



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

MM : 720

REVISION TEST SERIES

Time : 3 Hrs. 20 Min.

(for NEET-2022)

Test - 5

Answers

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



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Answers & Solutions

PHYSICS

SECTION-A

1. Answer (4)

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

$$\text{Case 1 : } \frac{1}{u_i} + \left(\frac{3}{25}\right) = \frac{1}{10}$$

$$\Rightarrow \frac{1}{u_i} = \frac{1}{10} - \frac{3}{25} = \frac{5-6}{50} = \frac{-1}{50}$$

$$\Rightarrow u_i = -50 \text{ m}$$

$$\text{Case 2 : } \frac{1}{u_f} + \frac{7}{50} = \frac{1}{10}$$

$$\Rightarrow \frac{1}{u_f} = \frac{1}{10} - \frac{7}{50} = \frac{5-7}{50} = \frac{-2}{50}$$

$$\Rightarrow u_f = -25 \text{ m}$$

$$\text{Speed of object} = \frac{|u_f - u_i|}{t} = \frac{5}{12} \text{ ms}^{-1}$$

2. Answer (3)

$$\mu_1 \sin i = \mu_2 \sin r$$

$$\mu_1 \sin 30^\circ = 1 \sin 90^\circ$$

$$\mu_1 = 2$$

3. Answer (4)

from figure (1)

$$\mu_1 = \mu$$

from figure (2)

$$\mu > \mu_2$$

from figure (3)

$$\mu < \mu_3$$

$$\mu_3 > \mu_1 > \mu_2$$

4. Answer (4)

$$u = \infty$$

$$v = 2R$$

$$\frac{n}{2R} - \frac{1}{\infty} = \frac{n-1}{R}$$

$$\frac{n}{2R} = \frac{n-1}{R}$$

$$n = 2n - 2$$

$$n = 2$$

5. Answer (2)

$$\sin i_c = \frac{1}{\mu}$$

$$i_c = 45^\circ$$

$$\text{Total angle} = 2i_c = 90^\circ$$

6. Answer (3)

Path difference should be integral multiple of λ .

7. Answer (3)

$$I_R = I_1 + I_2 + 2\sqrt{I_1}\sqrt{I_2}\cos\phi$$

$$I_R = I + 4I + 2 \times 2I \times \cos 60^\circ$$

$$= 5I + 2 \times 2I \times \frac{1}{2}$$

$$= 7I$$

8. Answer (3)

$$R = \sqrt{a_0^2 + a_0^2 + 2a_0a_0\cos\theta}$$

$$R = a_0$$

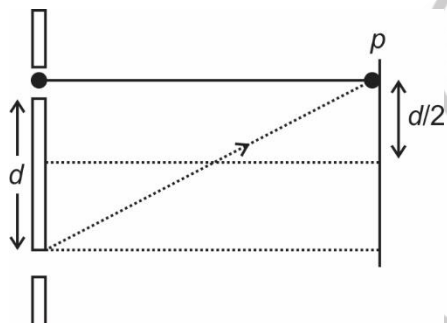
$$\therefore a_0^2 = a_0^2 + a_0^2 + 2a_0^2\cos\theta$$

$$-a_0^2 = 2a_0^2\cos\theta$$

$$\cos\theta = -\frac{1}{2}$$

$$\therefore \theta = 120^\circ = \frac{2\pi}{3} \text{ rad}$$

9. Answer (1)



$$d = 5\lambda$$

$$D = 10d = 10 \times 5\lambda = 50\lambda$$

$$\frac{y}{D} = \frac{\Delta x}{d}$$

$$\frac{\frac{d}{2}}{D} = \frac{\Delta x}{d}$$

$$\therefore \Delta x = \frac{d^2}{2D} = \frac{5\lambda \times 5\lambda}{2 \times 50\lambda} = \frac{\lambda}{4}$$

$$\text{So phase difference} = \frac{\pi}{2} \text{ rad}$$

$$I_R = I_0 \cos^2\left(\frac{\phi}{2}\right)$$

$$I_R = I_0 \times \cos^2(45^\circ)$$

$$\therefore I_R = \frac{I_0}{2}$$

10. Answer (4)

Total path difference from source to screen should be odd multiple of $\frac{\lambda}{2}$

$$\therefore (I_1 + I_3) - [I_2 + I_4] = (2n+1)\frac{\lambda}{2}$$

11. Answer (1)

Sources are not coherent (different wavelengths) results in no interference.

12. Answer (4)

Partially polarized light is mixture of unpolarized and polarized light.

13. Answer (1)

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$$

$$\frac{1}{f} = 10 + 5 = 15$$

$$f = \frac{1}{15} \text{ m}$$

$$= \frac{20}{3} \text{ cm}$$

14. Answer (2)

$$\therefore m = \frac{f}{f-u} = \frac{-12}{-12+3} = \frac{-12}{-9} = \frac{4}{3} = 1.33$$

i.e., image is virtual and erect.

