CLASSROOM CONTACT PROGRAMME
(Academic Session : 2023 - 2024)

LEADER & ACHIEVER COURSE

PHASE : MLA, MLB, MLC, MLQ, MLR, MLS, MLT, MLU, MLV, MAZA, MAZB, MAZC, MAZD, MAZE, MAZF, MAZP, MAZQ & MAZR

TARGET : PRE-MEDICAL 2024

Test Type : **MAJOR** Test Pattern : **NEET (UG)**

TEST DATE : 09-03-2024

ANSWER KEY

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

HINT – SHEET

SUBJECT : BOTANY

SECTION-A

1. **Ans (3)**
NCERT XI Page # 223

2. **Ans (2)**
NCERT XI Page # 218, 220, 211

3. **Ans (2)**
NCERT XI Page # 206

4. **Ans (2)**
NCERT XI Page # 210

5. **Ans (3)**
NCERT XI Pg # 208, Para 5th

6. **Ans (4)**
NCERT XI Pg # 209, Para 3rd

7. **Ans (1)**
NCERT XI Pg # 211, Para 1st

8. **Ans (1)**
NCERT XI Page # 217

9. **Ans (2)**
NCERT-XI, Pg. # 218

10. **Ans (3)**
NCERT XI Page # 222

11. **Ans (3)**
NCERT-XI Page # 222

12. **Ans (4)**
NCERT-XI Page # 222

13. **Ans (4)**
NCERT-XI, Pg.# 216

14. **Ans (3)**
NCERT-XI Page # 220

15. **Ans (1)**
NCERT XI Pg#220

16. **Ans (3)**
NCERT XI, Page No. 211,213,215

17. **Ans (1)**
Module No. 3 Page. No.126

18. **Ans (1)**
NCERT XI Pg.No.235

19. **Ans (4)**
NCERT XI Pg.No.235

20. **Ans (1)**
NCERT XI Pg.No.234

21. **Ans (1)**
NCERT XI Pg.No.228

22. **Ans (4)**
NCERT-XI Pg. No. # 231

23. **Ans (1)**
NCERT XI, Pg. # 234, 235

24. **Ans (1)**
NCERT-XI Pg. # 231,232

26. **Ans (1)**
NCERT XI Page No. 234

27. **Ans (3)**
NCERT-XI Pg.#249, Para-II

28. **Ans (4)**
NCERT-XI Pg.#250, Para-I

29. **Ans (4)**
NCERT-XI Pg.#246, Para-I

30. **Ans (3)**
NCERT-XI Pg.#247, Para-IV

31. **Ans (1)**
NCERT-XI Page No # 240

32. **Ans (1)**
NCERT-XI Page No # 239

33. **Ans (4)**
XI NCERT Pg # 249
Sprying of gibberellin extends the market period of fruits because Gibberellin causes delay in senescence of fruits.

SECTION-B

36. **Ans (4)**
NCERT XI Page # 207, 208

37. **Ans (3)**
NCERT XI Page # 223

38. **Ans (1)**
NCERT-XI, Pg # 214,217,219

39. **Ans (2)**
NCERT-XI Page # 223

40. **Ans (2)**
NCERT-XI Page # 218

41. **Ans (1)**
NCERT XI, Page No. 206, 208

42. **Ans (2)**
NCERT-XI, Pg. # 222

43. **Ans (1)**
NCERT XI Pg.No.230

44. **Ans (1)**
NCERT XI Pg.No.231

45. **Ans (3)**
NCERT-XI, Pg. # 232, 233

46. **Ans (2)**
NCERT XI, Page No. - 232,233

47. **Ans (3)**
NCERT-XI, Pg.#250, Para-III, IV

48. **Ans (3)**
NCERT-XI Page No # 239

49. **Ans (3)**
NCERT-XI, Pg. # 248

50. Ans (1)

NCERT XI Page-No. 248, 249

Given assertion and reason are correct but both are not related to each other.

