PACE-IIT & MEDICAL

AITS–07-(NEET 2023 Aspirants) – Answer key & Solutions

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

SOLUTIONS

1. (4)

The two slabs will shift the image at distance

$$d = 2\left(1-\frac{1}{\mu}\right)t = 2\left(1-\frac{1}{1.5}\right)(1.5) = 1.0\text{cm}$$

2. (4)

$$V_{il}\left(\frac{v}{u}\right)^2 (V_{o/l})$$

$$V_i - V_l = \left(\frac{+2f}{-2f}\right)^2 (V_0 - V_l)$$

$$Vi - (-V) = (-1)^2 \left[V - (-V)\right]$$

$$\Rightarrow \quad V_i = V$$

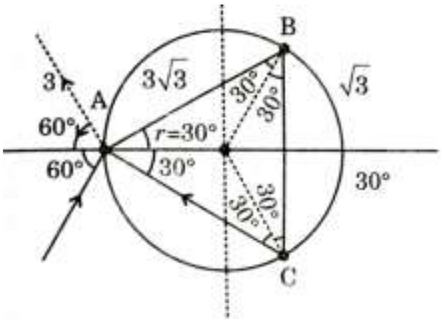
3. (1)

$$\mu_1 \sin 30° = \mu_2 \sin\theta \text{and} \tan\theta = \frac{(R/2)}{R}$$

4. (1)

$$3\sin 60° = 3\sqrt{3}\sin\alpha$$

$$r = 30°$$



For right boundry critical angle

$$\text{Sin}\,C = \frac{1}{3} \Rightarrow C < 30$$

Hence TIR occur at point B and C

Hence deviation $\delta = 60°\text{CW}$

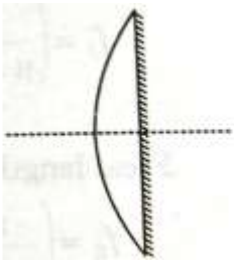
5. (2)

$$\frac{1}{F_{eq}} = \frac{1}{F_m} - \frac{1}{F_l}$$

$$\frac{1}{-28} = -\frac{2}{F_l}$$

$$\Rightarrow F_1 = 56\text{cm}$$

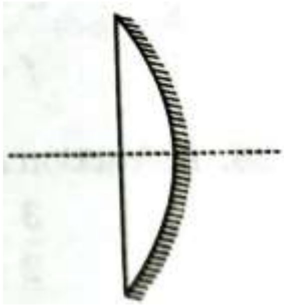
$$\frac{1}{-10} = \frac{1}{F_m} - \frac{2}{56}$$



$$\Rightarrow \frac{1}{F_m} = \frac{1}{28} - \frac{1}{10} = \frac{10-28}{28.10} = -\frac{18}{28.10}$$

$$\Rightarrow F_m = -\frac{280}{18} = -\frac{140}{9} \text{ as } F_m = \frac{R}{2}$$

$$\Rightarrow R = -\frac{280}{9}$$



Now for lens

$$\frac{1}{56} = (\mu-1)\left[\frac{1}{\infty} - \frac{1}{(-280/9)}\right]$$

$$\Rightarrow \quad \frac{1}{56} = (\mu-1)\frac{9}{280}$$

$$\Rightarrow \quad \mu - 1 = \frac{280}{56\times 9}$$

$$\Rightarrow \quad \mu = \frac{14}{9}$$

6. (4)

Focal length for upper half is,

$$f_1 = \left(\frac{\mu-1}{\mu/\mu_1 - 1}\right), f_{air} = \left(\frac{1.5-1}{\frac{1.5}{1.2}-1}\right)20 = 40\text{cm}$$

Focal length for lower half is,

$$f_2 = \left(\frac{\mu-1}{\mu/\mu_1 - 1}\right), f_{air} = \frac{1.5-1}{\frac{1.5}{2.5}-1}\times 20 = -25\text{cm}$$

If the object is at infinity, two will form at corresponding focuses.

So, the required separation is,

$$x = |f_1| + |f_2| = 40 + 25 = 65\text{cm}$$

7. (1)

$\frac{1}{\nu}-\frac{1}{-15}=\frac{1}{5}$

$\frac{1}{\nu}=\frac{1}{5}-\frac{1}{15}$

$\nu=7.5$

$\nu'=-12.5$

$\frac{1}{\nu'}-\frac{1}{12.5}=\frac{1}{-15}$

$\frac{1}{\nu'}=\frac{2}{25}-\frac{1}{15}$

$\frac{1}{\nu'}=\frac{12-10}{150}$

$\nu'=75\text{cm}$

$\nu''=-95\text{cm}$

$\frac{1}{\nu''}+\frac{1}{95}=\frac{1}{5}$

$\nu''=5.3\text{cm}$

8. (4)

$m=\frac{D}{f}$

Power of lens increases the magnification of microscope.