15. Answer (4)

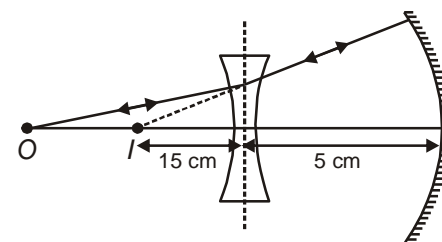
Because in displacement method,

$$M_1 = \frac{I_1}{O} = \frac{v}{u} \leftarrow \text{For position } L_1$$

$$M_2 = \frac{I_2}{O} = \frac{u}{v} \leftarrow \text{For position } L_2$$

$$\text{then } M_1 \times M_2 = 1$$

16. Answer (2)



$$\therefore \frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{-15} - \frac{1}{u} = \frac{1}{-20}$$

$\Rightarrow u = -60$ cm away from lens.

17. Answer (3)

$$i = 90^\circ - r$$

$$\sin i = \sin(90^\circ - r)$$

$$= \cos r$$

$$\frac{\mu_2}{\mu_1} = \frac{\sin i}{\sin r}$$

$$= \frac{\sin i}{\sqrt{1 - \cos^2 r}}$$

$$= \frac{\sin i}{\sqrt{1 - \sin^2 i}}$$

$$(\mu_1^2 + \mu_2^2) \sin^2 i = \mu_2^2$$

$$\sin i = \frac{\mu_2}{\sqrt{\mu_1^2 + \mu_2^2}}$$

18. Answer (2)

$$u = \infty, v = -200 \text{ cm}, f = ?$$

$$\text{from lens formula } \frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{-200} - \frac{1}{\infty} = \frac{1}{f}$$

$$\frac{1}{f} = -\frac{1}{200}$$

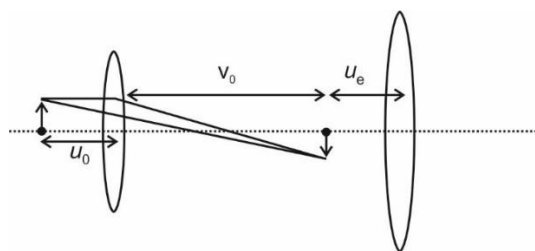
$$P = -0.5 \text{ D}$$

19. Answer (1)

$$\text{Thickness } t = \mu t_1 + \mu t_2$$

$$= 1.5 \times 9 + 1.5 \times 5 = 21 \text{ cm}$$

20. Answer (4)



For eyepiece

$$\frac{1}{5} = \frac{1}{-25} - \frac{1}{u_e}$$

$$u_e = \frac{-25}{6} \text{ cm}$$

$$\text{Now } v_o + u_e = 25 \text{ cm}$$

$$v_o = 25 - \frac{25}{6} = \frac{125}{6} \text{ cm}$$

$$\text{For objective } \frac{1}{3} = \frac{6}{125} - \frac{1}{u_o}$$

$$\frac{1}{u_o} = \frac{6}{125} - \frac{1}{3}$$

$$\frac{1}{u_o} = \frac{18 - 125}{375}$$

$$u_o \approx 3.5 \text{ cm}$$

21. Answer (2)

Concave mirror can produce erect and magnified image while convex mirror produces erect but diminished image.

22. Answer (1)

$$\text{Dispersive power } \omega = \frac{\mu_v - \mu_R}{\mu_y - 1}$$

$$\omega = \frac{1.705 - 1.690}{1.695 - 1} = 0.0215$$

23. Answer (3)

$$\text{Since amount of scattering} \propto \frac{1}{\lambda^4}$$

λ_R is largest in visible light, hence it is scattered least.

24. Answer (3)

$$\frac{1}{f_1} = (\mu_1 - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) = (\mu_1 - 1) \left(-\frac{1}{R} \right) = \frac{1 - \mu_1}{R}$$

$$\frac{1}{f_2} = (\mu_2 - 1) \left(\frac{1}{R} - \frac{1}{\infty} \right) = \frac{\mu_2 - 1}{R}$$

$$\frac{1}{f} = \left(\frac{1}{f_1} + \frac{1}{f_2} \right) = \frac{1 - \mu_1}{R} + \frac{\mu_2 - 1}{R}$$

$$\frac{1}{f} = \frac{\mu_2 - \mu_1}{R}$$

$$f = \frac{R}{\mu_2 - \mu_1} = \frac{20}{1.6 - 1.4} = \frac{20}{0.2}$$

$$f = 100 \text{ cm}$$

25. Answer (2)

$$d \sin \theta = n\lambda$$

$$\sin \theta = \frac{n\lambda}{3.73\lambda} = \frac{n}{3.73}$$

$$\sin \theta \leq 1$$

$$\frac{n}{3.73} \leq 1$$

$$n \leq 3.73$$

$$n = 3$$

26. Answer (3)

$$\frac{I_{\max}}{I_{\min}} = \frac{(\sqrt{I_1} + \sqrt{I_2})^2}{(\sqrt{I_1} - \sqrt{I_2})^2} = \frac{(\sqrt{I_0} + \sqrt{4I_0})^2}{(\sqrt{I_0} - \sqrt{4I_0})^2} = \frac{9}{1}$$

