06/03/2025

CODE-B

Aakash
Medical | IIT-JEE | Foundations

Corporate Office : AESL, 3rd Floor, Incuspaze Campus-2, Plot-13, Sector-18, Udyog Vihar, Gurugram, Haryana-122015

MOCK TEST for NEET-2025

MM : 720 | **Test - 6** | **Time : 3 Hrs.**

Answers

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

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MM : 720 **Test - 6** **Time : 3 Hrs.**

Answers & Solutions

PHYSICS

1. Answer (1)

$y = 4\sin(4t + \pi/3) \Rightarrow \omega = 4$

$v = 4 \times \cos(4t + \pi/3) \times 4 = 16\cos(4t + \pi/3)$

at $t = T/4$

$$v = 16\cos\left(\frac{4.T}{4} + \frac{\pi}{3}\right) = 16\cos\left(\frac{2\pi}{4} + \frac{\pi}{3}\right)$$

$$= 16\cos\left(\frac{\pi}{2} + \frac{\pi}{3}\right)$$

$$= 16\left(\frac{-\sqrt{3}}{2}\right) = -8\sqrt{3} \text{ cm s}^{-1}$$

$$\text{K.E.} = \frac{1}{2}mv^2$$

$$= \frac{1}{2} \times 64 \times 3 \times 1 \times 10^{-4}$$

$= 96 \times 10^{-4}$ J = 9.6 mJ

2. Answer (3)

Fundamental frequency of closed organ pipe

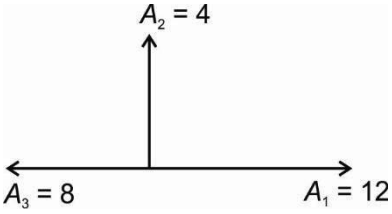
$$f_1 = \frac{v}{4l_1}$$

Fundamental frequency of open organ pipe

$$f_2 = \frac{v}{2l_2}$$

$$f_1 = f_2 \Rightarrow \frac{l_1}{l_2} = \frac{1}{2}$$

3. Answer (3)



$$\vec{A}_{net} = \vec{A}_1 + \vec{A}_2 + \vec{A}_3$$

$$A_{net} = \sqrt{4^2 + 4^2} = 4\sqrt{2} \text{ unit}$$

4. Answer (4)

We know, acceleration $= -\frac{F}{m} = -\frac{\mu mg}{m} = -\mu g$

$\therefore \quad v^2 - u^2 = 2as$

$-u^2 = -2\mu gd$

$u = \sqrt{2\mu gd}$

$\therefore$ Initial momentum $p = mu = m\sqrt{2\mu gd}$

5. Answer (2)

We know,

ammeter reading $I = \frac{\varepsilon}{R + r + R_A} = \frac{10}{2 + 8 + 10}$

$$I = \frac{10}{20} = 0.5 \text{ A}$$

6. Answer (4)

We know,

A has unit m while kx is dimensionless

$\therefore$ k has unit m^{-1}

Also, ωt is dimensionless

$\therefore$ ω has unit s^{-1}

Hence, $\frac{Ak}{\omega}$ has unit $\frac{(m)(m^{-1})}{s^{-1}}$ = second.

7. Answer (1)

We know,

$u_x = 10 + 20\cos37° = 26$ m/s

$u_y = 20\sin37° = 12$ m/s

$\therefore$ Range $R = \dfrac{2u_x \times u_y}{g} = \dfrac{2(26)(12)}{10}$

$R = 62.4$ m

8. Answer (2)

The action-reaction forces must act on different bodies along the same line of action in the opposite direction.

9. Answer (2)

Young's modulus is the measure of elasticity.

$\dfrac{Y_A}{Y_B} = \dfrac{\tan45°}{\tan60°} = \dfrac{1}{\sqrt{3}}$

10. Answer (2)

Since only half the ice is melt thus the temperature of both melted ice and water will be equal to melting point of ice (0°C) as both of them are in equilibrium.

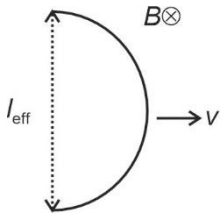
11. Answer (1)

Convex mirror forms image at its focus of a very distant object.

For a mirror, $R = 2f$

$\therefore$ $R = 2 \times 10$ cm $= 20$ cm

12. Answer (2)



$I = \pi R \Rightarrow R = \dfrac{I}{\pi}$ ...(i)

$\varepsilon = BI_{eff}v = B \times 2R \times v = \dfrac{2BIv}{\pi}$

13. Answer (4)

We know,

$\dfrac{V_{out}}{V_{in}} = \dfrac{60}{300}$

$V_{out} = \dfrac{V_{in}}{5} = \dfrac{10^4}{5}$

For an ideal transformer

$P_{in} = P_{out} = 300 \times 10^3$

$V_{out}\, I_{out} = 300 \times 10^3$

$\dfrac{10^4}{5}\, I_{out} = 300 \times 10^3$

$I_{out} = 150$ A

14. Answer (2)

$F = \dfrac{kq_1q_2}{r^2}$

1st case

$18 = \left|\dfrac{k \times 3 \times 6}{r^2}\right|$ ...(i)

2nd case

$q_1 = 3 - 4 = -1$, $q_2 = 6 - 4 = 2$

$F' = \left|\dfrac{k \times (-1) \times 2}{r^2}\right|$ ...(ii)