9. (1)

$\frac{1}{-(\text{N.P.})}-\frac{1}{(-D)}=\frac{1}{f}$

$-1+\frac{100}{25}$

$-1+4$

$3=\frac{1}{f}$

10. (3)

$$\frac{1}{f}=(\mu-1)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)=3$$

$$\therefore \quad 3=(1.25-1)\left(\frac{1}{R_1}-\frac{1}{R_2}\right) \quad ...(i)$$

$$\text{and} \quad -2=\left(\frac{1.25}{\mu}-1\right)\left(\frac{1}{R_1}-\frac{1}{R_2}\right) \quad ...(ii)$$

$$-\frac{3}{2}=\frac{0.25\mu}{1.25-\mu}$$

$$\Rightarrow -0.5\mu=3.75-3\mu$$

$$\Rightarrow \mu=\frac{3.75}{2.5}=1.5$$

11. (4)

$$\beta_w=\frac{\lambda D}{\mu d}$$

We need to increase $\beta \Rightarrow D$ increases; d decreases.

12. (1)

Path difference, $\Delta x=\frac{yd}{D}$

Here, $y=\frac{5\lambda}{2}$

and $D=10d=50\lambda \quad (\text{as } d=5\lambda)$

So, $\Delta x=\left(\frac{5\lambda}{2}\right)\left(\frac{5\lambda}{50\lambda}\right)=\frac{\lambda}{4}$

Corresponding phase difference will be

$$\phi=\left(\frac{2\pi}{\lambda}\right)(\Delta x)=\left(\frac{2\pi}{\lambda}\right)\left(\frac{\lambda}{4}\right)=\frac{\pi}{2}$$

or $\frac{\phi}{2}=\frac{\pi}{4}$

$$\therefore I=I_0\cos^2\left(\frac{\phi}{2}\right)=I_0\cos^2\left(\frac{\pi}{4}\right)=\frac{I_0}{2}$$

13. (1)

$$\mu=\frac{c}{v}=\frac{v\lambda}{v\lambda'}$$

$$\frac{3}{2}=\frac{\lambda}{\lambda'} \text{ or } \lambda'=\frac{2\lambda}{3}$$

Note that the frequency remains unchanged.

14. (1)

$$I_{min}\propto(A_1-A_2)^2$$

$$I_{min}\propto(2a-a)^2$$

Clearly, the intensity of minima increases, again,

$$I_{min} \propto \left(A_1 + A_2\right)^2$$

$$I_{max} \propto \left(2a + a\right)^2$$

Clearly, the intensity of maxima increases.

15. (4)

$$\beta' = \frac{D\lambda}{3d} = \frac{\beta}{3}$$

16. (1)

$$\beta = \frac{D\lambda}{d} = \frac{f\lambda}{d} = \frac{1 \times 4890 \times 10^{-10}}{0.2 \times 10^{-3}}$$

$$= 0.29 \times 10^{-2}\,\text{m} = 2.9\,\text{mm} \approx 3\,\text{mm}$$

17. (4)

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

Here $I_1 = I_0$, $I_2 = I_0/2$

For maximum intensity, $\cos\Delta\phi = 1$

For maximum intensity, $\cos\Delta\phi = -1$

18. (2)

When slits are of unequal width, then intensity of sources S1 and S2 is not equal. So, position of minimum intensity will not be completely dark.

19. (4)

Because white light will give a general illumination at the central maxima.

20. (1)

When slits of equal width are taken, then intensity at maxima is $4a^2$ and at minima it is zero $\left(I \propto w\right)$.

When one slit is doubled, then intensity at maxima will increase whereas intensity at minima will not be equal to zero and will be finite.

21. (1)

Band width $\propto \lambda$,

$\because \lambda_{blue} < \lambda_{red}$, hence for blue light the diffraction bands become narrower and crowded together.