$$n = 9 \Rightarrow n^2 = 9^2 = 81$$

27. Answer (1)

$$\text{Angular width} = \frac{\beta}{D} = \frac{\lambda}{d}$$

$$1^\circ = \frac{\lambda}{d}$$

$$\lambda = \frac{\pi}{180} \times 0.03 \times 10^{-3}$$

$$= 5233 \text{ \AA}$$

28. Answer (4)

For telescope resolving power $\propto \frac{1}{\lambda}$ and

Brightness $\propto (\text{Diameter})^2$

Since $\lambda_{\text{red}} > \lambda_{\text{blue}} \Rightarrow (R.P.)_{\text{red}} < (R.P.)_{\text{blue}}$

for good telescope, it should have high magnifying power

29. Answer (4)

$$\frac{n\lambda D}{d} = \frac{2\lambda D}{a}$$

$$\frac{n}{d} = \frac{2}{a}$$

$$a = \frac{2d}{n}$$

30. Answer (1)

$$I_t = \left(\frac{I_{\text{incident}}}{2} \right) \cos^2 \theta$$

$$2I_0 = \frac{I_{\text{incident}}}{2} \cos^2 45^\circ$$

$$2I_0 = \frac{I_{\text{incident}}}{2} \left(\frac{1}{\sqrt{2}} \right)^2$$

$$I_{\text{incident}} = 8I_0$$

31. Answer (2)

$$\tan i_p = \mu$$

$$\mu = \tan 53^\circ = \frac{4}{3}$$

$$\sin \theta_c = \frac{1}{\mu} = \frac{3}{4}$$

$$\theta_c = \sin^{-1} \left(\frac{3}{4} \right)$$

32. Answer (2)

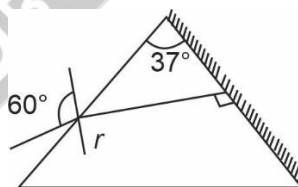
$$f_1 = f_2 = f_3 = f_4 = 2f$$

$$= \frac{1}{f_{\text{eq}}} = \frac{1}{f_1} + \frac{1}{f_2} + \frac{1}{f_3} + \frac{1}{f_4}$$

$$\frac{1}{f_{\text{eq}}} = \frac{1}{2f} + \frac{1}{2f} + \frac{1}{2f} + \frac{1}{2f}$$

$$f_{\text{eq}} = \frac{2f}{4} = \frac{f}{2}$$

33. Answer (3)



$$r = 37^\circ$$

$$\frac{\sin 60^\circ}{\sin 37^\circ} = \mu$$

$$\mu = \frac{\frac{\sqrt{3}}{2}}{\frac{3}{5}}$$

$$= \frac{5}{2\sqrt{3}}$$

34. Answer (2)

$$d_{\text{app}} = \sum \frac{d}{\mu}$$

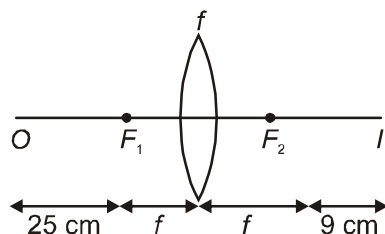
$$= \frac{d_1}{\mu_1} + \frac{d_2}{\mu_2} + \dots$$

$$\Rightarrow \frac{4}{\frac{4}{3}} + \frac{6}{\frac{3}{2}}$$

$$= 3 + 4 = 7 \text{ cm}$$

35. Answer (3)

$$f = \sqrt{OI}$$



$$= \sqrt{25 \times 9}$$

$$= \sqrt{225}$$

$$f = 15 \text{ cm}$$

SECTION-B

36. Answer (1)

$$\frac{1}{f_1} = (1.5 - 1) \left(-\frac{1}{10} \right)$$

$$\frac{1}{f_1} = -\frac{1}{20}$$

$$\text{Similarly, } \frac{1}{f_3} = -\frac{1}{20}$$

$$\frac{1}{f_2} = \left(\frac{8}{7} - 1 \right) \left(\frac{1}{10} + \frac{1}{10} \right)$$

$$\frac{1}{f_2} = \frac{1}{7} \times \frac{2}{10} = \frac{1}{35}$$

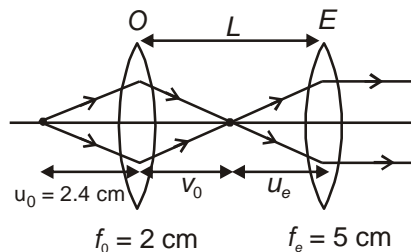
$$\frac{1}{f} = -\frac{1}{20} - \frac{1}{20} + \frac{1}{35}$$

$$\frac{1}{f} = \frac{-7 - 7 + 4}{140}$$

$$\frac{1}{f} = \frac{-10}{140}$$

$$|f| = 14 \text{ cm}$$

37. Answer (2)



$$\text{from } \frac{1}{v_0} - \frac{1}{u_0} = \frac{1}{f_0}$$

$$\frac{1}{v_0} = \frac{1}{2} - \frac{1}{2.4} \Rightarrow v_0 = 12 \text{ cm}$$

$$m = \frac{v}{u} = \frac{12}{-2.4} = -5$$

$$\text{As image will form at infinity } \Rightarrow m_e = \frac{D}{f}$$

$$u_e = -5 \text{ cm}$$

$$m_e = \frac{25}{5} = 5$$

$$\text{Now magnifying power } M = m \times m_e$$

$$M = -5 \times 5 = -25$$

38. Answer (1)

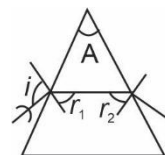
$$\frac{h_2}{h_1} = \frac{v_0}{u_0} = \frac{f_0}{u_0 + f_0}$$