$\dfrac{18}{F'} = \dfrac{18}{2} \Rightarrow F' = 2$ N (Attractive)

15. Answer (3)

$\phi_E = \int \vec{E}.\overrightarrow{dA}$

For constant electric field

$\phi_E = \vec{E} \cdot \vec{A}$

$\phi_E = \left(2\hat{i} + 3\hat{j} - 4\hat{k}\right)\dfrac{\text{N}}{\text{C}} \cdot \left(4\ \text{cm}^2\hat{k}\right)$

$\phi_E = -4 \times 4 \times 10^{-4}\left(\dfrac{\text{N m}^2}{\text{C}}\right) = -16 \times 10^{-4}\dfrac{\text{N m}^2}{\text{C}}$

16. Answer (3)

1 μF and 3 μF are in parallel combination.

$\therefore$ $C_1 = 1 + 3 = 4$ μF

Then, the capacitors are in series combination

$\therefore$ $\dfrac{1}{C_{eq}} = \dfrac{1}{1} + \dfrac{1}{4} + \dfrac{1}{2}$

$\dfrac{1}{C_{eq}} = \dfrac{4+1+2}{4} \Rightarrow C_{eq} = \dfrac{4}{7}$ μF

17. Answer (4)

We know,

Energy of incident photons $E = \dfrac{hc}{\lambda} = \dfrac{12400}{3100}$ eV

$E = 4$ eV

Here work function, ϕ > Energy incident E

$\therefore$ Photoelectrons will not be ejected

Hence, kinetic energy = 0

18. Answer (2)

$$B = \frac{\mu_0}{4\pi}\frac{2\pi I a^2}{\left(r^2 + a^2\right)^{3/2}}$$

$$B_{centre} = \frac{\mu_0 I}{2\pi a}$$

$\therefore$ The graph will be continuous.

19. Answer (3)

Speed in Bohr's model

$$v_n = \frac{v_0}{n}$$

$$v \propto \frac{1}{n}$$

$$v_3 = \frac{v_0}{3}$$

20. Answer (4)

Linear fringe width (β) = $\frac{\lambda D}{d}$

&

Angular fringe width = $\frac{\lambda}{d}$.

21. Answer (1)

Electromagnetic waves have energy and carry momentum.

EM waves are transverse in nature.

22. Answer (2)

In vacuum, all component of light have same velocity.

23. Answer (4)

K.E. about fixed axis = $\frac{1}{2}I\omega^2$

$$= \frac{1}{2} \times \frac{mR^2}{2}\omega^2$$

$$= \frac{mR^2\omega^2}{4}$$

24. Answer (3)

$$\Rightarrow r_1 = \frac{m_2}{m_1 + m_2}r \quad \& \; r_2 = \frac{m_1}{m_1 + m_2}r$$

$$\Rightarrow \frac{r_1}{r_2} = \frac{m_2}{m_1}$$

25. Answer (2)

W.D. (w) = $FS\cos\theta$

$25\sqrt{3}$ J = 10 × 5 × $\cos\theta$

$$\cos\theta = \frac{\sqrt{3}}{2}$$

$\theta = 30°$

26. Answer (3)

Insulators have maximum energy band gap among the given options.

27. Answer (4)

R_{eq} = 20 Ω

$$i = \frac{4}{20} = \frac{1}{5}\text{A}$$

28. Answer (3)

At constant volume, $C_V = \frac{5R}{2}$

$\therefore f = 5$

So, $\gamma = 1 + \frac{2}{f} = 1 + \frac{2}{5} = \frac{7}{5}$

29. Answer (4)

At constant pressure,

$W.D. = P\Delta V$

&

$PV = nRT$

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

v_f = 2 V

$$W = \frac{nRT}{v} \times V$$

$= nRT$

= 1 × 2 × 300

W = 600 cal

30. Answer (2)

Magnetic induction at centre due to arc is given by

$$B_0 = \frac{\mu_0}{4\pi}\frac{i}{r}\theta$$

$$= \frac{\mu_0}{4\pi}\frac{i}{r}\left(\frac{3\pi}{2}\right)$$

$$= \frac{3}{8}\frac{\mu_0 i}{r}$$

31. Answer (3)

$\chi = \mu_r - 1$

$\chi = 5460 - 1$

$= 5459$

32. Answer (2)

Angular momentum of electron in n^{th} orbit is given by

$$L = \frac{nh}{2\pi}$$

$$L = 4 \times \frac{h}{2\pi}$$

$$= \frac{2h}{\pi}$$

33. Answer (3)

Nuclear density is same for all nucleus and radius $R = R_0A^{1/3}$.

34. Answer (1)

1 M.S.D. = 1 mm

20 V.S.D. = 18 M.S.D.

$\Rightarrow$ 1 V.S.D = $\frac{18}{20}$ M.S.D.

L.C. = 1 M.S.D. – 1 V.S.D.

= 1 M.S.D. – $\frac{18}{20}$ M.S.D.

= $\frac{2}{20}$ M.S.D

= 0.1 × 1 mm

= 0.1 mm

35. Answer (2)

Capacitance of an isolated conducting sphere of radius R is given by $C = 4\pi\varepsilon_0R$.