22. (1)

Intensity of the polarized light coming out of polarizing sheet

Will be $I = \int_0^{2\pi} I_0 \cos^2\theta d\theta$

On solving, we get $I = \frac{I_0}{2}$

23. (1)

Energy = $\frac{1}{2}mv^2 = 5000\text{eV} = 5000 \times 1.6 \times 10^{-19}\,\text{J}$

$$mv = \sqrt{2 \times 5000 \times \left(1.6 \times 10^{19}\right)} = 4 \times 10^{-8} \times \sqrt{m}$$

Number of electrons striking per second is

$$n=\frac{q}{e}=\frac{It}{e}=\frac{50\times10^{-6}\times1}{1.6\times10^{-19}}=31.25\times10^{13}$$

Force = change of momentum per second

$$=n(mv)=31.25\times10^{13}\times4\times10^{-8}\sqrt{m}$$

$$=125\times10^{5}\sqrt{9.1\times10^{-31}}$$

$$=1.1924\times10^{-8}\,N$$

24. (2)

Number of photons falling per second.

$$N_P=\frac{10^{-3}}{\dfrac{6.6\times10^{-34}\times3\times10^{8}}{5000\times10^{-10}}}=2.5\times10^{15}$$

Let N_e is the number of photoelectrons emitted per second.

$$\therefore I=\frac{q}{t}=\frac{N_e e}{1}\Rightarrow N_e=\frac{I}{e}=\frac{0.16\times10^{-6}}{1.6\times10^{-19}}=10^{12}$$

Percentage of photons producing photoelectrons,

$$=\frac{N_e}{N_p}\times100=\frac{10^{12}}{2.5\times10^{15}}\times100=0.04\%$$

25. (3)

Using photoelectric equation, $hf-hf_0=\frac{1}{2}mv^2=eV,$

or $\left(\frac{hc}{\lambda}-\frac{hc}{\lambda_0}\right)=eV,$

For the first case, $\frac{hc}{\lambda}-\frac{hc}{\lambda_0}=e(3V_0)$ ....(i)

For the second case, $\frac{hc}{2\lambda}-\frac{hc}{\lambda_0}=e(V_0)$ ....(ii)

Solving $\lambda_0=4\lambda$

26. (3)

Einstein's equation for photoelectric effect is

$$hf-hf_0=\frac{1}{2}mv^2{}_{max}$$

$$f=2f_0, f_{max}=4\times10^{8}\,cm\,s^{-1}$$

$$2hf_0-hf_0=(1/2)m\left(4\times10^{8}\right)^2$$

When $hf_o=\frac{1}{2}m\left(4\times10^{8}\right)^2$ ...(i)

When $f=5f_0, v_{max}=v'$

$h(5f_0)-hf_0=\frac{1}{2}mv^2$ ...(ii)

Dividing Eq. (ii) by Eq. (i), we get v' = $8\times10^{8}\,cm\,s^{-1}$

27. (2)

$E - W_0 = \frac{1}{2}mv^2 = eV_s$

or $\frac{hc}{\lambda} - W_0 = eV_s$

Hence, $\frac{hc}{0.6\times10^{-6}} - W_0 = e(0.5)$ ...(i)

and $\frac{hc}{0.4\times10^{-6}} - W_0 = e(1.5)$ ...(ii)

Solving, we get $W_0 = 1.5 eV$

28. (4)

Since the number of photoelectrons emitted is directly proportional to the intensity of incident radiation, the number of photoelectrons emitted becomes four times.
The energy of photoelectrons does not change with the intensity of light.

29. (3)

$\frac{hc}{\lambda_{max}} = 3\times1.6\times10^{-19} J$

$\Rightarrow \lambda_{max} = \frac{6.6\times10^{-34}\times3\times10^8}{3\times1.6\times10^{-19}} = 4.125\times10^{-7} m$

30. (1)

$K_{max} = hv - W$

ω is the intercept on y – axis and h is the slope.

$\therefore h = \frac{2.4\times10^{-15}}{4\times10^{18}} = 6\times10^{-34} Js$

$W = 2\times10^{-15} J$

$\Rightarrow hv_0 = 2\times10^{-15}$

or $v_0 = 3.33\times10^{18} Hz$

31. (4)

$\frac{1}{\lambda} = R\left[\frac{1}{2^2} - \frac{1}{4^2}\right]$

or $\frac{f}{c} = R\left[\frac{1}{4} - \frac{1}{16}\right]$

or $f = cR\left[\frac{1}{4} - \frac{1}{16}\right] = 3\times10^8\times10^7\times\frac{3}{16} = \frac{9}{16}\times10^{15} Hz$

32. (2)

$$f = cZ^2R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

$$\Rightarrow 2.7\times10^{15} = cz^2R\left[\frac{1}{1^2} - \frac{1}{2^2}\right]$$

$$f' = cZ^2R\left[\frac{1}{1^2} - \frac{1}{3^2}\right]$$

Divide and solve to get: $f = 3.2\times10^{15}\,Hz$

33. (4)

$$E_p = -\frac{ke^2}{r}, E = -\frac{ke^2}{2r}$$

So, E_p=2E=2(–13.6)eV=–27.2eV.

