ANSWER KEY FOR MOCK TEST- 47 (FOR 2020 ASPIRANTS) (25th Aug 2020)

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

(1) distance during n^{th} second

$$S_n = u + \frac{a}{2}(2n-1)$$

$$20 = u + \frac{a}{2}(15) \quad \text{---(1)}$$

$$22 = u + \frac{a}{2}(17) \quad \text{---(2)}$$

$$u = 5, \quad a = 2$$

(2) $$\frac{S_n}{5} = \frac{n}{25}$$

$$\Rightarrow \frac{\frac{g}{2}(10-1)}{\frac{1}{2}g(5)^2} = \frac{n}{25} \Rightarrow n = 9$$

(3) A & B will strike with same speed $\sqrt{v^2+2gh}$

C will strike with $-\sqrt{2gh}\,\hat{j} + v\,\hat{i}$

So speed will be same for all three.

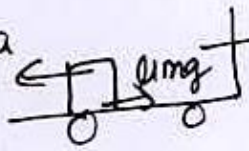
④ equation of line

$$y = 2x - 2$$

$$a = 2t - 2$$

$$v = \int a\,dt$$

$$= t^2 - 2t$$

⑤ 

$$\text{acc}^n \text{ of block} = \frac{ma - \mu mg}{m}$$

$$= a - \mu g$$

$$= 2 - 1.5 = 0.5\ m/s^2$$

time taken by block to fall t.

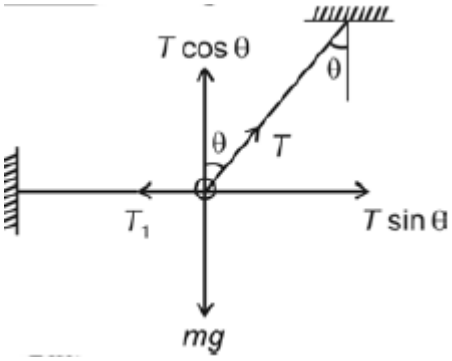
$$s = \frac{1}{2}(0.5)t^2 \quad \text{——— (1)}$$

distance travelled by trick in this time -

$$\Rightarrow s = \frac{1}{2}(2)t^2 = 20m$$

6. **Correct option is (1)**

Solution:



Before cutting,

$T\cos\theta = mg$

$$\Rightarrow \quad T = \frac{mg}{\cos\theta}$$

And just after cutting, ball moves freely on circular path.