SUBJECT : ZOOLOGY

SECTION-A

59. Ans (2)

NCERT Pg # 316, 22.2

61. Ans (2)

NCERT (XI) Pg. # 338 para(22.4)

63. Ans (2)

NCERT Page # 332, 336

64. Ans (2)

NCERT XI Page No. 337

65. Ans (3)

NCERT, Pg. # 332

72. Ans (2)

NCERT XI Pg # 337, para-22.2.10

75. Ans (2)

NCERT Pg. # 337

84. Ans (1)

NCERT Page No. # 105

SECTION-B

86. Ans (4)

NCERT Pg. # 317, 319

87. Ans (1)

NCERT Pg#321

91. Ans (4)

NCERT Pg .# 337

95. Ans (3)

NCERT Page # 386

97. Ans (3)

NCERT XI (E)Pg.# 303, para 4

NCERT XI (H)Pg.# 303, para 4

SUBJECT : CHEMISTRY

SECTION-A

105. Ans (2)

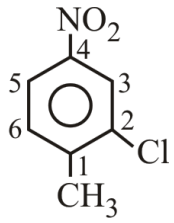
Molecular mass of AgCl = 108 + 35.5 = 143.5 g mol^{-1}

$$\% \text{ of chlorine} = \frac{35.5 \times 0.5740 \times 100}{143.5 \times 0.3780}$$

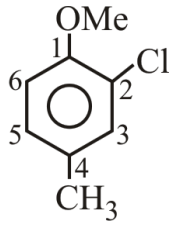
$$\% \text{ of chlorine} = \frac{\text{Atomic mass of Cl} \times \text{mass of AgCl}}{\text{Molecular mass of AgCl} \times \text{wt of compound}}$$

107. Ans (4)

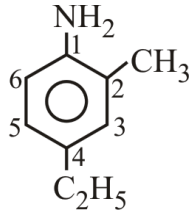
NCERT XI, Part-II, (2023-24) Pg. # 269

(1) 

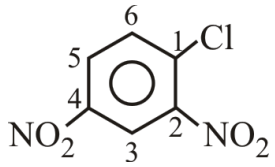
2-Chloro-4-methyl-4-nitro benzene

(2) 

2-chloro-4-methyl anisole

(3) 

4-ethyl-2-methyl aniline

(4) 

1-chloro-2,4-dinitrobenzene

Option 4 given IUPAC name is incorrect

108. Ans (4)

NCERT XI, Part-II, (2023-24) Pg. # 257

109. Ans (4)

NCERT XI Part-II, (2023-24) Pg. # 262

110. Ans (2)

NCERT XI Part-II, (2023-24) Pg. # 270

$\overset{3}{CH_3}-\overset{2}{CH_2}-\overset{1}{CH_2}-OH$ and $\overset{1}{CH_3}-\overset{2}{CH}(OH)-\overset{3}{CH_3}$

(Propan-1-ol) (Propan-2-ol)

Both having same P.C.C but having different position of −OH. So these are positional isomers

∴ Ans. is 2

111. Ans (4)

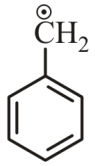
NCERT XI Part II, (2023-24) Pg. # 271

Methoxy propane ($CH_3OC_3H_7$) and ethoxyethane ($C_2H_5OC_2H_5$) both having same molecular formula and functional group but having different attachment of alkyl part so these are metamers.

112. Ans (2)

NCERT XI Part-II, (2023-24) Pg. # 277

Stability of free radical = Resonance > Hyper conjugation

Stability :  > $CH_3-\overset{\odot}{C}H-CH_3$ >

Resonance (II) α–C–H = 6 (I)

$\overset{\odot}{C}H_2-CH_3$ > $\overset{\odot}{C}H_2-CH-(CH_3)_2$

α–C–H = 3 (IV) α–C–H = 1 (III)