36. Answer (1)

$$\vec{v} = \vec{\omega} \times \vec{r}$$

37. Answer (4)

We know,

Common potential $V_c = \frac{q_1 + q_2}{c_1 + c_2}$

$$V_c = \frac{(240 + 240)\mu C}{(4 + 4)\,\mu F}$$

$\therefore \quad V_c = 60$ V

Thus, no charge sharing will take place and hence there will be no loss of energy.

38. Answer (2)

$$v_e = \sqrt{2gR}$$

At centre $K_e = \frac{1}{2}mv^2 = -\frac{GMm}{R} + \frac{3}{2}\frac{GMm}{R}$

$$K = \frac{2gmR}{4} = \frac{1}{4}mv_e^2$$

39. Answer (2)

We know,

$$X_L = \omega L = (100\,\pi)\frac{200}{\pi} \times 10^{-3} = 20\ \Omega$$

$$X_C = \frac{1}{\omega C} = \frac{10^6}{100\,\pi\,50\,\pi} = 20\ \Omega$$

$\therefore X_L = X_C$

Hence, $Z = R = 50\ \Omega$

$$\cos\phi = \frac{Z}{R} = \frac{50}{50} = 1$$

Also, $I_0 = \frac{E_0}{Z} = \frac{200}{50} = 4$ A

40. Answer (2)

$$I = I_{max}\cos^2\left(\frac{\phi}{2}\right)$$

$$\Rightarrow \quad \frac{1}{2}I_{max} = I_{max}\cos^2\left(\frac{\phi}{2}\right)$$

$$\cos\left(\frac{\phi}{2}\right) = \frac{1}{\sqrt{2}} \Rightarrow \frac{\phi}{2} = (2n+1)\frac{\pi}{4}$$

$$\phi = (2n+1)\frac{\pi}{2}$$

$$\frac{2\pi}{\lambda}\Delta x = (2n+1)\frac{\pi}{2} \Rightarrow \Delta x = (2n+1)\frac{\lambda}{4}$$

41. Answer (2)

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

If material of wires are same then $\rho_1 = \rho_2$

$\therefore \rho_1 : \rho_2 = 1 : 1$

42. Answer (2)

Here stopping potential = 6 V

using $eV_0 = h\nu - \phi$

$$6\text{ eV} = \frac{12400}{1550}\text{ eV} - \phi$$

$\phi = 8$ eV – 6 eV = 2 eV

43. Answer (1)

Shift $S = t\left(1-\frac{1}{\mu}\right)$

$=6\left(1-\frac{2}{3}\right)$

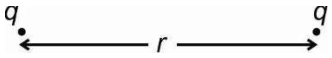
= 2 cm

and shift is in the direction of incident rays.

44. Answer (4)

Object is placed between *f* and 2*f*.

45. Answer (2)



$U = \frac{Kq^2}{r}$

$= \frac{9\times10^9\times\left(10^{-6}\right)^2}{1}$

$= 9 \times 10^9 \times 10^{-12}$

$= 9 \times 10^{-3}$ J

U = 9 mJ

CHEMISTRY

46. Answer (2)

Fehling's test is given by only aliphatic aldehydes.

CH_3CHO gives +ve Fehling's test.

47. Answer (2)

The basic strength of alkyl amines in aqueous solution is decided on the basis of inductive effect, solvation effect and steric hindrance of the alkyl group so, the correct order of basicity is:

$(CH_3)_2NH > (CH_3)NH_2 > (CH_3)_3N > NH_3$

48. Answer (3)

Phenolphthalein is pink coloured in basic medium.

49. Answer (3)

Angular nodes = l

Radial nodes = n – l – 1

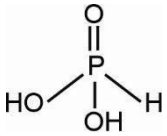
3*p*, angular nodes = 1

Radial nodes = 3 – 1 – 1

= 1

50. Answer (2)

Orthophosphorous acid has Two P–OH bonds

(H_3PO_3) 

One P–H bond

One P=O bond

51. Answer (2)

$H^+ + e^- \rightarrow \frac{1}{2}H_2(g)$

$E^\circ_{cell} = E^\circ - \frac{0.0591}{n}\log\frac{P_{H_2}}{(H^+)^2}$

$= 0 - \frac{0.0591}{2}\log\frac{1}{(10^{-5})^2}$

E_{cell} = –0.3 V

52 Answer (3)

$Pb^{2+} + S^{2-} \longrightarrow \underset{\text{(black ppt)}}{PbS}$

53. Answer (3)

- Sc^{3+}, Ti^{4+} contain $3d^0$ configuration
- Cu^+ contains $3d^{10}$ configuration
- Cr^{3+} contains $3d^3$ configuration

d – *d* transition is possible only for d^1 to d^9 (d^5 low spin complex)

54. Answer (4)

$\lambda = \frac{2\pi r}{n}$

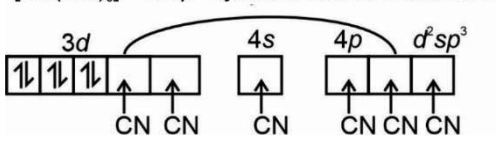
$r_4 = 52.9\times\frac{16}{1}$ pm

$\lambda = \frac{2\pi\times52.9\times16}{4}$

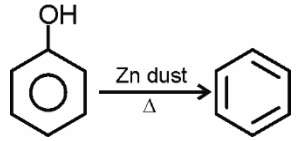
$\lambda = 423.2\ \pi$ pm

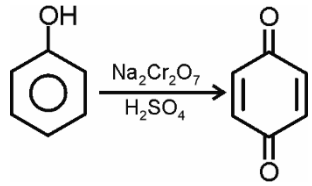
55. Answer (3)

