophosphorylation occurs in chloroplast.
135. Answer (2)  
Ribosome is membraneless organelle. Chloroplast and mitochondria are double membranous organelles.

**SECTION-B**

136. Answer (4)  
Mitotic apparatus (two asters together with spindle fibres) is formed during prophase.
137. Answer (1)  
In some organisms karyokinesis is not followed by cytokinesis as a result of which multinucleate condition arises leading to the formation of syncytium.
138. Answer (2)  
Temperature is the external factor that affects the rate of photosynthesis
139. Answer (3)  
RQ value of two molecules of  $C_{51}H_{98}O_6$  i.e. tripalmitin is (0.7).

140. Answer (3)  
Seed dormancy can be removed by the application of gibberellic acid and nitrates.

141. Answer (2)  
Phenylketonuria is an autosomal recessive disorder.

142. Answer (1)

In ABO Blood Group

Genotypes			Phenotypes	
①	$I^A I^A$	}	①	→ 'A' Blood Group
②	$I^A i$		②	
③	$I^A I^B$	}	③	→ 'AB' Blood Group
④	$I^B I^B$		④	
⑤	$I^B i$	}	⑤	→ 'B' Blood Group
⑥	$ii$		⑥	
			⑦	→ 'O' Blood Group

143. Answer (4)  
RNA polymerase facilitates opening of DNA helix during transcription.
144. Answer (1)  
Histones are basic proteins as they are rich in basic aminoacids lysine & arginine.
145. Answer (1)  
Primary sewage treatment is a physical process which involves filtration and sedimentation.
146. Answer (3)  
In both predation and parasitism, one of the interacting species is benefitted and other is harmed.
147. Answer (3)  
In a terrestrial ecosystem, a much larger fraction of energy flows through detritus food chain than through GFC.
148. Answer (4)  
Carrot grass (*Parthenium*), *Lantana* and water hyacinth (*Eichhornia*) are the examples of invasive weed species in India.
149. Answer (2)  
Three celled egg apparatus is found in embryo sac of angiosperms.
150. Answer (2)  
Phellogen (cork cambium), Phellem (cork) and phelloderm (secondary cortex) are collectively known as periderm.

**ZOOLOGY****SECTION-A**

151. Answer (2)  
Compound epithelium is made of more than one layer of cells and thus has a limited role in secretion and absorption. Its main function is to provide protection against chemical and mechanical stresses.

152. Answer (1)

Leydig cells or interstitial cells which are present in interstitial spaces of testes produce a group of hormones called androgens, mainly testosterone.

153. Answer (2)

Tendons are dense regular connective tissues that attach skeletal muscles to bones. In dense regular connective tissue, orientation of fibres show a regular pattern.

154. Answer (3)

Element	% Weight of Earth's crust	% Weight of Human body
Hydrogen (H)	0.14	0.5
Carbon (C)	0.03	18.5
Oxygen (O)	46.6	65.0
Nitrogen (N)	very little	3.3
Sulphur (S)	0.03	0.3
Sodium (Na)	2.8	0.2
Calcium (Ca)	3.6	1.5
Magnesium (Mg)	2.1	0.1
Silicon (Si)	27.7	negligible

155. Answer (3)

Liver secretes bile that is stored in the gall bladder. Bile helps in emulsification of fat.

156. Answer (2)

JGA is a special sensitive region formed by cellular modifications of DCT and the afferent arteriole at the location of their contact.

157. Answer (3)

The lymphatic system of frogs consists of lymph, lymph channels and lymph nodes. A triangular structure called sinus venosus joins the right atrium of the heart.

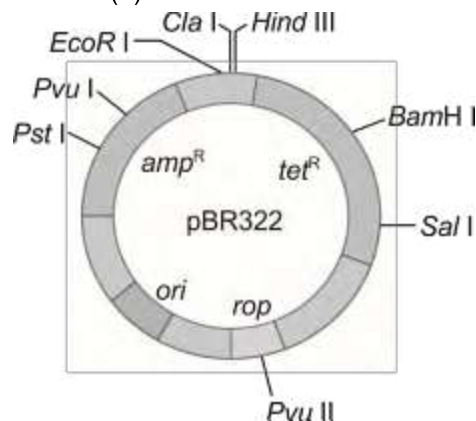
158. Answer (1)

Contraceptive methods	Examples
IUD	LNG-20
Vault	Barrier contraceptive
Chemical contraceptive	Foam
Oral contraceptive	Saheli

159. Answer (2)

Lemon grass oil is a secondary metabolite that is placed under the category of essential oils. Gums, cellulose and rubber are polymeric substances.

160. Answer (3)



161. Answer (4)

In humans, in the tissues, low  $pO_2$ , high  $pCO_2$ , high  $H^+$  concentration, high temperature and low pH favour the dissociation of oxygen from the oxyhaemoglobin under normal physiological conditions.

162. Answer (3)

Disturbance in genetic equilibrium or Hardy-Weinberg equilibrium *i.e.*, change of frequency of alleles in a population would lead to evolution.

163. Answer (2)

SA node is present in the right upper corner of the right atrium.

164. Answer (3)

In chordates, CNS is dorsal, hollow and single.

165. Answer (3)

The normal blood pressure in humans is 120/80 mm Hg *i.e.*, systolic pressure is 120 mm Hg and diastolic pressure is 80 mm Hg.

166. Answer (4)

A ring of 6-8 blind tubules called hepatic or gastric caeca is present at the junction of foregut and midgut, which secrete digestive juice.

167. Answer (3)

*Ichthyosaurs* probably evolved 200 mya. About 65 mya, the dinosaurs suddenly disappeared from the Earth. Sea weeds and few plants existed probably around 320 mya.