$$= \frac{2}{2000 + 2} \approx \frac{1}{1000}$$

$$h_2 = \frac{1}{1000} \times h_1 = \frac{50}{1000} \times 100 \text{ cm}$$

$$= 5 \text{ cm}$$

39. Answer (4)



$$r_1 + r_2 = A$$

For no emergence

$$r_2 \geq i_c = \sin^{-1} \left(\frac{1}{\mu} \right)$$

$$r_2 = i_c = \sin^{-1} \left(\frac{1}{\mu} \right)$$

$$r_1 = A - i_c$$

If at $i = 90^\circ$ there is no emergent then for every value of i there will be no emergent

$$\text{For } i = 90^\circ, r_1 = i_c$$

and

$$r_2 > i_c$$

$$A - i_c > i_c$$

$$A > 2 i_c$$

40. Answer (3)

Angular positions of the fringes must be same

$$\frac{5\lambda_1}{2d} = \frac{7\lambda_2}{2d}$$

$$\Rightarrow \lambda_2 = \frac{5}{7}\lambda_1$$

$$\Rightarrow \lambda_2 = \frac{6300 \times 5}{7} = 4500 \text{ \AA}$$

41. Answer (2)

$$\text{Shift} = \frac{\beta(\mu - 1)t}{\lambda} = \beta$$

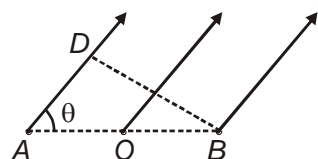
$$\Rightarrow (1.5 - 1)t = \lambda$$

$$\Rightarrow t = 2\lambda$$

42. Answer (1)

Large radius so $r \gg \lambda$.

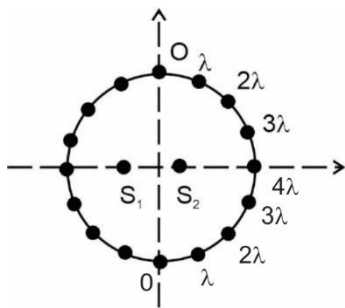
Lines AP, OP and BP are nearly parallel.



$$\text{Path difference } AD = AB \cos \theta = 2d \cos \theta$$

43. Answer (1)

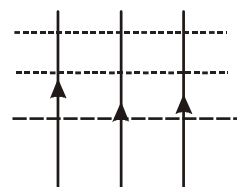
$$n_{\max} = \frac{d}{\lambda} = \frac{2}{0.5} = 4$$



$$n = 4 \times 4 = 16$$

44. Answer (2)

$$y = \text{Constant}$$



45. Answer (1)

$$\frac{\lambda D}{d} = (\mu - 1)t \frac{D}{d}$$

$$\mu - 1 = \frac{\lambda}{t}$$

$$\mu = \frac{\lambda}{t} + 1 = \frac{600 \times 10^{-9} \text{ m}}{12 \times 10^{-7} \text{ m}} + 1$$

$$= 0.5 + 1 = 1.5$$

46. Answer (1)

At Brewster angle reflected light is totally polarised.

47. Answer (2)

$$y_{n_1} = \frac{n_1 \lambda_1 D}{d}$$

$$y_{n_2} = \frac{n_2 \lambda_2 D}{d}$$

$$y_{n_1} = y_{n_2}$$

$$n_1 \lambda_1 = n_2 \lambda_2$$

$$\frac{n_1}{n_2} = \frac{\lambda_2}{\lambda_1} = \frac{800}{500}$$

$$\frac{n_1}{n_2} = \frac{8}{5} = \frac{16}{10} = \frac{24}{15} \dots\dots$$

For minimum value of $n_1 \rightarrow$ such that

$$y_{n_1} = y_{n_2} \Rightarrow n_1 = 8;$$

$$n_1 = 8$$

48. Answer (4)

$$\text{If } i = \theta_p.$$

Then reflected ray is fully polarised and refracted ray is partially polarised.

Also, both reflected and refracted rays are perpendicular to each other.

49. Answer (4)

$$\Delta x = d \sin \theta = n\lambda$$

$$= 10 \times 6.2 \times 10^{-6} \text{m}$$

$$= 6.2 \times 10^{-5} \text{m}$$

50. Answer (2)

$$\frac{I_{\max.}}{I_{\min.}} = \frac{(a_1 + a_2)^2}{(a_1 - a_2)^2}$$

$$\frac{a_1 + a_2}{a_1 - a_2} = \sqrt{\frac{36}{1}} = 6$$

$$a_1 + a_2 = 6a_1 - 6a_2$$

$$5a_1 = 7a_2$$

$$\frac{a_1}{a_2} = \frac{7}{5}$$

CHEMISTRY

SECTION-A

51. Answer (4)

High purity dihydrogen is obtained by electrolysis of warm aq. Ba(OH)_2 solution between nickel electrodes.