$[Co(CN)_6]^{3-}$–d^2sp^3 hybridised and octahedral



56. Answer (1)

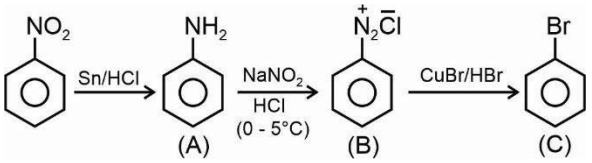
- 

- 

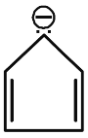
57. Answer (1)

(Vitamin)	(Deficiency disease)
Vitamin A	Xerophthalmia
Vitamin B_6	Convulsions
Vitamin B_{12}	Pernicious anaemia
Vitamin E	Increased fragility of RBC's

58. Answer (2)



59. Answer (1)


is an aromatic species

60. Answer (4)

- When iodine and sodium hydroxide are added to a compound that contains either a methyl ketone or a secondary alcohol with methyl group at alpha position give positive iodoform test example: Acetaldehyde, Methyl ketones, Ethanol etc.

61. Answer (1)

At lower pH the concentration of anion decreases as it gets protonated. This is turn increases solubility of the salt, so that $K_{sp} = Q_{sp}$.

62. Answer (3)

$$\text{Bond order} = \frac{1}{2}(N_b - N_a)$$

Where N_b = Number of electrons in bonding orbitals and N_a = Number of electrons in antibonding orbitals.

NO^+ and CO both have 14 electrons each hence will have the same bond order i.e. 3.

63. Answer (2)

H_3BO_3 is Lewis acid because of incomplete octet (Vacant Orbital)

64. Answer (3)

$$(NH_4)_2SO_4 \xrightarrow{\Delta} NH_3(g)\uparrow + H_2SO_4$$

65. Answer (1)

$$P_A = P°_A X_A \Rightarrow P_A = \frac{1}{4} \times 100 = 25 \text{ mmHg}$$

$$P_B = \frac{3}{4} \times 400 = 300 \text{ mmHg}$$

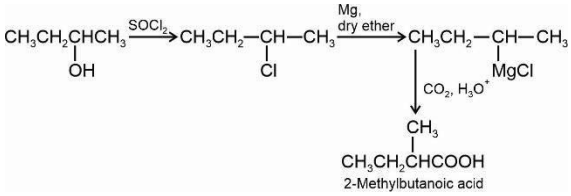
Mole fraction of A in vapour phase (y_A)

$$= \frac{25}{25 + 300} = \frac{25}{325} = \frac{1}{13}$$

66. Answer (2)

Sucrose on hydrolysis gives D-(+)-Glucose and D-(–)-Fructose

67. Answer (2)



68. Answer (3)

2 molal contains 0.8 mole of solute

$$2 = \frac{0.8}{\text{Mass of solvent (kg)}}$$

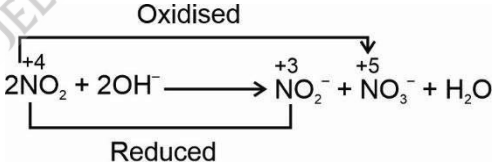
Mass of solvent = 0.4 × 1000 = 400 g

69. Answer (1)

In pyrosilicate two units share one oxygen atom.

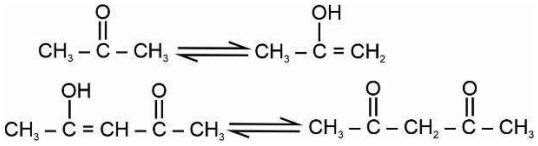
70. Answer (4)

When same element oxidises and reduces during a chemical reaction, then the reaction is called as disproportionation reaction.



71. Answer (1)

Only (c) and (d) show keto-enol tautomerism



72. Answer (2)

$$A(s) \rightleftharpoons \underset{2p'}{2B(g)} + \underset{p'}{C(g)}$$

$P_T = 2p' + p' = P$

$$p' = \frac{P}{3}$$

$$K_P = \left[P_B^2 \times P_C\right] = \left[2\frac{P}{3}\right]^2\left[\frac{P}{3}\right] = \frac{4}{27}P^3$$

73. Answer (2)

$$\% \text{ of S} = \frac{32 \times 0.960 \times 100}{233 \times 0.482} = 27.35\% \simeq 27\%$$

74. Answer (2)

$K_p = K_c(RT)^{\Delta n_g}$

for $K_p = K_c$; $\Delta n_g = 0$

$H_2(g) + I_2(g) \rightleftharpoons 2HI\ (g)$

$\Delta n_g = n_P - n_R = 2 - 2 = 0$

So, $K_p = K_c$

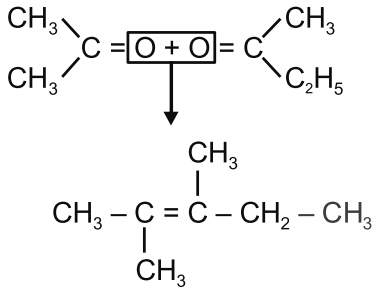
75. Answer (1)