113. Ans (2)

NCERT XI Part - II, (2023-24) Pg. # 276

114. Ans (2)

NCERT XI Part - II, (2023-24) Pg. # 272

115. Ans (4)

NCERT XI Part-II, (2023-24) Pg. # 309

116. Ans (3)

NCERT XII Part-II, (2023-24) Pg. # 250

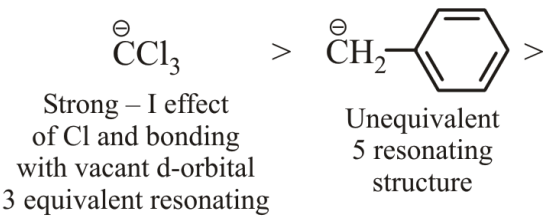
Carboxylic acid is more acidic than phenol because the conjugated base of carboxylic acid a carboxylate ion is stabilised by two equivalent resonance structures in which the negative charge is at the more electronegative oxygen atom. The conjugated base of phenol; a phenoxide ion has non-equivalent resonating structures in which the negative charge is at the less electronegative carbon atom. Therefore resonance in phenoxide ion is not as important as it is in carboxylate ion.

117. Ans (2)

NCERT XII Part - II, (2023-24) Pg. # 269

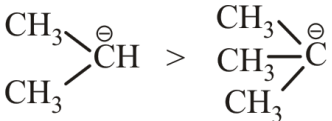
Lone pair of N are not taking part in conjugation where as in other options lone pairs are taking part in conjugation.

118. Ans (2)



Strong – I effect of Cl and bonding with vacant d-orbital 3 equivalent resonating structures

Unequivalent 5 resonating structure



+I effect of $2CH_3$ +I effect of $3CH_3$

119. Ans (2)

(1), (3) and (4) are aromatic in nature while (2) is antiaromatic in nature.

121. Ans (4)

In soda lime decarboxylation carbanion is intermediate.

122. Ans (1)

NCERT XI Part II, Pg. # 373

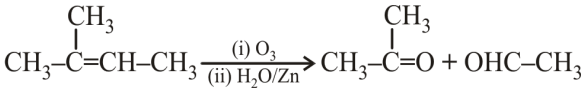
124. Ans (2)

NCERT XI Part II, Pg. # 379

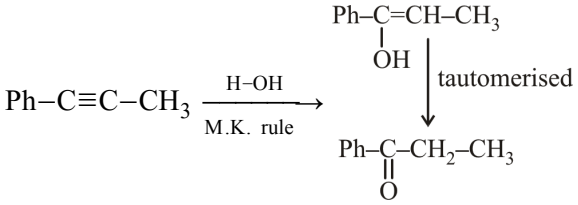
125. Ans (2)

Reaction takes place anti to Markovnikoff rule.

127. Ans (1)



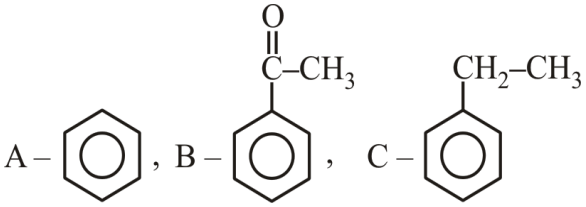
128. Ans (1)



129. Ans (3)

X is CH≡ CH, Y is = 

133. Ans (4)



SECTION-B

139. Ans (1)

$$\% \text{ of } N = \frac{1.4 \times M \times 2(V - V_1/2)}{m}$$

$$= \frac{1.4 \times 0.5 \times 2(50 - 60/2)}{0.5}$$

$$= 1.4 \times 40 = 56.0$$

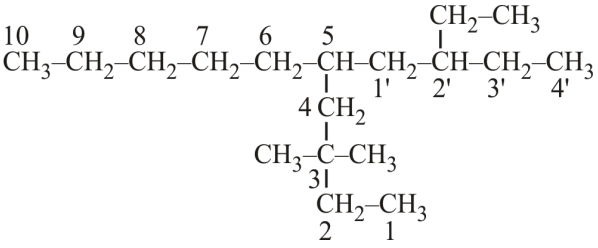
M = molarity of H_2SO_4, V = Volume of H_2SO_4

m = weight of sample of molarity M

V_1 = Volume of NaOH of molarity M

140. Ans (3)

NCERT XI, Part-II, (2023-24) Pg. # 265



5-(2-Ethyl butyl)-3,3-dimethyldecane

141. Ans (3)

NCERT XI Part-II, (2023-24) Pg. # 257

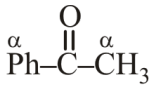
142. Ans (3)