168. Answer (2)

Agriculture came around 10,000 years back. Two mya, *Australopithecines* probably lived in East African grasslands.

169. Answer (1)

The diffusion membrane is made of two cellular and one acellular layer. The basement substance present in between the thin squamous epithelium of alveoli and the endothelium of alveolar capillaries is an acellular layer.

170. Answer (3)

Epinephrine secreted from the adrenal medulla is an amino-acid derivative hormone.

171. Answer (4)

Sertoli cells are present inside the seminiferous tubules and provide nutrition to the germ cells.

172. Answer (3)

*Cannabis sativa* → Cannabinoids → Effect on cardiovascular system

*Erythroxylum coca* → Cocaine → Sense of euphoria

173. Answer (4)

Joints are essential for all types of movements involving the bony parts of the body. Locomotory movements are no exception to this. Force generated by the muscles is used to carry out movement through joints, where joint acts as a fulcrum.

174. Answer (2)

Thermostable DNA polymerase or *Taq* polymerase is isolated from the bacterium *Thermus aquaticus*.

175. Answer (3)

Osteoporosis is an age-related disorder characterised by decreased bone mass and increased chances of fractures. Decreased levels of estrogen is a common cause.

176. Answer (3)

Zoological name		Common name
<i>Chelone</i>	–	Turtle
<i>Calotes</i>	–	Garden lizard
<i>Clarias</i>	–	Magur
<i>Columba</i>	–	Pigeon

177. Answer (2)

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

178. Answer (3)

Electrical synapses are rare in our body.

179. Answer (1)

The PNS comprises of all the nerves of the body associated with the CNS. The PNS is divided into somatic neural system and autonomic neural system. The somatic neural system relays impulses from the CNS to skeletal muscles while the autonomic neural system transmits impulses from the CNS to the involuntary organs and smooth muscles of the body.

180. Answer (3)

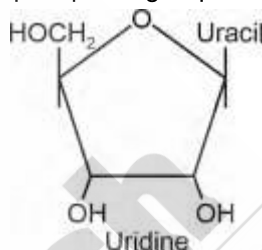
JOINT	LOCATION
Ball and socket joint	Between humerus and pectoral girdle
Pivot joint	Between atlas and axis
Gliding joint	Between carpals
Saddle joint	Between carpal and metacarpal of thumb

181. Answer (2)

Three major regions make up the brain stem i.e., midbrain, pons and medulla oblongata.

182. Answer (2)

Uridylic acid contains uracil, ribose sugar and phosphate group.



183. Answer (3)

Secretin acts on the exocrine pancreas and stimulates the secretion of water and bicarbonate ions. The secretion of pancreatic enzymes is stimulated by CCK.

184. Answer (3)

Volume of air that remains in the lungs even after a forcible expiration is residual volume.

$$FRC = ERV + RV$$

185. Answer (2)

Androgens play a major stimulatory role in the process of spermatogenesis.

### SECTION-B

186. Answer (4)

If we can introduce ADA gene into cells at early embryonic stages, then it could be a permanent cure for ADA deficiency.

187. Answer (3)

White muscle fibres possess less quantity of myoglobin. Number of mitochondria are also few in them. They depend on anaerobic process for energy.

188. Answer (1)

The testes are situated outside the abdominal cavity within a pouch called scrotum.

The scrotum helps in maintaining the low temperature of the testes (2-2.5°C lower than the normal internal body temperature).

189. Answer (1)

A functional mammary gland is characteristic of all female mammals only. Males do not have functional mammary glands.

190. Answer (4)

In human male, FSH acts on Sertoli cells and stimulates them to secrete inhibin. LH acts on Leydig cells and stimulates them to secrete testosterone.

191. Answer (4)

A pregnancy may be terminated on certain considered grounds within the first twelve weeks of pregnancy on the opinion of one registered medical practitioner.

192. Answer (3)

Most substances are reabsorbed in PCT.  $K^+$  are mainly secreted in DCT. Afferent arteriole brings blood towards glomerulus.

193. Answer (3)

ICSI (Intra Cytoplasmic Sperm Injection), ZIFT (Zygote Intra Fallopian Transfer) and IUT (Intra Uterine Transfer) involve *in-vitro* fertilisation while GIFT (Gamete Intra Fallopian Transfer) is transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce one, but can provide suitable environment for fertilisation and further development.

194. Answer (4)

Spermatheca is responsible for temporary storage of sperms only in female cockroaches.

195. Answer (2)

The figure represents a leaf of *Cannabis sativa*. Drugs obtained from this plant are cannabinoids. Their receptors are present principally in the brain. These are generally taken by inhalation and oral ingestion. Coca plant is native to South America.

196. Answer (1)

RCH creates awareness among people about various reproduction related aspects. It provides facilities and support for building up a reproductively healthy society.

197. Answer (2)

Cancer causing viruses called oncogenic viruses have genes called viral oncogenes.

198. Answer (3)

Tunica intima of arteries has no muscular membrane and it is lined by simple squamous epithelium.

199. Answer (3)

Common cold is a viral disease caused by Rhinovirus. Amoebiasis is caused by *Entamoeba histolytica*. *Epidermophyton* causes ringworm. *Salmonella typhi* is a bacterium which causes typhoid fever.

200. Answer (2)

The descending limb of loop of Henle is permeable to water but almost impermeable to electrolytes. This concentrates the filtrate as it moves down.

PCT helps to maintain pH and ionic balance by selective secretion of  $H^+$  and ammonia and absorption of  $HCO_3^-$ .