$H_2SO_4 + NaOH \rightarrow NaHSO_4 + H_2O$

$$\text{Equivalent weight} = \frac{M}{n_f}$$

$$= \frac{M}{1}$$

76. Answer (3)



77. Answer (3)

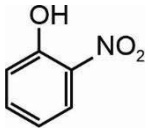
For ideal solutions

$\Delta_{mix} H = 0$ and $\Delta_{mix} V = 0$

Mixture of n-hexane and

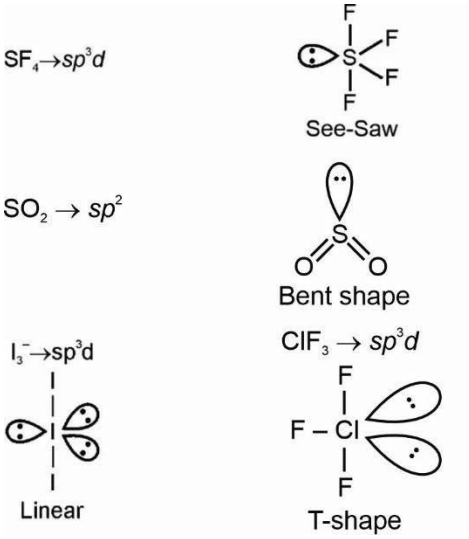
n-heptane is an ideal solution

78 Answer (2)

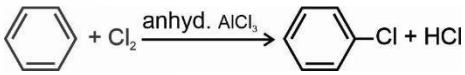


- Nitro group has electron withdrawing tendency. It can withdraw electrons both by –I effect and –R effect. Thus the acidic strengths of monosubstituted nitrophenol is higher than phenol.
- Nitro group present at o-position will have strong –R effect while nitro group present at m-position will induce only –I effect

79. Answer (1)

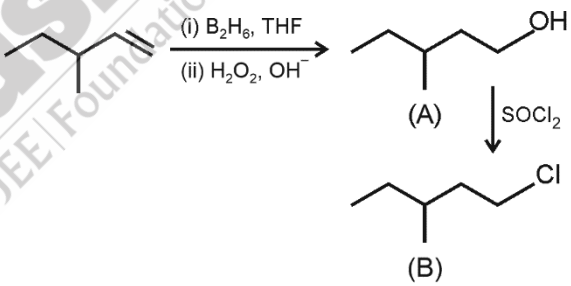


80. Answer (4)



Is an electrophilic substitution reaction

81. Answer (2)



82. Answer (1)

Number of electron exchange in the reaction

$Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$ is 2

$$E^\circ_{cell} = \frac{0.0591}{2} \log K_c = 0.46$$

$$\log K_c = \frac{0.46 \times 2}{0.0591} = 15.6$$

$K_c = 3.92 \times 10^{15}$

83. Answer (2)

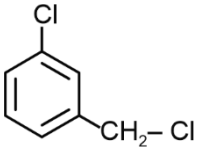
0.2 mol $C_{12}H_{22}O_{11}$

$\Rightarrow 0.2 \times 45 = 9$ mol $= 9 \times N_A$ atoms

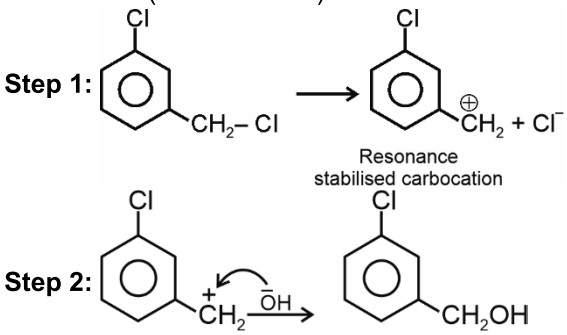
84. Answer (3)

Na	:	[11]	:	$1s^2$	$2s^2$	$2p^6$	$3s^1$
Azimuthal quantum no.	(l)			0	0	1	0

85. Answer (3)



This substrate participates in nucleophilic substitution reaction by S_N1 mechanism because of a solvent (Protic solvent)



86. Answer (2)

$$2NaNO_3 + 4H_2SO_4 + 3Cu \longrightarrow \underset{\text{(Blue)}}{3CuSO_4} + 4H_2O + 2NO + Na_2SO_4$$

$$2NO + O_2 \longrightarrow \underset{\text{(Brown fumes)}}{2NO_2}$$

87. Answer (2)

$[Co(NH_3)_5NO_2]Br_2$ and $[Co(NH_3)_5ONO]Br_2$ = Linkage Isomerism

$[Cr(NH_3)_6]$ $[Co(CN)_6]$ and $[Co(NH_3)_6]$ $[Cr(CN)_6]$ = Coordination Isomerism

$[Co(H_2O)_5(SO_4)]$ Br and $[Co(NH_3)_5Br]SO_4$ = Ionisation Isomerism

$[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_5Cl]Cl_2.H_2O$ = Solvate Isomerism

88. Answer (2)

In isothermal condition, $\Delta U = 0$

For irreversible expansion, $\Delta S_{total} \neq 0$

For free expansion of ideal gas in isothermal condition

$q = \Delta T = w = 0$

89. Answer (3)

$$\Delta S = \frac{\Delta H_f}{T_f}$$

$\Delta H_f = \Delta S \times T_f = 5.260 \times 273 = 1.436$ kcal/mol

90. Answer (2)

$$\frac{r'}{r} = (2)^{\left(\frac{80-10}{10}\right)}$$

$$\frac{r'}{r} = (2)^{\left(\frac{70}{10}\right)}$$

$$\frac{r'}{r} = (2)^7 = 128 \text{ times}$$

BOTANY

91. Answer (3)

Mushroom belongs to class Basidiomycetes. In members of Basidiomycetes mycelium is branched and septate. The sex organs are absent. Sexual spores *i.e.,* basidiospores are exogenously produced on the basidium.