52. Answer (3)

CH_4 is an electron precise covalent hydride

53. Answer (2)

- Temporary hardness of water is due to bicarbonates of Ca and Mg while permanent hardness is due to presence of chlorides and sulphates of Ca and Mg.

54. Answer (3)

More stable is the conjugate base, stronger is the acid.

55. Answer (4)

Higher is the value of negative electron gain enthalpy higher is electron affinity

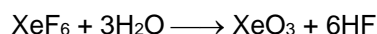
Element	$\Delta_{\text{eg}}H$ (kJ mol ⁻¹)
F	-333
Cl	-349
Br	-325
I	-296

56. Answer (4)

Element	Standard reduction potential E° (V)
F	2.87
Cl	1.36
Br	1.09
I	0.54

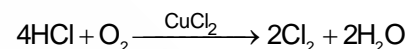
Standard reduction potential of iodine is minimum hence it will not oxidise F^- , Cl^- and Br^- present in the solution to respective gases.

57. Answer (1)

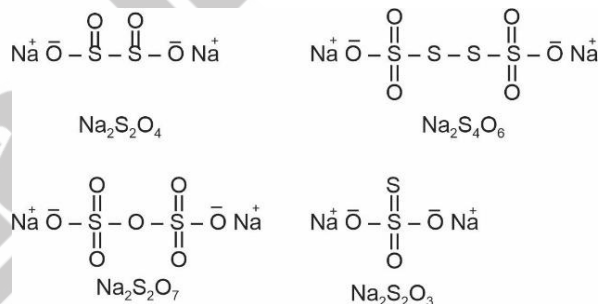


58. Answer (4)

Deacon's process



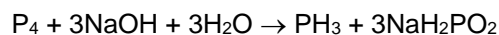
59. Answer (3)



60. Answer (4)

NO is neutral gas.

61. Answer (2)



62. Answer (2)

Lower is the value of pK_a stronger is the acidic nature of the compound.

Compound	pK_a
HF	3.2
HCl	-7.0
HBr	-9.5

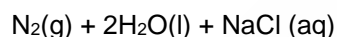
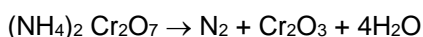
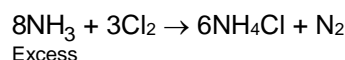
63. Answer (1)



64. Answer (3)

Compound	Oxidation state of Phosphorus
Pyrophosphoric acid ($\text{H}_4\text{P}_2\text{O}_7$)	+5
Phosphonic acid (H_3PO_3)	+3
Hypophosphoric acid ($\text{H}_4\text{P}_2\text{O}_6$)	+4
Phosphinic acid (H_3PO_2)	+1

65. Answer (4)



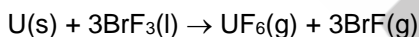
66. Answer (3)

Low temperature and high pressure are the most favourable conditions for maximum yield of H_2SO_4 through contact process.

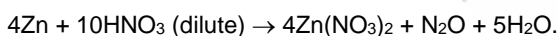
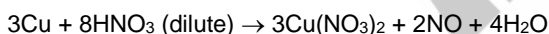
67. Answer (3)

HOIO is least likely to exist.

68. Answer (1)



69. Answer (3)



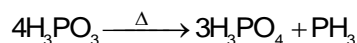
70. Answer (4)



71. Answer (2)

Halogens	Bond dissociation enthalpy (kJ mol^{-1})
F_2	158.8
Cl_2	242.6
Br_2	192.8
I_2	151.1

72. Answer (2)



73. Answer (3)

Blue vitriol is $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ which exist as $[\text{Cu}(\text{H}_2\text{O})_4]^{2+} \text{SO}_4^{2-} \cdot \text{H}_2\text{O}$. The water molecule outside coordination sphere is hydrogen bonded.

74. Answer (1)

Ice crystallises in hexagonal form at atmospheric pressure.

75. Answer (1)

Lewis acids are electron deficient species.

B_2H_6 acts as a Lewis acid

76. Answer (4)

Carbon is sp^3 hybridised in diamond and sp^2 hybridised in graphite.

77. Answer (4)

Higher is the bond strength, higher will be the catenation.

Catenation tendency for 14th group elements,



78. Answer (1)

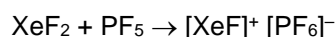
20 Volume H_2O_2 means, 1 L H_2O_2 solution on decomposition gives 20 L oxygen gas at NTP.

$$\therefore 1000 \text{ mL } 20 \text{ V } \text{H}_2\text{O}_2 \text{ gives } = 20 \text{ L } \text{O}_2(\text{g})$$

$$\therefore 30 \text{ mL } 20 \text{ V } \text{H}_2\text{O}_2 \text{ gives } = \frac{20 \times 30}{1000} \text{ L } \text{O}_2(\text{g})$$

$$= 0.6 \text{ L } \text{O}_2(\text{g})$$

79. Answer (2)



80. Answer (4)

Transition metals form metallic hydrides.