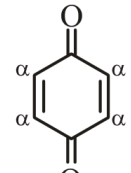
NCERT XI Part -II, (2023-24) Pg. # 275

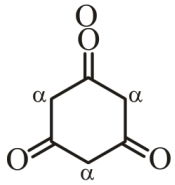
143. Ans (1)

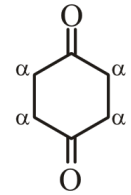
NCERT XI Part-II, (2023-24) Pg. # 306

144. Ans (1)

(A)  α–C–H = 3

(B)  α–C–H = 0

(C)  α–C–H = 6

(D)  α–C–H = 8

146. Ans (4)

Fact

147. Ans (2)

NCERT XI Part - II, Pg. # 273

148. Ans (1)

For halogen rate is : Iodine > bromine > chlorine

while for alkyl group.

tert > see > primary

149. Ans (3)

Trans-but-2-ene will be major product.

SUBJECT : PHYSICS

SECTION-A

151. Ans (2)

$$\eta = 1 - \frac{T_2}{T_1} \Rightarrow \frac{W}{3000\text{ kcal}} = 1 - \frac{300}{900}$$

$$\Rightarrow W = \frac{2}{3} \times 3000\text{ kcal} = 2000\text{ kcal}$$

$$= 2 \times 4.2 \times 10^6\text{ J}$$

$$= 8.4 \times 10^6\text{ J}$$

152. Ans (3)

Given, $\Delta Q = 4\Delta W$

But, $\Delta W + \Delta U = \Delta Q$

$\therefore \quad \Delta U = 3\Delta W$

$$\Rightarrow \Delta U = \frac{3}{4}\Delta Q$$

$$\Rightarrow nC_V\Delta T = \frac{3}{4}nC\Delta T$$

$$\text{or, } C = \frac{4}{3}C_V = \frac{4}{3}\left[\frac{3R}{2}\right] = 2R$$

153. Ans (2)

At P = const.

$$\frac{\Delta W_p}{\Delta Q_p} = 1 - \frac{1}{\gamma}$$

$$\left[f = 5, \gamma = 1 + \frac{2}{f} = 1 + \frac{2}{5} = \frac{7}{5}\right]$$

$$\frac{\Delta W}{140} = 1 - \frac{5}{7}$$

$$\frac{\Delta W}{140} = \frac{2}{7} \Rightarrow \Delta W = 40\text{ J}$$

154. Ans (2)

$VP^3 = \text{constant}$

$$V\left(\frac{nRT}{V}\right)^3 = \text{constant}$$

$T^3 \propto V^2$

$$\frac{T_1}{T_2} = \left(\frac{V_1}{V_2}\right)^{2/3} = \left(\frac{V}{27V}\right)^{2/3} = \frac{1}{9}$$

$T_2 = 9T_1 = 9T$

155. Ans (3)

Difference in Molar specific heats = R

$\therefore \quad 28C_p - 28C_v = R$

$$\Rightarrow \quad C_p - C_v = \frac{R}{28}$$

156. Ans (4)

$E \propto T$

$$\frac{E_1}{E_2} = \frac{T_1}{T_2}$$

$$\frac{5 \times 10^{-14}}{E} = \frac{250}{500}$$

$E = 10 \times 10^{-14}$ erg.

157. Ans (2)

$PV = NKT$

$$N_A = \frac{(2P)(2V)}{K(2T)}$$

$$N_B = \frac{PV}{KT}$$

$$\frac{N_A}{N_B} \Rightarrow \frac{2}{1}$$

158. Ans (3)

For isobaric process

$$\frac{V_2}{V_1} = \frac{T_2}{T_1} \Rightarrow V_2 = V \times \left(\frac{T+1}{T}\right)$$

$$\Rightarrow \frac{(T+1)V}{T} = V' \text{ (say } V' = V_2)$$

$$\text{change in volume } = V' - V = \frac{V}{T}$$

159. Ans (3)

$$PV = \frac{M}{M_w}RT$$

$$P \propto \frac{M}{M_w}$$

$$\frac{6}{9} = \frac{\frac{35}{28} \times 10^3}{\frac{35}{28} \times 10^3 + \frac{M}{32}}$$