34. (3)

Required energy = $\left[\left(\frac{-13.6}{9}\right) - \left(\frac{-13.6}{1}\right)\right]\times 9$

$$= \left[13.6 - \frac{13.6}{9}\right]9 = 8\times13.6eV$$

Wavelength = $\frac{12375}{8\times13.6} = 113.7\,\mathring{A}$

35. (4)

$$F = \frac{mv^2}{r}$$

But $v \propto \frac{1}{n}$ and $r \propto n^2$

$$\Rightarrow F \propto \frac{1}{n_4}$$

36. (1)

Linear momentum, $mv \propto \frac{1}{n}$

Angular momentum, $mvr \propto n$

Therefore, product of linear momentum and angular momentum $\propto n^0$

37. (3)

Energy of photon is given by mc2. Now,the maximum energy of photon is equal to the maximum energy of electrons = *eV*

Hence, $mc^2 = eV$

$$\Rightarrow m = \frac{eV}{c^2} = \frac{1.6\times10^{-19}\times18\times10^3}{\left(3\times10^8\right)^2} = 3.2\times10^{-32}\,kg$$

38. (1)

$$\frac{1}{\lambda_\alpha}=\frac{3R}{4}(Z-1)^2$$

$$(Z-1)=\sqrt{\frac{4}{3R\lambda_\alpha}}=\sqrt{\frac{4}{3\times1.1\times10^7\times1.8\times10^{-10}}}$$

$$=\frac{200}{3}\sqrt{\frac{5}{33}}=\frac{78}{3}=26\Rightarrow Z=27$$

39. (1)

Given, $N_2=\frac{N_0}{e}=N_0e^{-\lambda t}\Rightarrow t=\frac{1}{\lambda}=10s$

$$\therefore T_{1/2}\frac{\ln 2}{\lambda}=0.693\times10\approx7s$$

40. (2)

For $\alpha-$decay: $zA^y\rightarrow_{x-2}B^{y-4}+\alpha$

For β^{-}decay: ${}_xA^y\rightarrow_{x+1}B^y+_{-1}\beta^0$

For β^{+}decay: ${}_xA^y\rightarrow_{x-1}B^y+_{+1}\beta^0$

For k-capture, there will be no change in the number of proton. Hence, only case in which number of protons increases is β^- decay.

41. (2)

90% of the sample is left undercayed after time t.

$$\therefore\frac{9}{10}N_0=N_0e^{-\lambda t}$$

$$\lambda=\frac{1}{t}\ln\left(\frac{10}{9}\right)\qquad\text{...(i)}$$

After time 2t,

$$N_c=N_0e^{-\lambda(2t)}=N_0e^{-\frac{1}{t}\left[\ln\left(\frac{10}{9}\right)\right]2t}\qquad\text{...(ii)}$$

$$N=N_0e^{-\ln\left(\frac{10}{9}\right)2}=N_0\left(\frac{9}{10}\right)^2\approx81\%\text{ of }N_0\qquad\text{...(iii)}$$

Therefore, 19% of initial value will decay in time 2t.

42. (3)

Let N_2 be the number of atoms of X at time t = 0. Then, at t = 4 h (two half-lives),

$$N_x=\frac{N_0}{4}\text{ and }N_y=\frac{3N_0}{4}$$

$$\therefore\frac{N_x}{N_y}=\frac{1}{3}\approx0.33$$

At t = 6h (three half –lives),

$$N_x=\frac{N_0}{8}\text{ and }N_y=\frac{7N_0}{8}\text{ or }\frac{N_x}{N_y}=\frac{1}{7}\approx0.142$$

The given ratio $\frac{1}{4}$ lies between $\frac{1}{3}$ and $\frac{1}{7}$.
Therefore, t lies between 4h and 6h.

43. (2)
$\frac{N_0}{4} = \frac{N_0}{2n} \Rightarrow n = 2$
Thus, 10 days = 2 half-lives
$\therefore$ half-life = 8 days

44. (4)
α – decay decreases mass number by 4 and reduces charge number by 2. β -decay keeps mass number unchanged and increases charge by 1. Clearly option (4) is the right choice.

45. (1)
In n-type semiconductor, free electrons are the majority charge carries

46. (1)
Phosphorus is pentavalent.

47. (1)
The current is due to the flow of minority charge carriers.