92. Answer (1)

Klinefelter's syndrome is caused due to the presence of an additional copy of X chromosome resulting into a karyotype of 47, XXY. Such an individual shows gynaecomastia or development of breasts.

93. Answer (3)

'Biodiversity hotspots' are characterised by a high degree of endemism. These hotspots are also regions of accelerated habitat loss.

94. Answer (4)

Eukaryotic transcription is a template dependent process which leads to the formation of hnRNA.

95. Answer (4)

False fruit develops from other floral parts and thalamus along with the development of ovary wall.

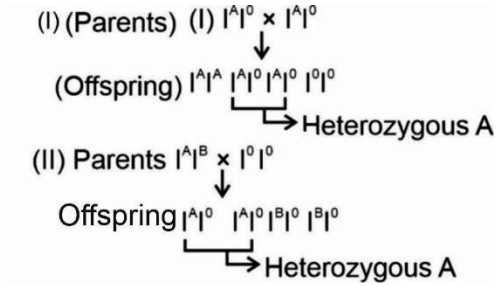
96. Answer (2)

Cyclosporin A is produced by the fungus *Trichoderma polysporum.*

97. Answer (4)

Heterozygous alleles for blood group A = I^AI^0

If Parents have genotype



98. Answer (2)

Photorespiration results in the release of CO_2 with the utilisation of ATP. C_3 plants show photorespiration in which RuBisCO binds to O_2

99. Answer (3)

Net primary productivity is the available biomass for the consumption to primary consumers.

100. Answer (3)

Ethylene initiates sprouting of potato tubers.

101. Answer (3)

In some prokaryotes like cyanobacteria, chromatophores contain photosynthetic pigments which are the membranous extensions into the cytoplasm.

102. Answer (4)

The beginning of diplotene is recognised by the dissolution of synaptonemal complex.

103. Answer (1)

Since, 2n = 18

$\therefore$ Total number of bivalents

$$= \frac{1}{2} \text{ (total number of chromosomes)}$$

$$= \frac{1}{2} \times 18 = 9$$

104. Answer (2)

Members of kingdom Plantae exhibits only autotrophic mode of nutrition while, members of kingdom Fungi and Animalia exhibit only heterotrophic mode of nutrition.

105. Answer (4)

Some epidermal cells from the region of maturation form very fine and delicate thread-like structures called root hairs.

106. Answer (3)

In monocot root, there is no secondary growth because cambium is absent.

107. Answer (2)

PS II occurs on the inner surface of the thylakoids.

108. Answer (2)

Fructose-6-phosphate is phosphorylated to form fructose-1,6-bisphosphate. The enzyme which helps in transfer of phosphate from ATP to fructose-6-phosphate is phosphofructokinase (Pacemaker enzyme of EMP pathway).

109. Answer (4)

Phyllodes are green coloured leaf like petioles which perform photosynthesis. These are found in plants such as Australian acacia. In *Euphorbia* phylloclade is present.

110. Answer (1)

For every CO_2 molecule entering Calvin cycle, three molecules of ATP and two molecules of NADPH are required.

111. Answer (3)

In plants the tonoplast facilitate the transport of a number of ions and other materials against the concentration gradient into the vacuole. Hence, the concentration is significantly higher in the vacuole than in the cytoplasm.

112. Answer (4)

In racemose inflorescence, the shoot axis continue to grow indefinitely and the flowers are borne in an acropetal succession *i.e.* younger flowers are present towards the apex.

113. Answer (2)

Endodermis is absent in monocot stem.

114. Answer (4)

The flowers pollinated by insects or other animals have pollen grains which are sticky in nature.

115. Answer (4)

i gene of *lac* operon synthesises repressor protein.

The repressor protein binds to the operator region of the operon and prevent RNA polymerase from transcribing the operon.

116. Answer (1)

A typical mammalian cell contains 6.6×10^9 bp.

Since, a typical nucleosome contains 200 bp of DNA helix (2×10^2 bp) wrapped around histone octamer, the number of nucleosomes

$$= \frac{6.6 \times 10^9 \text{ bp}}{2 \times 10^2 \text{ bp}} = 3.3 \times 10^7$$

117. Answer (2)

Sacred groves/lakes found in several parts of India are

1. Khasi and Jaintia hills in Meghalaya
2. Aravalli hills of Rajasthan
3. Western Ghats regions of Karnataka and Maharashtra
4. Khecheopalri lake in Sikkim

118. Answer (1)

Geometric population growth equation is represented by $\frac{dN}{dt} = rN$

119. Answer (4)

Sickle cell anaemia is caused by substitution of glutamic acid by valine at the sixth position of the beta globin chain of the haemoglobin molecule. This is due to a transversion mutation.

120. Answer (2)

Meiosis involve pairing of homologous chromosomes and recombination between non-sister chromatids of homologous chromosomes. Four haploid cells are formed at the end of meiosis II.

121. Answer (2)

$(n - 1) \times (n - 1) \Rightarrow 2n - 2$ reflects nullisomic condition.