$$2 \times \frac{35}{28} \times 10^3 + \frac{2M}{32} = 3 \times \frac{35}{28} \times 10^3$$

$$\frac{2M}{32} = \frac{35}{28} \times 10^3$$

$$M = 20 \times 10^3 gm$$

$$M = 20 \text{ kg}$$

160. Ans (1)

$$\text{Area} \propto T^4$$

$$\frac{A_1}{A_2} = \left(\frac{T_1}{T_2}\right)^4 = \left(\frac{327+273}{627+273}\right)^4 = \frac{16}{81}$$

$$\Rightarrow \frac{A_2}{A_1} = \frac{81}{16}$$

161. Ans (2)

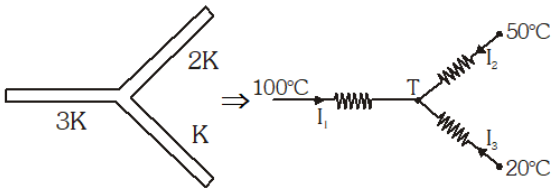
use $\frac{-dT}{dt} = K(T - T_0)$ (T = average temp.)

$$\frac{20}{2} = K[70 - 10] \Rightarrow K = \frac{1}{6}$$

$$\frac{20}{t} = K[50 - 10] \Rightarrow \frac{20}{t} = \frac{40}{6}$$

$$t = 3 \text{ min}$$

163. Ans (2)



$$3K(100 - T) + 2K(50 - T) + K(20 - T) = 0$$

$$T = \frac{420}{6}$$

$$T = 70°C$$

164. Ans (1)

Heat added = heat loss

$$m_0 \cdot c_0 \cdot (T - T_0) = m_a \cdot c_a (T_a - T)$$

$$0.1 \times 1800 (20 - 15) = m_a \times 2400(35 - 20)$$

$$m_a = 0.025 \text{ kg}$$

$$m_a = 25 \text{ gram}$$

165. Ans (3)

$$\gamma_r = \gamma_a + 3\alpha$$

$$7 \times 10^{-4} = \gamma_a + 3 \times 10^{-5}$$

$$\gamma_a = 67 \times 10^{-5} /°C$$

166. Ans (2)

$$\frac{P_t - P_0}{P_{100} - P_0} = \frac{T_c - 0}{100 - 0}$$

$$= \frac{80 - 75}{100 - 75} = \frac{T_c}{100}$$

$$\frac{5}{25} = \frac{T_c}{100}$$

$$T_c = 20°C$$

167. Ans (1)

Fahrenheit = 3x

Celsius = x

$$\frac{x}{100} = \frac{3x - 32}{180}$$

$$\frac{9x}{5} = 3x - 32$$

$$32 = 3x - \frac{9x}{5} = \frac{15x - 9x}{5}$$

$$\frac{6x}{5} = 32$$

$$= x = \frac{32 \times 5}{6} = 26.66^{o}C$$

168. Ans (1)

Since both individual SHM's have same frequency, the resulting motion of particle will be SHM. Here the path of particle is straight line.

169. Ans (3)

One third length is cut away

$$\therefore \text{ Remaining length, } \ell' = \ell - \frac{\ell}{3}$$

$$\Rightarrow \ell' = \frac{2\ell}{3}$$

$$K \propto \frac{1}{\ell}, \quad K' \propto \frac{1}{\ell'}$$

$$\therefore \frac{K'}{K} = \frac{\ell}{\ell'} = \frac{3\ell}{2\ell}$$

$$\Rightarrow \frac{K'}{K} = \frac{3}{2} \Rightarrow \left\{K' = \frac{3K}{2}\right\}$$