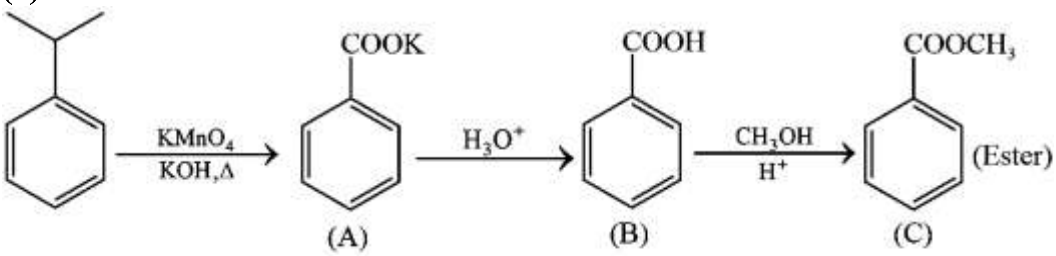
48. (2)
When reverse bias is increased, the electric field at the junction also increases. At some stage electric field breaks the covalent bond, thus the large number of charge carries are generated. This is called zener breakdown.

49. (2)
Because p-side is more negative as compared to n-side.

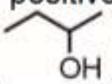
50. (2)
Due to the large concentration of electrons in n- side and holes in p-side, they diffuse from their own side to other side. Hence, depletion region produces.

51. (3)
• –I effect of – NO_2 > –F
• Correct order of acidic strength
$NO_2CH_2COOH > FCH_2COOH > HCOOH$

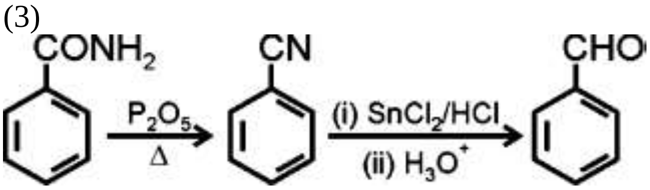
52. (4)



53. (2)

- Compounds having $CH_3-\overset{\overset{\large O}{\|}}{C}-$ group or $CH_3-\overset{\overset{\large OH}{|}}{C}H-$ group will be oxidised to iodoform by I_2/NaOH
- Benzaldehyde will not give positive iodoform test but sec-butyl alcohol () will give positive iodoform test.

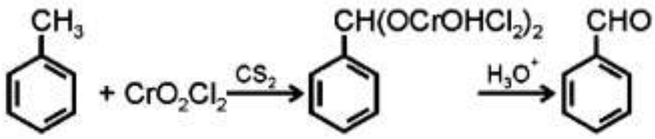
54. (3)



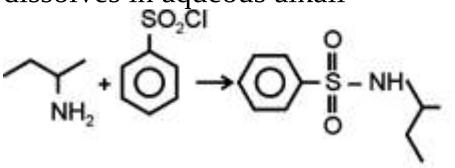
55. (4)
Aliphatic aldehyde reacts at fastest rate with HCN because of more electrophilicity of carbonyl carbon and less steric hindrance of the intermediate formed during reaction.

56. (1)
Aromatic aldehyde does not react with Fehling's solution.

57. (2)
Etard reaction

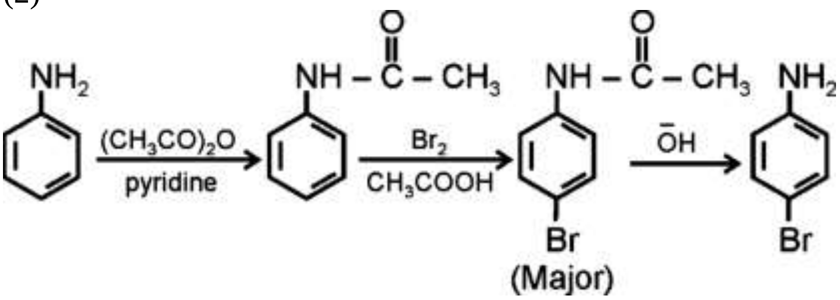


58. (1)
Primary amine on reaction with benzenesulphoxyl chloride form sulphonamide derivative which dissolves in aqueous alkali

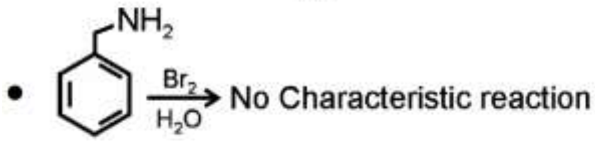


(soluble in alkali)

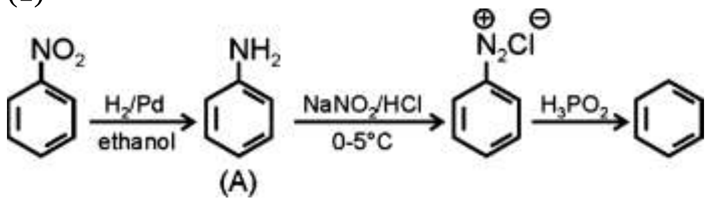
59. (2)



60. (2)



61. (1)

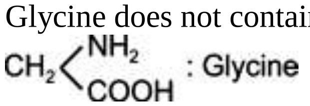


62. (1)
Sucrose is a non-reducing sugar.