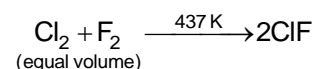
81. Answer (2)

GeO and GeO_2 both are acidic in nature.

82. Answer (3)

Syn gas is mixture of $\text{CO} + \text{H}_2$

83. Answer (1)

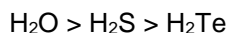


84. Answer (1)

Carbon does not have any vacant d -orbital in CCl_4 so it is not hydrolysed.

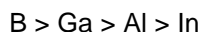
85. Answer (3)

Correct order of bond angle is

**SECTION-B**

86. Answer (1)

Correct order of ionization energy is



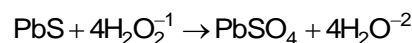
87. Answer (4)

 H_3PO_2 only has one P-OH bond.

88. Answer (3)

Basicity of hydrides of group 15 elements decreases on going down the group.

89. Answer (1)



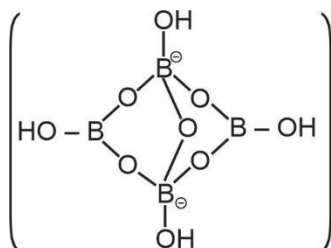
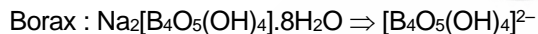
90. Answer (3)

Clark's method can remove temporary hardness of water only.

91. Answer (1)

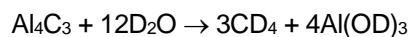
 $(\text{CH}_3)_3\text{SiCl}$ blocks the ends of the silicone polymer.

92. Answer (3)

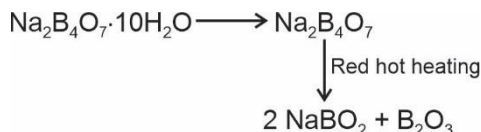


No. of B - O - B bonds = 5

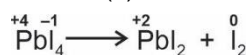
93. Answer (2)



94. Answer (1)

So, HBO_2 is not obtained in the product.

95. Answer (2)

Due to above reaction, PbI_4 is least likely to exist.

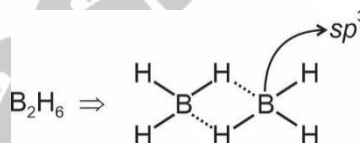
96. Answer (4)

 C_{60} molecule has twelve, five members rings.

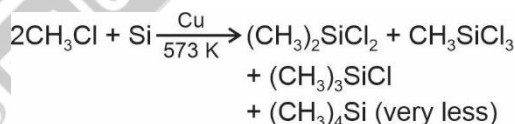
97. Answer (4)

	Boiling point (K)
H_2	20.39
D_2	23.67
T_2	25.0

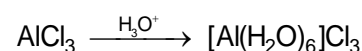
98. Answer (3)



99. Answer (4)



100. Answer (4)

**BOTANY****SECTION-A**

101. Answer (2)

In aquatic, ecosystem, such as sea, the pyramid of biomass is generally inverted.

102. Answer (1)

Pioneer community is the first biotic community that develops in a bare area.

103. Answer (3)

Phytoplanktons and zooplanktons are pioneer community in hydrarch succession.

104. Answer (3)

Primary consumers or herbivores are called key industry animals as they convert plant matter into animal matter.

105. Answer (3)

Grasslands are called treeless biome as trees are rare or absent in this biome.

106. Answer (3)

Ecological niche of an organism represents the range of conditions that it can tolerate, the resources it utilises and its functional role in ecological system.

107. Answer (1)

Temperature is most ecologically relevant environmental factor.

108. Answer (1)

Stenothermal organisms cannot tolerate large variations of temperature and thus restricted to narrow range of temperature.

109. Answer (1)

Sciophytes are those plants which require low intensity light and grow in shaded areas.

110. Answer (1)

UV-C are radiations of wavelength 100-280 nm and these range are lethal to organisms.

111. Answer (2)

Majority of animals and almost all plants cannot maintain constant internal environment. These organism are called conformers.

112. Answer (2)

Bears escape in time during winter by a process called hibernation.

113. Answer (2)

According to Allen's rule, mammals from colder climates generally have shorter ears and limbs to minimise heat loss.

114. Answer (2)

The body fluid of fishes survive below 0°C contain antifreeze solutes by which they can manage to keep their body fluids from freezing.

115. Answer (3)

Desert plants have small sized leaves or leaves reduced to spine.

116. Answer (3)

Birth and death are attributes of an individual

117. Answer (2)

A population having high birth rate has a very high proportion of pre-reproductive individuals. Population age pyramid of such population is triangular.

118. Answer (2)

$$\text{Death rate} = \frac{\text{Number of deaths}}{\text{Initial population}} = \frac{10}{200} = 0.05$$

119. Answer (3)

Vital index for a population

$$= \frac{\text{Number of births}}{\text{Number of deaths}} \times 100$$

120. Answer (3)

The equation $\frac{dN}{dt} = rN$ represents exponential

growth and equation $\frac{dN}{dt} = rN \left[\frac{K - N}{K} \right]$ represents

logistic growth.