170. Ans (3)

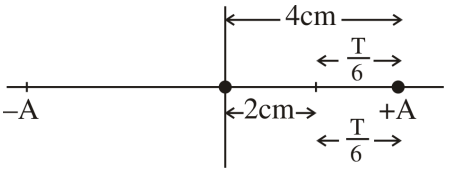
Given elastic energies are equal i.e.,

$$\frac{1}{2}k_1x_1^2 = \frac{1}{2}k_2x_2^2$$

$$\Rightarrow \frac{k_1}{k_2} = \left(\frac{x_2}{x_1}\right)^2 \text{ and using } F = kx$$

$$\Rightarrow \frac{F_1}{F_2} = \frac{k_1x_1}{k_2x_2} = \frac{k_1}{k_2} \times \sqrt{\frac{k_2}{k_1}} = \sqrt{\frac{k_1}{k_2}}$$

171. Ans (2)



$$\text{total time} = \frac{2T}{6} = \frac{T}{3} = \frac{1.2}{3} = 0.4 \text{ sec}$$

172. Ans (1)

$$v_{max} = A\omega$$

$$4.4 = 7 \times 10^{-3} \times \frac{2\pi}{T}$$

$$T = \frac{7 \times 2\pi \times 10^{-3}}{4.4} = \frac{7 \times 2}{4.4} \times \frac{22}{7} \times 10^{-3}$$

$$\boxed{T = 0.01 \text{ sec}}$$

173. Ans (1)

$$y = 10 \sin\left[6t + \frac{\pi}{3}\right]$$

at t = 0

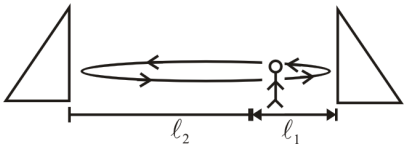
$$y = 10 \sin\left(\frac{\pi}{3}\right) = 5\sqrt{3} \text{ m}$$

$$v = \frac{dy}{dt} = 60 \cos\left[6t + \frac{\pi}{3}\right]$$

at t = 0

$$v = 60 \cos\left(\frac{\pi}{3}\right) = 30 \text{ m/s}$$

174. Ans (2)



Width of valley, $W = \ell_1 + \ell_2$

time taken to travel $2\ell_1$ is t_1

so $2\ell_1 = vt_1$

time taken to travel $2\ell_2$ is t_2

so $2\ell_2 = vt_2$

$$W = \ell_1 + \ell_2 = \frac{v(t_1 + t_2)}{2}$$

$$W = 330\left(\frac{1+2}{2}\right) = 495 \text{ m}$$

175. Ans (1)

$\frac{\lambda}{4} = \ell_1 + e$ & $\frac{3\lambda}{4} = \ell_2 + e$

$\Rightarrow \lambda = 2(\ell_2 - \ell_1)$

speed of sound = $n\lambda$

$= 512 \times 2 \times 34 \times 10^{-2} = 348$ m/s

176. Ans (2)

For P_1 in first overtone,

$\ell_1 = \frac{3\lambda}{4}$ ...(1)

For P_2 in third overtone,

$\ell_2 = 4.\frac{\lambda}{2}$ ...(2)

by (1) & (2)

$\frac{\ell_1}{\ell_2} = \frac{3}{8}$

177. Ans (3)

$\frac{I_1}{I_2} = \left(\frac{a_1 f_1}{a_2 f_2}\right)^2 = \left(\frac{4 \times 1}{1 \times 5}\right)^2 = \frac{16}{25}$

178. Ans (2)

$v = \sqrt{\frac{P}{\rho}}$

$\frac{v_1}{v_2} = \sqrt{\frac{\rho_2}{\rho_1}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$

179. Ans (4)

$v_{t°C} = 332 + 0.61\ t°$

$= 332 + 0.61 \times 1$

$v_{1°C} = 332.61$ m/s

So velocity of sound increases by 0.61 m/s

180. Ans (2)

Velocity of wave,

$v = \sqrt{\frac{\text{stress}}{\text{density}}} = \sqrt{\frac{3.2 \times 10^8}{8 \times 10^3}}$

$= \sqrt{0.4 \times 10^5} = \sqrt{4 \times 10^4} = 200$ m/s

$\therefore$ fundamental frequency $= \frac{v}{2L} = \frac{200}{2 \times 1.25}$

$= 80$ Hz

181. Ans (2)

By Theory : Phase difference of 'π' occurs when wave in string is reflected from rigid end.