63. (2)
Maltose is composed of two α-D-glucose units.

64. (3)
Glucose does not form hydrogensulphite addition product with $NaHSO_3$.

65. (3)
Glycine does not contain any chiral centre.

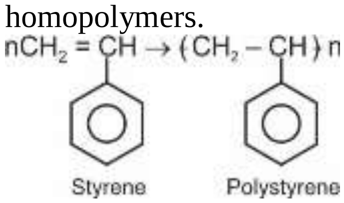


66. (2)
Vitamin B_{12} deficiency causes pernicious anaemia.

67. (4)
Nucleotides are joined together by phosphodiester linkage between 5′ and 3′ carbon atoms of pentose sugar.

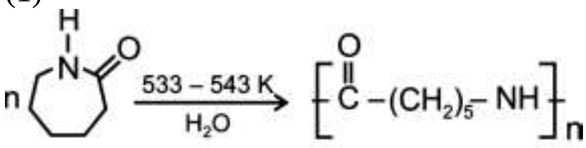
68. (1)
Abnormally low level of thyroxine leads to hypothyroidism.

69. (2)
The addition polymers formed by the polymerisation of a single monomeric species are known as homopolymers.



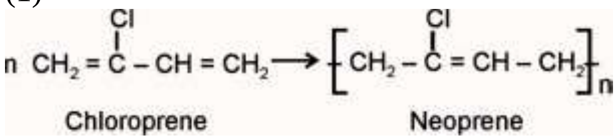
70. (1)
Novolac is used in manufacture of paints.

71. (1)



Caprolactam Nylon 6

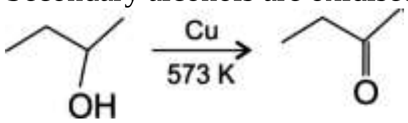
72. (1)



73. (2)
LDP has highly branched structure.

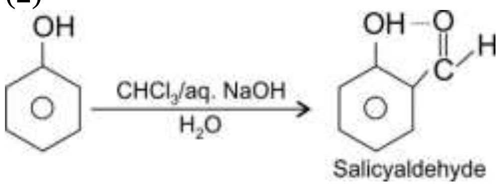
74. (1)
Nylon 2-nylon 6 is biodegradable polymer.

75. (2)
Secondary alcohols are oxidised to ketones by Cu at 573 K



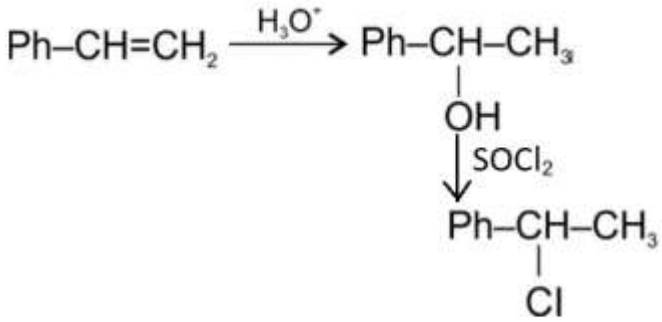
76. (4)
Tertiary alcohol $[(CH_3)_3C–OH]$ is the most reactive towards Lucas reagent due to formation most stable intermediate

77. (2)

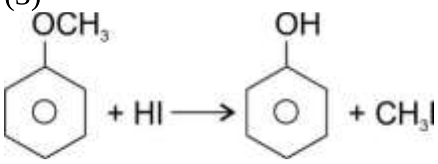


78. (4)
More the number of electron withdrawing groups at ortho and para positions in haloarene, more will be the reactivity towards nucleophilic substitution reaction

79. (3)



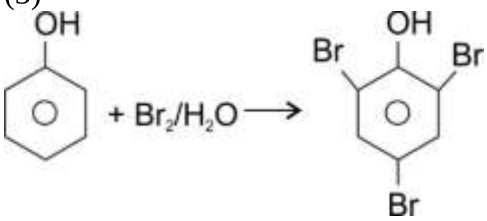
80. (3)



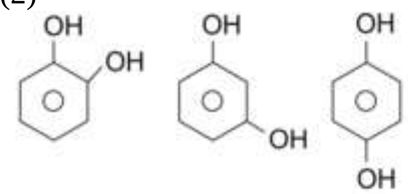
81. (2)

Electron withdrawing group increases the acidic strength of phenol

82. (3)



83. (2)

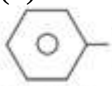


Catechol Resorcinol Hydroquinone

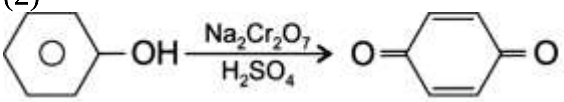
84. (3)

$$C_6H_{12}O_6 \xrightarrow{\text{Zymase}} 2C_2H_5OH + 2CO_2$$

85. (3)


—CH_2–Br is used in Williamson synthesis reaction

86. (2)



Phenol p-Benzoquinone

87. (4)

Foam contains gas as dispersed phase while liquid as dispersion medium.