122. Answer (1)

Anthropogenic ecosystem does not possess self regulatory mechanism.

123. Answer (2)

There are 1300 species of birds in Amazonian rain forest.

124. Answer (4)

Altitude sickness can be experienced at high altitudes where body does not get enough oxygen due to low atmospheric pressure and causes nausea.

Altitude sickness symptoms includes nausea, fatigue and heart palpitations.

125. Answer (3)

In taxonomic hierarchy, the number of similar characters of organisms belonging to the particular category decreases from lowest to highest rank, *i.e.*, from species to kingdom.

126. Answer (1)

If the female parent produces unisexual flowers, there is no need for emasculation during artificial hybridisation.

127. Answer (1)

In parietal placentation, the ovules develop on the inner wall of the ovary or on the peripheral part. Ovary is one-chambered but it becomes two-chambered due to the formation of the false septum *e.g.,* mustard and *Argemone*. Pea shows marginal placentation. *Dianthus* and *Primrose* show free central placentation.

128. Answer (4)

Joseph Priestley performed series of experiments that revealed essential role of air in the growth of green plants.

129. Answer (3)

Sclerenchyma is usually dead and without protoplast.

130. Answer (2)

Humus is dark coloured amorphous substance.

131. Answer (2)

Repetitive sequence are stretches of DNA that are repeated many times. They are thought to have no direct coding function.

132. Answer (4)

During treatment of waste water, the primary treatment is a physical process which involves removal of large and small particles through filtration and sedimentation.

133. Answer (3)

Members of Phaeophyceae have mannitol and laminarin as stored food. They contain cellulose and algin in their cell wall.

Members of red algae contain cellulose, pectin and polysulphate esters in their cell wall.

134. Answer (3)

Eurythermal organisms include most of the mammals and birds.

135. Answer (2)

In liverworts, gametophyte is the main plant body.

Asexual reproduction in liverworts takes place by fragmentation of thalli, or by the formation of specialised structures called gemmae. The sporophyte is differentiated into foot, seta and capsule. After meiosis, spores are produced within the capsule. These spores germinate to form free-living gametophytes.

ZOOLOGY

136. Answer (2)

Vagina is an unpaired structure. Labia minora are paired folds of tissue under the labia majora.

Fallopian tube is also a paired structure.

137. Answer (1)

Ocellus, filiform antennae, mandibles as well as hypopharynx are present in the head region of cockroach. Tegmina arises from mesothorax.

138. Answer (4)

An excessive loss of fluid from the body can activate osmoreceptors which stimulate the hypothalamus to release ADH from neurohypophysis.

139. Answer (2)

The process of formation and breaking of cross bridge continues till the Ca^{++} are pumped back to the sarcoplasmic cisternae resulting in the masking of actin filaments. This causes relaxation of skeletal muscles.

140. Answer (2)

Air sacs connected to lungs supplement respiration but do not participate in exchange of gases between atmosphere and body cells.

141. Answer (2)

Polymeric substance $\Rightarrow$ Cellulose

Alkaloid $\Rightarrow$ Codeine

Drug $\Rightarrow$ Curcumin

Lectin $\Rightarrow$ Concanavalin A

Pigment $\Rightarrow$ Carotenoid

142. Answer (3)

Carbon monoxide binds with haemoglobin molecule at the same site as oxygen does. Thus, in CO poisoning, oxyhaemoglobin concentration is reduced.

143. Answer (4)

Aldosterone is secreted by adrenal cortex in response to low blood pressure and blood volume. Aldosterone causes reabsorption of Na^+ and water from the distal parts of the renal tubule.

144. Answer (1)

Number of metacarpals in one hindlimb of an adult man = 5

Number of lumbar vertebrae in an adult man = 5

Number of false ribs in an adult man = 6

Number of floating ribs = 4

145. Answer (1)

Myxine (Hagfish) belongs to the class Cyclostomata and possesses closed type of blood circulation.

146. Answer (1)

Bioreactors are used for large scale production and provide optimum conditions for multiplication of microorganisms.

147. Answer (3)

TV = 500 mL, Residual volume = 1100 – 1200 mL

Expiratory reserve volume = 1000 – 1100 mL

Vital capacity = 4600 mL

So, correct increasing order of lung volumes / capacities is a < b < c < d

148. Answer (1)

Angina is acute chest pain due to reduced blood circulation to cardiac muscles. People with AB^+ blood group are universal recipients.

149. Answer (2)

High levels of progesterone help to maintain endometrium and prevent menstrual bleeding.

Synthetic oxytocin given to a pregnant woman, induces labor.

150. Answer (3)

Lipids are not polymeric compounds.

151. Answer (4)

All living members of the class Cyclostomata are ectoparasites on some fishes. Their body is devoid of scales and paired fins.

152. Answer (3)

The C peptide is not present in mature insulin and is removed during conversion of proinsulin into insulin.

153. Answer (1)

Frogs are poikilotherms, which means they are not able to regulate their internal body temperature.

154. Answer (1)

The mitotic division starts as the zygote moves through the isthmus of oviduct towards uterus and forms 2, 4, 8, 16 daughter cells called blastomeres. The embryo with 8 to 16 blastomeres is called a morula which continues to divide and transforms into the blastocyst.

155. Answer (4)

Closure of semilunar valves occurs at the beginning of ventricular diastole whereas closure of tricuspid valve occurs at the beginning of ventricular systole.