182. Ans (2)

$d = d_1 - d_2 = 15 - 10 = 5$ m

$t = \frac{d}{v} = \frac{5}{30} = \frac{1}{6}$ s

183. Ans (3)

$f_A = \frac{1}{2\ell}\sqrt{\frac{T}{\mu}} = \frac{1}{2\ell}\sqrt{\frac{T}{\rho A}} = \frac{1}{2\ell}\sqrt{\frac{T}{\rho\pi r^2}}$

$f_B = \frac{P}{2(2\ell)}\sqrt{\frac{(2T)}{(2\rho)\,\pi\,(2r)^2}} = \frac{P}{4} f_A$

If $f_B = f_A \Rightarrow P = 4$

4^{th} harmonic means 3^{rd} overtone.

184. Ans (2)

$V_{max} = 4V$

$2\pi f\, y_0 = 4f\lambda$ or $\lambda = \frac{\pi y_0}{2}$

185. Ans (2)

Net torque = 0

$12 \times \ell = m\left(\frac{\ell}{2}\right) + 3\left(\frac{3\ell}{2}\right)$

$\boxed{m = 15 \text{ kg}}$

SECTION-B

186. Ans (1)

$\Rightarrow$ Process AB is isobaric expansion so 1, 2, 4 may be correct, option 3 is wrong

$\Rightarrow$ Process BC is isothermal expansion, pressure decrease so option 1, 2, 4 may be correct

$\Rightarrow$ Process CD is isochoric process, pressure is decreasing ($P \propto T$) so only option (1) is correct.

187. Ans (4)

$PV^m = \text{constant}$

$\Rightarrow V^m dP + mPV^{m-1}dV = 0$

$\Rightarrow \frac{dP}{dV} = -m.\frac{P}{V}$

$\Rightarrow \tan(180 - 37)^o = -m\frac{P}{V}$

$\Rightarrow -\frac{3}{4} = -m \times \frac{2 \times 10^5}{4 \times 10^5}$

$\Rightarrow m = \frac{3}{2}$

188. Ans (4)

$$W_{IT} = 2.303\ \mu RT \log_{10}\left(\frac{V_2}{V_1}\right)$$

$$W_{IT} = 2.303 \times 1 \times 8.31 \times 273 \log_{10}\left(\frac{11.2}{22.4}\right)$$

$$W_{IT} = -2.303 \times 1 \times 8.31 \times 273 \times 0.3010$$

$$W_{IT} = -1572.6 \text{ joule} \approx -1572 \text{ J}$$

189. Ans (3)

$$\frac{n_1 + n_2}{\gamma_m - 1} = \frac{n_1}{\gamma_1 - 1} + \frac{n_2}{\gamma_2 - 1}$$

$$\frac{2}{\gamma_m - 1} = \frac{1}{\frac{7}{5} - 1} + \frac{1}{\frac{4}{3} - 1}$$

$$\frac{2}{\gamma_{m-1}} = \frac{5}{2} + 3$$

$$= \frac{2}{\gamma_{m-1}} = \frac{11}{2}$$

$$\gamma_m - 1 = \frac{4}{11}$$

$$\gamma_m = 1 + \frac{4}{11} = \frac{15}{11}$$

OR

$$f_1 = \frac{2}{\gamma - 1} = \frac{2}{\frac{7}{5} - 1} = \frac{2}{7 - 5} \times 5 = 5$$