88. (1)

Sulphur sol consists of particles containing a thousand or more sulphur molecules.

89. (4)

Bredig’s Arc method involves dispersion as well as condensation steps to from the sols of metals.

90. (2)

Dialysis on applying an electric field can be made faster, which is named by electrodialysis.

91. (4)

	$AgNO_3$ +	KI $\longrightarrow$	$AgI\downarrow$ + KNO_3
(m mol)i	15	10	
(m mol)f	5	0	10

$\Rightarrow$ Resulting sol will be positive.

92. (3)
• Hydrated aluminium oxide sol is positive which is easily coagulated by $[Fe(CN)_6]^{4-}$
• Highest coagulating power, less coagulating value.

93. (4)
In calcination, hydrated ores are converted into oxides.

94. (2)
Actinium (Ac) shows only +3 oxidation state.

95. (3)
Gallium is refined by zone refining.

96. (1)
$$4Au(s) + 8CN^-(aq) + 2H_2O(aq) + O_2(g) \longrightarrow 4[Au(CN)_2]^-(aq) + 4OH^-(aq)$$

97. (3)
Scandium (Sc) has least density among all the elements of 3*d* series.

98. (4)
Cobalt has veryhigh positive value of $E^o_{M^{3+}/M^{2+}}$ among 3*d* series elements.

99. (4)
$E^o_{Cu^{2+}/Cu}$ is positive hence copper cannot reduce $H^{\oplus}$ in aqueous medium.

100. (2)
The stability of $Cu^{2+}(aq)$ rather than $Cu^+(aq)$ is due to the much more negative hydration enthalpy of $Cu^{2+}(aq)$ than $Cu^+(aq)$

101. [NCERT-220]

102. [NCERT-220]

103. NCERT – 220

104. [NCERT-222]

105.

106. NCERT - 221

107. NCERT - 232

108. NCERT – 235

109. NCERT - 236

110. NCERT - 234

111. NCERT - 232

112. NCERT – 248

113. NCERT - 248

114. NCERT – 245

115. Solution - Humus is a black amorphous substance produced by the decomposition of dead and decaying organic matter by microorganisms.

116. Solution - Immobilization is the conversion of inorganic compounds to organic compounds by microorganisms or plants, by which it is prevented from being accessible to plants. Immobilization is the opposite of mineralization. Plants utilize minerals in inorganic form. Hence, immobilization helps in nutrient conservation.

117. NCERT – 253

118.

119. NCERT – 267

120. NCERT – 282

121. NCERT – 276

122. NCERT - 279

123. NCERT – 281

124. NCERT – 276

125.

126. Solution – Montreal protocol – ozone depletion ; Basel convention – hazardous waste ; Ramsar convention – wetlands protection

127. Solution - **Critically Endangered** (CR): A species facing an *extremely* high risk of extinction in the wild.
Endangered (EN): A species considered to be facing a *very high* risk of extinction in the wild.
Vulnerable (VU): A species considered to be facing a *high* risk of extinction in the wild.

128. T3 Human
↑
T2 cow (milk)
↑
T1 Grass

129.

130. Solution -
No Tobacco Day – 31 May
World Environment Day – 5 June
World Health Day – 7 April

131. Solution - **Biochemical oxygen demand** (**BOD**) is the amount of dissolved oxygen (DO) needed (i.e. demanded) by aerobic biological organisms to break down organic material present in a given water sample at a certain temperature over a specific time period.
NCERT – 275

132.

133.

134.

135.

136. Solution – ex situ conservation is off site conservation
NCERT – 267

137. Solution - Excess fluoride in drinking water causes teeth mottling.
Excess cadmium in drinking water may cause Itai-Itai disease.
Methyl mercury in water may cause Minamata disease.

138. NCERT – 177

139.