hence $T = mg\cos\theta$ $\quad \{As\ v = 0\}$

7. **Correct option is (2)**

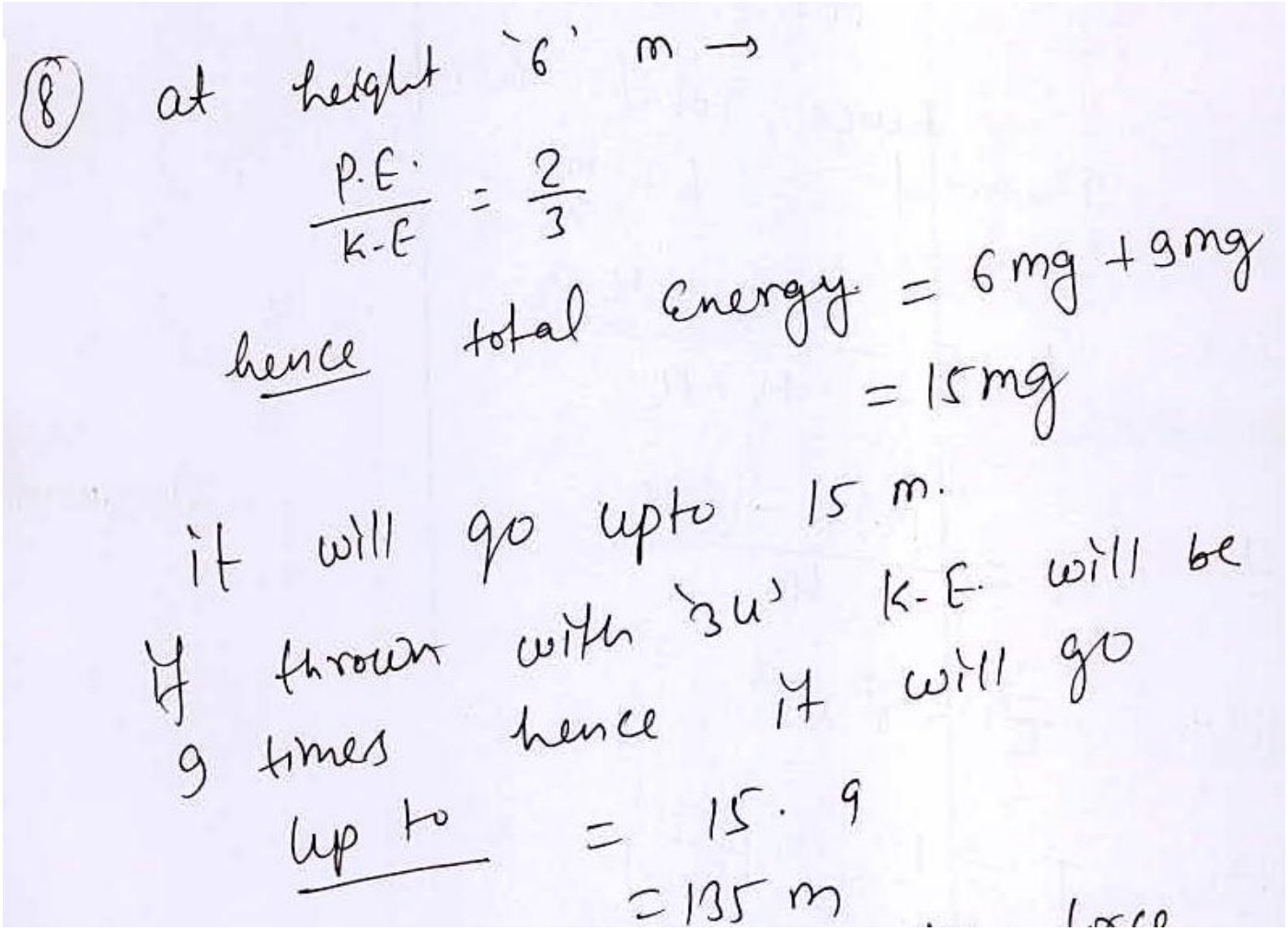
Solution:

$$KE_{loss} = \frac{1}{2}\frac{m_1 m_2}{m_1 + m_2}(u_1 - u_2)^2$$

$$= \frac{1}{2}\frac{(80)(20)}{100}(4-2)^2$$

$$= \frac{1}{2}(16)(4)$$

$$= 32\ J$$



9. **Solution**:

Statement A:

$$W_{tot} = KE_f - KE_i$$

$$FS = \frac{p_f^2}{2m} - \frac{p_i^2}{2m}$$

$$(-F)S = 0 - \frac{p_i^2}{2m}$$

$$FS = \frac{p_i^2}{2m}$$

$$S \propto \frac{1}{m}$$

As mass of the car is less, so its stopping distance is more.

Statement B:

$$W_{tot} = KE_f - KE_i$$

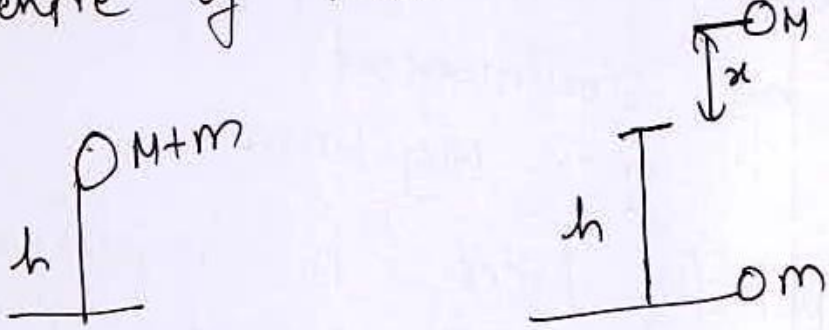
$$(-F)S = 0 - \frac{1}{2}mu^2$$

$$FS = \frac{1}{2}mu^2$$

$$S \propto m$$

As mass of the car is less, its stopping distance is less.

(10) Centre of mass won't move.