Logistic growth describes a situation in which resources present in the environment are limited.

121. Answer (2)

Both the interacting species get harmed in competition.

In mutualism and protocoeperation, both the interacting species are benefited.

122. Answer (2)

In protocoeperation, both the interacting species are benefited but they can live equally well without association.

123. Answer (3)

In commensalism, one species is benefited and other is neither harmed nor benefited.

124. Answer (4)

Diapause is a stage of suspended development in some organisms such as insects and zooplanktons during unfavourable environmental conditions.

125. Answer (2)

Bees get pseudocoupled while pollinating the *Ophrys*.

126. Answer (4)

Anthropogenic ecosystems such as crop fields are created and maintained by human beings.

127. Answer (3)

Anthropogenic ecosystems do not possess self regulatory mechanisms.

128. Answer (3)

Topographic factors includes factor related to physical features of earth like slope, valley, mountains, plains etc.

129. Answer (3)

J. Grinnell gave the concept of ecological niche.

130. Answer (2)

Secondary consumers are those animals who feed on herbivores *i.e.*, primary consumers.

131. Answer (2)

Producers are transducers or converters because they convert solar energy into chemical energy.

132. Answer (1)

Stratification is vertical distribution of different species occupying different levels.

133. Answer (3)

Net primary productivity is rate of organic matter build up or stored by producers in excess of respiratory utilization per unit time and area.

134. Answer (4)

Desert and deep sea are least productive ecosystem.

135. Answer (4)

Leaching is going down of water-soluble substances present in detritus into the soil horizon.

SECTION-B

136. Answer (2)

Most limiting nutrient of marine ecosystem is nitrogen. Light also decreases with depth.

137. Answer (4)

Photosynthetically active radiation is less than 50% of incident solar radiation.

138. Answer (3)

Secondary consumers feed on herbivores and form third trophic level.

139. Answer (2)

Autotrophic organisms which fix the solar energy and manufacture their own food from inorganic raw materials form the base of food chain constituting first trophic level.

140. Answer (1)

GFC is major conduit of energy flow in aquatic ecosystem.

141. Answer (3)

Each trophic level has a certain mass of living material at a particular time called as Standing crop.

142. Answer (1)

Mean annual temperature range and mean annual precipitation of different biomes are as follows:

Biome	Mean annual temperature	Mean annual Precipitation
Desert	5°C to 20°C	10 to 50 cm
Grassland	0°C to 25°C	25 to 100 cm
Tropical forest	18°C to 25°C	150 to 400 cm
Coniferous forest	– 1°C to 13°C	50 to 250 cm
Temperate forest	10°C to 22°C	60 to 220 cm
Arctic and Alpine tundra	– 11°C to 1°C	10 to 120 cm

143. Answer (3)

Snow laden areas in polar regions are called permafrost.

144. Answer (4)

Tropical rain forests are rich in biodiversity. Along with tall trees, woody climbers and epiphytes are also found there.

145. Answer (3)

Succulent xerophytes are found in deserts.

146. Answer (2)

Goat-plant; Tiger-Deer and sparrow-Seed interactions show predation whereas *Cuscuta*-Hedge plant interaction shows parasitism.

147. Answer (1)

Regarding brood parasitisms, the evolution occurs in such a direction that the eggs of parasitic bird resemble the host egg to reduce the chance of ejection of parasitic bird's egg by the host bird.

148. Answer (4)

Pacific salmon fish breeds only once in its life time.

149. Answer (3)

For sedimentary cycle, reservoir pool is earth's crust or lithosphere. Phosphorus cycle is sedimentary cycle.

150. Answer (2)

According to Robert Costanza and his colleagues, soil formation cost 50% of total ecosystem services.

ZOOLOGY**SECTION-A**

151. Answer (4)

Keeping beehives in crop fields during flowering is beneficial for both plants and humans as there is an increase in pollination efficiency, crop yield and honey yield.

152. Answer (4)

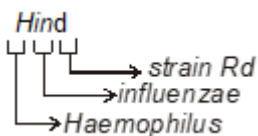
New materials are biologically converted into specific products in upstream processing.

153. Answer (4)

Rohu is a fresh water, edible fish.

154. Answer (3)

According to the convention of naming restriction enzymes, the first letter of the name comes from the genus and the second and third letter come from the species of the prokaryotic cell from which they were isolated.



155. Answer (4)

Restriction endonuclease	–	Cuts DNA at specific locations
Bioprocess engineering	–	Maintenance of sterile ambience
Genetic engineering	–	Creation of rDNA
MCS of pBR322	–	Collection of unique restriction sites in a vector

156. Answer (4)

Improved breed of cattle is Jersey.

157. Answer (3)

Artificial insemination helps us overcome several problems of normal mating.

158. Answer (4)

PCR is for amplification of DNA. Vector has no role in it.

159. Answer (2)

Taq polymerase is a thermostable enzyme, isolated from *Thermus aquaticus*.

160. Answer (1)

Viral poultry diseases are Ranikhet, New Castle's disease, fowlpox, infections bronchitis and bird flu.