$$f_2 = \frac{2}{\frac{4}{3} - 1} = 6$$

$$C_{V_1} = \frac{5}{2}R,\ C_{V_2} = \frac{6}{2}R$$

$$(C_V)_{Mix} = \frac{\mu_1 Cv_1 + \mu_2 Cv_2}{\mu_1 + \mu_2}$$

$$= \frac{1 \times \frac{5}{2}R + 1 \times \frac{6}{2}R}{2} = \frac{11}{4}R$$

$$(C_P)_{Mix} = (C_v)_{Mix} + R$$

$$= \frac{11}{4}R + R = \frac{15R}{4}$$

$$(\gamma)_{mix} = \frac{(C_P)_{Mix}}{(C_v)_{Mix}} = \frac{15}{11}$$

191. Ans (2)

$$\frac{E_b}{E_{IBB}} = 0.8$$

$$E_b = 0.8E_{IBB}$$

$$E_b = 0.8 \times 200 = 160 \text{ watt/m}^2$$

$$\frac{Q}{At} = 160$$

$$Q = 160 \times 20 \times 60 = 192 \text{ kJ}$$

193. Ans (2)

From Stefen's law, $P' = \frac{Q'}{t} = e_r \sigma A (T')^4$ and

$P = \frac{Q}{t} = \sigma A T^4$, $e_r = 0.30°$ (given)

$$\frac{P'}{P} = \frac{0.30 \times (3T)^4}{T^4}$$

$$P' = \frac{30}{100} \times 81\,P = 24.3\,P$$

$$P' \simeq 24\,P$$

194. Ans (1)

$$T = 2\pi\sqrt{\frac{\ell}{g}}$$

$$T' = 2\pi\sqrt{\frac{1.21\ell}{g}} = 1.1\left(2\pi\sqrt{\frac{\ell}{g}}\right) = 1.1\ T$$

$\Rightarrow$ % increase in time period will be 10%

195. Ans (4)

Total energy of particle performing S.H.M.

$$= \frac{1}{2}m\omega^2a^2$$

Kinetic energy of particle performing S.H.M.

$$= \frac{1}{2}m\omega^2a^2\cos^2\left(\frac{2\pi}{T}\right)t$$

According to problem,

kinetic energy = 75% of total energy

$$\Rightarrow \frac{1}{2}m\omega^2a^2\cos^2\left(\frac{2\pi}{T}\right)t = \frac{3}{4}\left(\frac{1}{2}m\omega^2a^2\right)$$

$$\Rightarrow \cos^2\left(\frac{2\pi}{T}\right)t = \frac{3}{4} \Rightarrow \cos\left(\frac{2\pi}{T}\right)t = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \left(\frac{2\pi}{T}\right)t = \frac{\pi}{6} \Rightarrow t = \frac{T}{12}\text{sec}$$

In the problem T = 2 sec $\quad \therefore t = \frac{1}{6}\text{sec}.$

196. Ans (4)

$$x = \sin\left(\frac{2\pi}{8}t\right) = \sin\left(\frac{\pi}{4}t\right)$$

$$\alpha = -\omega^2 x = -\frac{\pi}{4} \times \frac{\pi}{4} \times \sin\left(\frac{\pi}{4} \times \frac{4}{3}\right)$$

$$= -\frac{\pi^2}{16} \times \frac{\sqrt{3}}{2} = \frac{-\sqrt{3}\pi^2}{32} \text{ cm/s}^2$$

197. Ans (3)

When pendulum oscillates in air, it will loose energy continuously in overcoming resistance due to air. Therefore amplitude decreases continuously with time.

198. Ans (4)

ME = 36 J

$U_{min} = 20$ J, $F = -\frac{dU}{dx} = -2(x-4)$

Mean position = 4m, k = 2 N/m,

$KE_{max} = 36 - 20 = 16$ J

$\Rightarrow \frac{1}{2}kA^2 = 16 \Rightarrow A = 4$ m

At x = 2 m, $KE = \frac{1}{2}k(A^2 - x^2) = 12$ J

199. Ans (1)

Guitar-string frequnecy $\longrightarrow$ n Hz (say)

First tunning fork frequency $\longrightarrow$ 440 Hz

Beat frequency = 5Hz

So, frequency of guitar-string

may be (440 + 5) Hz or (440 – 5) Hz

Second tuning fork (frequency 437 Hz) provides

8 Hz beat frequency with guitar-string.

Therefore, frequency of guitar string,

n = 440 + 5 = 445 Hz

200. Ans (2)

For A :

$y = A\sin(\omega t)$

For B :

$y = A\sin\left(\omega t + \frac{\pi}{2}\right)$

For C :

$y = A\sin\left(\omega t - \frac{\pi}{2}\right)$