156. Answer (4)

Collecting duct extends from the cortex of the kidney to the inner parts of the medulla. This segment allows passage of small amounts of urea into the medullary interstitium to keep up the osmolarity. It also plays a role in the maintenance of pH and ionic balance of body by the selective secretion of H^+ and K^+.

157. Answer (4)

Longer loop of Henle contributes in production of more concentrated/hypertonic urine and is a characteristic of juxtamedullary nephrons.

Cortical nephrons have shorter loop of Henle.

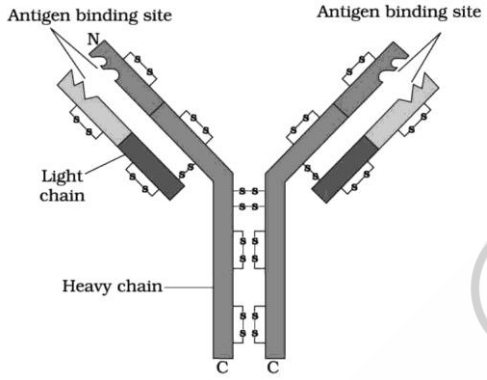
Vasa recta is highly reduced or absent in cortical nephrons.

158. Answer (3)

Macrophages act as HIV-factory. Viral RNA is converted into viral DNA by enzyme reverse transcriptase.

HIV infection does not spread by mere touch or physical contact.

159. Answer (2)



Total intrachain bonds = 12

Total interchain bonds = 4

160. Answer (4)

The ovarian hormone which shows two peaks during a menstrual cycle is estrogen which is steroidal in nature and interacts with its intracellular receptors.

161. Answer (2)

The above given features are exhibited by molluscs. *E.g.*, *Pila* (Apple snail), *Dentalium* (Tusk shell).

162. Answer (1)

Antigen binding sites are present at N terminal of each light and heavy chain of an antibody.

163. Answer (3)

V_{max} is achieved after certain concentration of substrate because all the active sites of enzymes are fully occupied on increasing substrate concentration.

164. Answer (2)

Secondary spermatocyte, ovum and spermatid have 23 chromosomes and are haploid in nature.

165. Answer (2)

The introduction of DNA is such that it produces both sense and anti-sense RNA in the host cells. These two RNAs being complementary to each other forms a double stranded RNA (dsRNA) that initiates RNAi and thus, silence the specific mRNA of the nematode.

166. Answer (2)

A functional ADA cDNA (using a retroviral vector) is introduced into lymphocytes from the blood of the patient, which are subsequently returned to the patient. However, as these cells are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes.

167. Answer (3)

Prawn is an aquatic arthropod.

Planaria is a flatworm and exchange O_2 with CO_2 by simple diffusion over their entire body surface. Earthworms use their moist cuticle and insects have a network of tubes (tracheal tubes) to transport atmospheric air within the body.

168. Answer (3)

The genetic material of HIV is two ssRNA molecules. During its isolation, treatment with ribonuclease must not be done as ribonuclease will digest RNA.

169. Answer (3)

Receptors associated with aortic arch and carotid artery can recognise changes in CO_2 and H^+ concentration and send necessary signals to the rhythm centre for remedial actions.

170. Answer (2)

The zygote or early embryos (with upto 8 blastomeres) could be transferred into the fallopian tube known as ZIFT – Zygote Intra Fallopian Transfer.

171. Answer (2)

The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiations.

Bromophenol blue is the tracking dye used in agarose gel electrophoresis. It is used to monitor the progress of migration of DNA towards anode.

172. Answer (3)

The smaller the DNA fragment, the farthest it moves from cathode. The largest DNA fragment is in band A.

173. Answer (3)

The polarity of the neuronal membrane gets reversed during depolarisation.

Depolarisation of a resting neuronal membrane occurs due to the rapid influx of Na^+ into axoplasm.

174. Answer (2)

Fibrous joints do not allow any movement. This type of joint is shown by the flat skull bones. In cartilaginous joints, the bones involved are joined together with the help of cartilages. The joint between the adjacent vertebrae in the vertebral column is of this type.

175. Answer (2)

PCR can detect very low amount of DNA and amplify it. It involves three steps: Denaturation $\rightarrow$ Annealing $\rightarrow$ Extension.

ELISA is based on the principle of antigen-antibody interaction. When DNA is present in significant amount, hybridisation using probe complementary to DNA of interest can be used to detect the DNA.

176. Answer (3)

Gonorrhoea and syphilis are bacterial diseases.

Trichomoniasis is a protozoan disease.

177. Answer (1)

AVN is the mass of nodal tissue, seen in the lower left corner of the right atrium close to the atrio-ventricular septum.

178. Answer (3)

The elevated concentration of calcium ions causes exocytosis of synaptic vesicles.

179. Answer (4)

Malaria, filariasis and dengue are transmitted by mosquitoes.

180. Answer (3)

Frequency of recessive individuals

$$q^2 = \frac{32}{200}$$

$q^2 = 0.16$

So, $q = 0.4$

As per Hardy-Weinberg principle,

$p + q = 1$

$\therefore \quad p = 1 - q = 1 - 0.4 = 0.6$

and frequency of heterozygous individuals = $2pq$

$= 2 \times 0.6 \times 0.4 = 0.48 = 48\%$

So,

Total number of heterozygous individuals

$$= \frac{48 \times 200}{100} = 96$$

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