161. Answer (4)

Hisardale is a new breed of sheep developed in Punjab by crossing Bikaneri ewe with Merino ram.

162. Answer (3)

In pBR322, *rop* codes for the proteins involved in replication of plasmid.

163. Answer (1)

A single outcross often helps to overcome inbreeding depression.

164. Answer (3)

Multiple Ovulation Embryo Transfer Technique (MOET) is applied to improve herd size, milk quality, meat quality etc. MOET can be performed in cows, sheep, rabbits, buffaloes and mares. In fishes like *Hilsa*, *Catla*, Sardines and *Rohu* external fertilisation takes place in water, so embryo transfer cannot take place.

165. Answer (2)

Since these three fishes feed at different levels in water, there will be no competition for food between them. Thus, they can be grown in one pond without affecting the survival of each other.

166. Answer (1)

*Bam*HI

5'G↓GATCC3'

3'CCTAG↑G5'

167. Answer (3)

Retroviruses are used to deliver desirable genes into animal cells.

Ti plasmid is used to deliver eukaryotic genes into dicot cells.

168. Answer (3)

Dairying is the management of animals for milk and its products for human consumption.

169. Answer (3)

The feeding of cattle should be carried out in a scientific manner with special emphasis on the quality and quantity of fodder.

170. Answer (3)

Babesiosis is caused by a sporozoan and infects RBCs of mammals (cattles).

171. Answer (3)

Most plasmids are extrachromosomal DNA; they are not a part of chromosomal DNA and they do not integrate with it generally. Histones are associated with chromosomal DNA.

172. Answer (1)

Hybrid is a result of mating of two different related species.

173. Answer (2)

The two enzymes responsible for restricting the growth of bacteriophages in *E.coli* were restriction endonuclease and methylase.

174. Answer (2)

Agarose gel electrophoresis is employed to check the progression of a restriction enzyme digestion.

175. Answer (4)

Inbreeding helps in accumulation of superior genes and elimination of less desirable genes.

176. Answer (3)

The length of palindromic sequence varies from one restriction enzyme to another.

177. Answer (2)

The enzyme DNA ligase belongs to the 6th class of enzyme, i.e., ligases.

178. Answer (1)

Agrobacterium infects dicot plants. Wheat, rice and corn are monocots.

179. Answer (1)

In cross-breeding, superior males of one breed are mated with superior females of another breed.

180. Answer (1)

Probe is a single stranded DNA or RNA, tagged with a radioactive molecule which is used to identify genetic material.

181. Answer (2)

Bacteria modifies its own DNA restriction site through methylation and protects it from its own restriction enzyme.

182. Answer (4)

DNA ligase is commonly known as molecular glue.

183. Answer (4)

Each nucleotide in a molecule of DNA contains a negatively charged phosphate group, so DNA is attracted towards the anode.

184. Answer (3)

ori(origin of replication) – this site enables autonomous replication in a plasmid.

185. Answer (2)

Gene gun is also known as biolistic method.

SECTION-B

186. Answer (4)

Hisardale was developed in Punjab.

187. Answer (3)

Plasmids are double stranded DNA molecules that are found naturally in bacteria and some yeast.

188. Answer (3)

Male horse crossed with female donkey produces a hinny.

189. Answer (2)

The plasmid was isolated from *Salmonella typhimurium* and antibiotic resistance gene was introduced in it. Recombinant DNA was then introduced into *E.coli*.

190. Answer (1)

Palindromic sequences of base pairs read the same on the two strands when orientation of reading is kept same i.e. 5' → 3' on both strands.

191. Answer (1)

DNA threads are isolated from the solution by spooling. Extraction of DNA fragments from agarose gel is elution. Agglutination can refer to clumping resulting from interaction between antigen and antibodies.

192. Answer (4)

ori regulates copy number of a plasmid. *ori* is a sequence from where replication starts; so any foreign DNA linked with *ori* can replicate and multiply itself in the host organism.

193. Answer (2)

Insertional inactivation of antibiotic resistance gene in pBR322 helps in selection of recombinants and non-recombinants. *HindIII* recognition site is located outside the selectable marker, so both recombinants and non-recombinants will show resistance to ampicillin and tetracycline and we will not be able to differentiate between them.

194. Answer (2)

Poultry includes chicken and ducks and sometimes turkey and geese; but in a more general sense it may refer to the meat of other birds too.

195. Answer (4)

Different enzymes are used depending on the composition of cell wall and cell membrane. Animal cells lack cell wall and their cell membrane can be digested by SDS and alkaline salts. RNase hydrolyses the RNA in cell and not the cell membrane constituents.

196. Answer (1)

Out-crossing is the best breeding method for animals that are below average in productivity in milk production, growth rate in beef cattle etc.

197. Answer (1)

The first step in PCR is denaturation and the last step is extension.

198. Answer (3)

Embryos are transferred from genetic mother to surrogate mother. In MOET, fertilization takes place inside the female's body *i.e., in vivo* fertilization.

199. Answer (1)

The first digit in E.C. indicates the class of the enzyme and hence the mode of its activity.

200. Answer (4)

'A' represents restriction site of *Bam* HI in the site of tetracycline resistance gene.

□ □ □