$Mx = mh \Rightarrow x = \frac{mh}{M}$

distance covered = total height from ground $= h + \frac{mh}{M} = h\left(1+\frac{m}{M}\right)$

(11) $a_{cm} = \frac{M_1 a_1 + M_2 a_2}{M_1 + M_2}$, $a_1 = a_2 = g$

12. **Correct option is (3)**

Solution:

$$(v_x)_{cm} = 0$$

$$-MV_f + m(v_0 \cos\theta - v_f) = 0$$

$$v_f = \frac{mv_0 \cos\theta}{(M+m)}$$

13. **Solution**:

$\vec{r}_1 = 2\mathbf{i} + 4\mathbf{j} + 7\mathbf{j}$

$\vec{r}_2 = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$

$\vec{r} = \vec{r}_1 - \vec{r}_2 = (2\mathbf{i} + 4\mathbf{j} + 7\mathbf{j}) - (\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}) = \mathbf{i} + 2\mathbf{j} + 4\mathbf{k}$

$\vec{\tau} = \vec{r} \times \vec{F}$

$$= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 1 & 2 & 4 \\ 2 & 3 & -5 \end{vmatrix} = \mathbf{i}(-22) - \mathbf{j}(-13) + \mathbf{k}(3-4) = -22\mathbf{i} + 13\mathbf{j} - \mathbf{k}$$

(14) $I = \frac{1}{2}\cdot\left[2\cdot\frac{M\ell^2}{12}\right]$

15. **Solution**:

$$\frac{T_{max}}{T_{min}} = \frac{\frac{mv_{max}^2}{R} + mg}{\frac{mv_{min}^2}{R} - mg}$$

$$\frac{1}{2}mv_{max}^2 = \frac{1}{2}mv_{min}^2 + 2mgR$$

$$\frac{\frac{1}{2}mv_{max}^2}{\frac{1}{2}mv_{min}^2} = 1 + \frac{2mgR}{\frac{1}{2}mv_{min}^2}$$

$$\frac{3}{1} = 1 + \frac{4gR}{v_{min}^2} \Rightarrow v_{min}^2 = 2gR \text{ and } \frac{1}{2}mv_{max}^2 = 3mgR \Rightarrow v_{max}^2 = 6gR$$

$$\frac{T_{max}}{T_{min}} = \frac{7}{1}$$

17. **Solution**:

$$U = 5\left(x^2 - 4\right)$$

$$F = -\frac{dU}{dx} = -\frac{d}{dx}\left[5\left(x^2 - 4\right)\right]$$

$$F = -5(2x)$$

$$F = -10x$$

$$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{0.1}{10}} = \frac{2\pi}{10} = \frac{\pi}{5}\text{sec}$$

18. **Solution**:

$$\text{weight} = F_{\text{buoyancy}}$$

$$\sigma\frac{4}{3}\pi\left(R^3 - r^3\right)g = \rho\frac{4}{3}\pi R^3 g$$

$$\sigma\left(R^3 - r^3\right) = \rho R^3$$

$$\frac{R^3 - r^3}{R^3} = \frac{\rho}{\sigma}$$

$$1 - \frac{r^3}{R^3} = \frac{\rho}{\sigma}$$

$$\frac{r^3}{R^3} = 1 - \frac{\rho}{\sigma}$$

$$\left(\frac{r}{R}\right)^3 = \frac{\sigma - \rho}{\sigma}$$

$$\frac{R}{r} = \left(\frac{\sigma}{\sigma - \rho}\right)^{1/3}$$

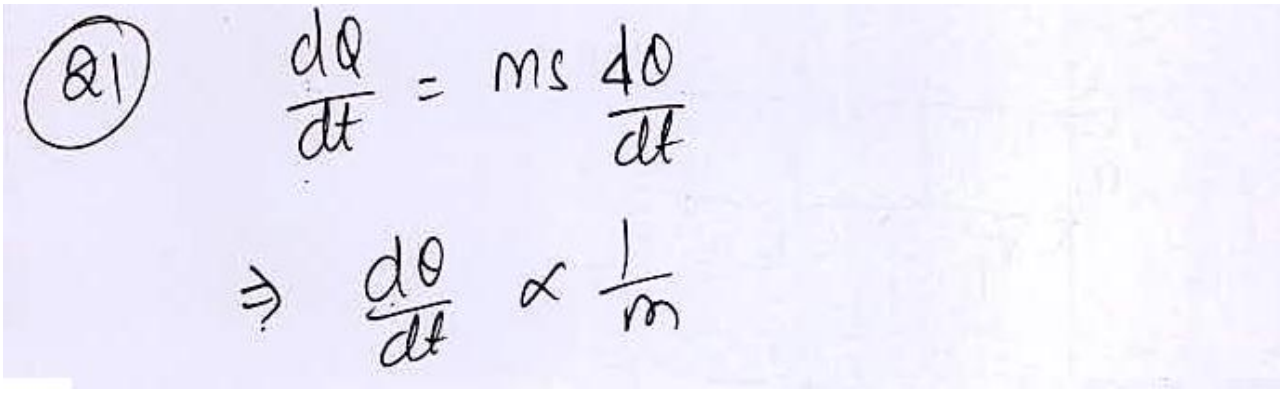
20. **Solution**:

$$\frac{W}{Q} = \frac{nR\Delta T}{nC_P\Delta T} = \frac{C_P - C_V}{C_P} = 1 - \frac{1}{\gamma}$$

$$\frac{W}{Q} = 1 - \frac{1}{\gamma}$$

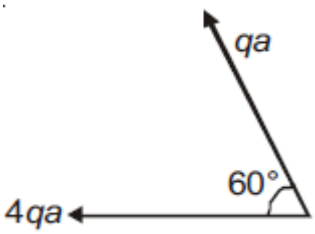
$$\frac{100J}{Q} = 1 - \frac{5}{7} = \frac{2}{7}$$

$$Q = 350J$$



22. **Correct option is (3)**

Solution:



$$p = \sqrt{(qa)^2 + (4qa)^2 + 2(qa)(4qa)\cos 60^\circ}$$

24. **Solution**:

$$\frac{3v}{4\ell}-\frac{v}{2\ell}=100\text{Hz}$$

$$\frac{v}{4\ell}=100\text{Hz}$$

$$\frac{v}{2\ell}=200\text{Hz}$$

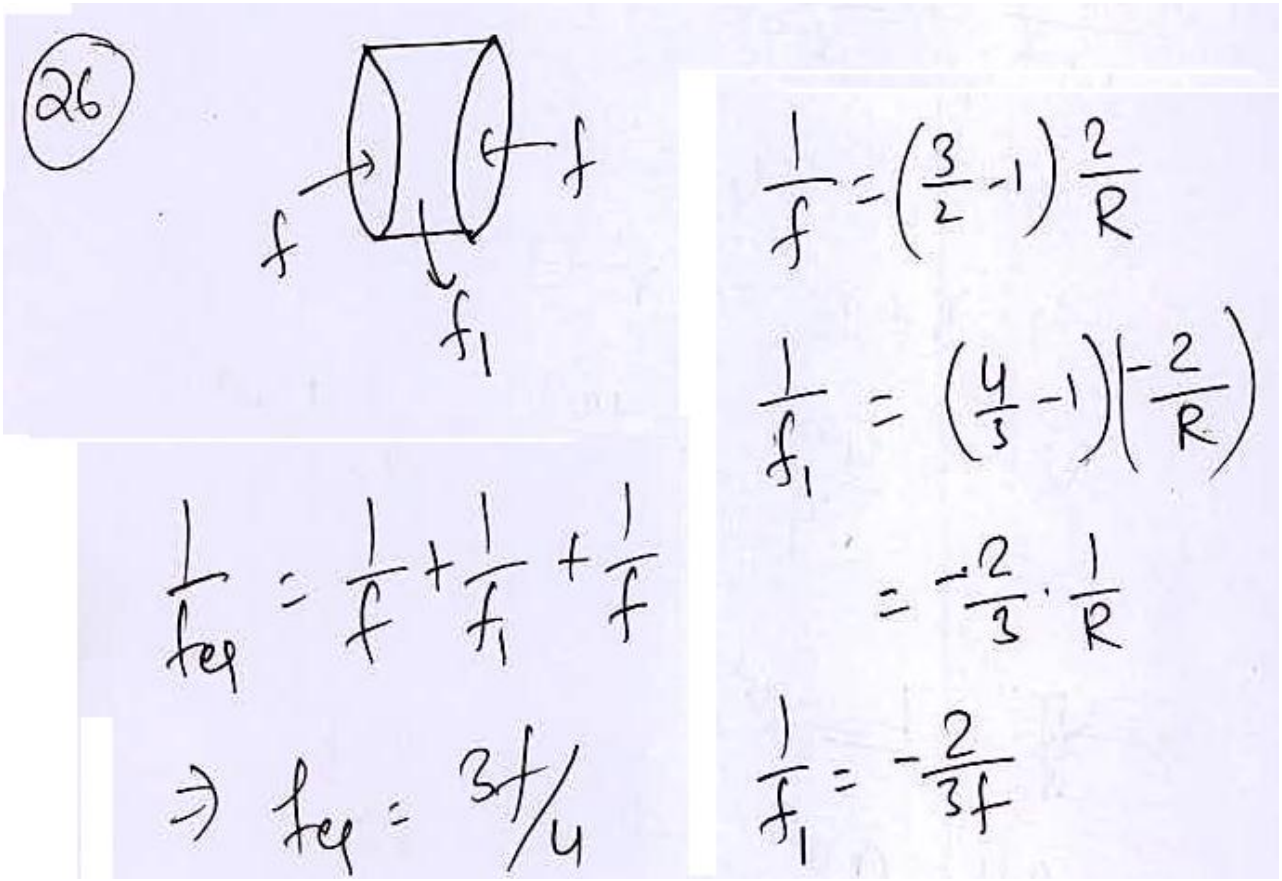
25. **Solution**:

$$\frac{\mu_2}{v}-\frac{\mu_1}{u}=\frac{\mu_2-\mu_1}{R}$$

$$\frac{1}{v}-\frac{1.5}{-10\text{cm}}=\frac{-0.5}{-5\text{cm}}$$

$$\frac{1}{v}+\frac{3}{20\text{cm}}=\frac{2}{20\text{cm}}$$

$$\frac{1}{v}=-\frac{1}{20\text{cm}}\Rightarrow v=-20\text{cm}$$



27. **Solution**:

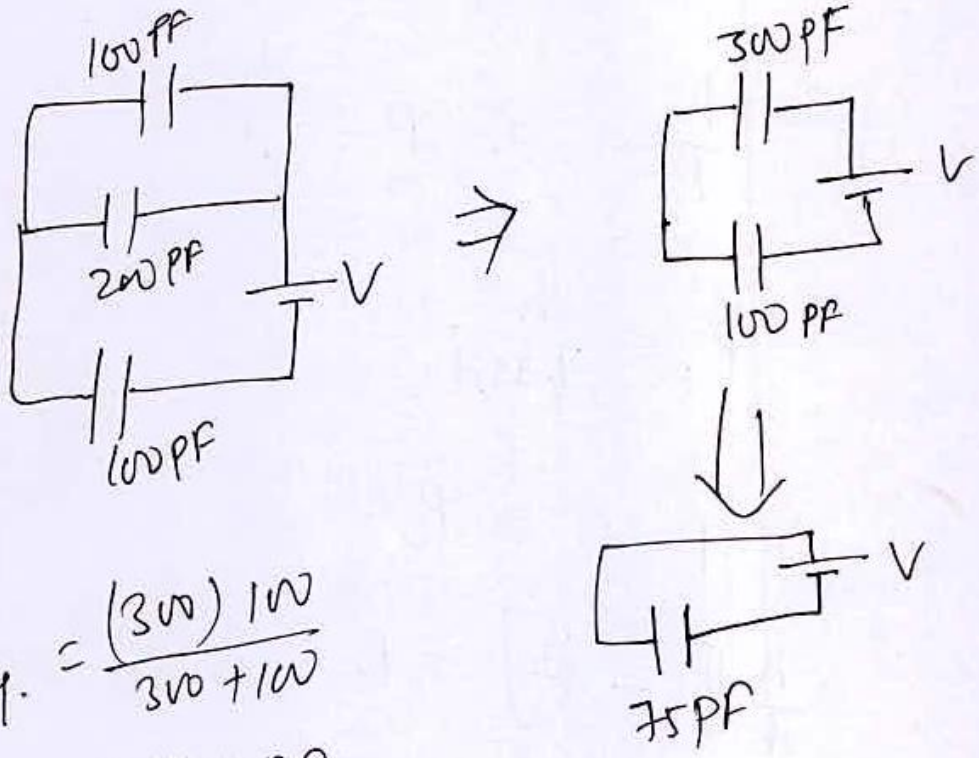
Speed of Sound wave in air is independent on pressure at constant temperature.