140. NCERT – 173

141. NCERT – 173

142. NCERT – 174

143. NCERT – 176

144. NCERT –176

145. NCERT – 173

146. NCERT – 176
Solution - Biofortification is (**the process of improving the nutritional quality of food crops**).

147. NCERT – 171

148. NCERT – 177

149. NCERT – 173

150. NCERT – 172

151. XII NCERT pg 134

152. XII NCERT pg 200

153. XII NCERT pg 152

154. XII NCERT pg 211

155. XII NCERT pg 132

156. Solution: Contact inhibition is a process of arresting cell growth when cells come in contact with each other. Contact inhibition is a powerful anticancer mechanism that is lost in cancer cells.

157. XII NCERT pg 212

158. XII NCERT pg 195

159. XII NCERT pg 158.Heroin- brown sugar.Ganja and charas are cannabinoids.

160. XII NCERT pg 127. Louis Pasteur proposed theory of Biogenesis and had disapproved theory of Abiogenesis.

161. XII NCERT pg 151

162. XII NCERT pg 199. All cloning vectors should have-ori site, high gene copy number, cloning sites, restriction sites.

163. Outbreeding is useful in the problem of inbreeding depression. Inbreeding is useful in producing purelines of animals, exposes harmful recessive genes that are eliminated by selection and helps in accumulation of superior genes.

164. Solution: A mule is produced by the interspecific hybridisation between male donkey and a female horse (mare). In interspecific hybridisation, male and female animals of two different related species are mated.

165. XII NCERT pg 133

166. *Bacillusthuringiensis* is a source of Cry- proteins. *Thermusaquaticus* is a source of thermostable DNA polymerase (*Taq polymerase*) used in PCR. Agrobacterium tumefaciens is a cloning vector. The construction of 1st recombinant DNA molecule was performed using native plasmid of *Salmonella typhimurium.*

167. XII NCERT pg 199

168. XII NCERT pg 208

169. Asthma (an allergic condition) is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles. It can be due to increasing air born allergens and pollutants. Many people in urban areas are suffering from this respiratory disorder.

170. XII NCERT pg 131

171. XII NCERT pg 195

172. During the isolation of desired gene, chilled ethanol is used for the precipitation of DNA. Ethanol is used in DNA extraction to force the DNA to precipitate in a solution. In order to collect a DNA sample, cells are broken down through agitation, and then mixed with water, salt and ethanol to create an aqueous solution. Ethanol along with salt work to prevent the DNA from dissolving into the water, instead causing it to precipitate out so it can be separated and extracted using a centrifuge.

173. XII NCERT pg 208

174. XII NCERT pg 138

175. RNAi (RNA interference) is triggered by double stranded RNA in a wide variety of organisms including animals, plants and fungi. It involves silencing of a specific mRNA and therefore the expression of a gene by formation of a dsRNA molecule. The dsRNA is formed by binding of a complementary RNA (anti-sense RNA) molecule to original mRNA thereby preventing translation of the original mRNA.

176. XII NCERT pg 201

177. XII NCERT pg 133

178. XII, NCERT Chapt. 8, Page – 159.Hallucinogenic chemicals obtained from leaves, resins and inflorescence of plant *Cannabis sativa* are called as cannabinoids. Opioids are depressants and hence non-hallucinogenic.

179. XII, NCERT Chapt. 16, Page – 204, 2ndpara, Fig. 11.7

180. XII NCERT pg131

181. XII, NCERT, Page 149. Secretions from sebaceous glands and sweat glands give the skin a slightly acidic pH

182. XII, NCERT, Page 149

183. XII NCERT pg 136

184. XII NCERT pg 160

185. Solution: NCERT XII page-168 last para.

186. XII NCERT pg 129. Embryological evidence

187. XII NCERT pg 209. Reverse transcriptase forms DNA from RNA

188. XII NCERT pg 148

189. Herbicide-tolerant plants are plants whose growth and development are not significantly affected by herbicides used on the weeds These types of plants were developed to help growing around them. farmers control weeds without the use of manual labour that competes with crops for soil, space, water, and sunlight.

190. XII, NCERT Chapt. 16, Page – 204, 2ndpara, Fig. 11.7

191. XII NCERT pg 141

192. Datura- hallucinogen. Barbiturates- synthetic sleeping pills

193. XII NCERT pg 200

194. XII, NCERT Page – 208, 2nd last para

195. XII NCERT pg 168

196. XII NCERT pg 158

197. XII NCERT pg 127

198. XII NCERT pg 153. Auto immune disorder

199. XII NCERT pg 213. Chorionic gonadotropin shall stimulate gonads to produce sex hormones and hence treat infertility.

200. Solution: aquaculture is the process of breeding, rearing and harvesting of aquatic flora and fauna with commercial value in saltwater or freshwater while pisciculture is the culturing of fish (fish farming) to obtain fish and fish products as food.