(29) flux will be maximum if string passes through diagonal.

total charge enclosed $= (\sqrt{3}a)\lambda$

$$\phi = \frac{\sqrt{3}a\lambda}{\varepsilon_0}$$

(30)

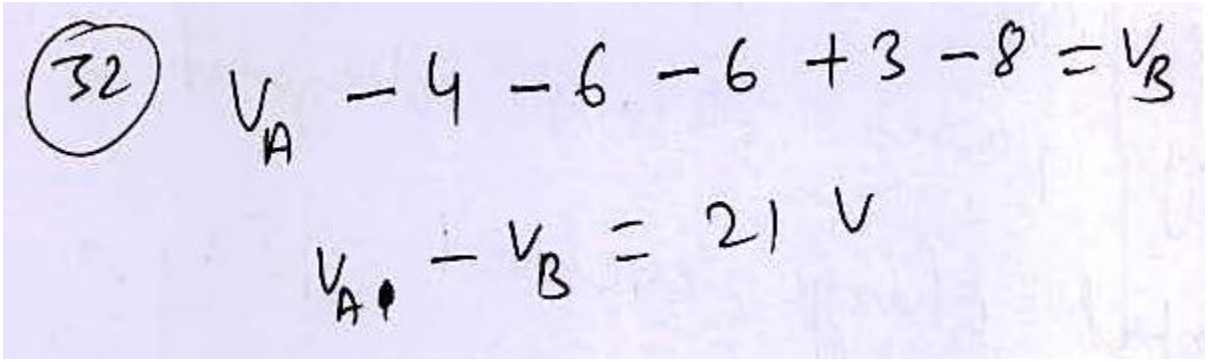


$$C_{eq.} = \frac{(300)100}{300+100}$$

$$= 75\ PF$$

(34) $V = \frac{Kq}{10}$ (inside Potential will be same)

$$V' = \frac{Kq}{15} = \frac{2}{3}V$$



33. **Correct option is (2)**

Solution:

As net resistance increases, so current decreases, so bulb B_1 gets dimer.

34. **Correct option is (2)**

Solution:

$$K = \frac{2RB_H}{\mu_0 N}$$

$$\therefore \quad K \propto= \frac{R}{N} \text{ and } K' \propto= \frac{2R}{2N} = K$$

35. **Correct option is (3)**

Solution:

$$S_{i_1} = \frac{NiAB}{ki} = \frac{NAB}{k}$$

$$S_{i_2} = \frac{1.2NAB}{k}$$

$$S_{v_1} = \frac{NAB}{kR} = \frac{S_{i_1}}{R}$$

$$S_{v_2} = \frac{S_{i_2}}{2R} = \frac{1.2(NAB)}{k(2R)}$$

37. **Correct option is (4)**

Solution:

$$\Delta q = \frac{\Delta\Phi}{R}$$

$$\frac{1}{2}(0.2)(6) = \frac{\Delta\Phi}{20}$$

$$\Delta\Phi = 12 \text{ weber}$$

38. **Correct option is (2)**

Solution:

$$e = \left(\vec{v} \times \vec{B}\right).\vec{\ell}$$

$$= \left[\mathbf{i} \times \left(3\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}\right)\right].\left(5\mathbf{j}\right)$$

$$= \left(4\mathbf{k} - 5\mathbf{j}\right).\left(5\mathbf{j}\right)$$

$$= -25 \text{ volt}$$

39. **Correct option is (4)**

Solution:

$$\sqrt{f} \propto (Z-1)$$

$$\text{or} \quad f \propto (Z-1)^2$$

$$\therefore \quad \lambda \propto \frac{hc}{(Z-1)^2}$$

$$\frac{\lambda_1}{\lambda_2} = \frac{(Z_2-1)^2}{(Z_1-1)^2}$$

$$\frac{\lambda_1}{\lambda_2} = \left(\frac{28}{42}\right)^2$$

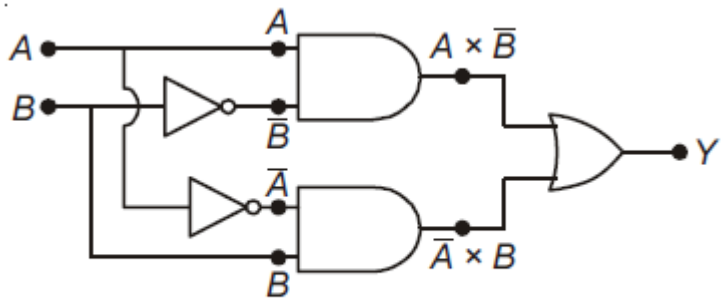
$$\frac{\lambda_1}{\lambda_2} = \left(\frac{2}{3}\right)^2$$

$$\frac{\lambda_1}{\lambda_2} = \frac{4}{9}$$

$$\lambda_2 = \frac{9}{4}\lambda_1$$

40. **Correct option is (4)**

Solution:



$$Y = (A \cdot \bar{B} + \bar{A} \cdot B)$$

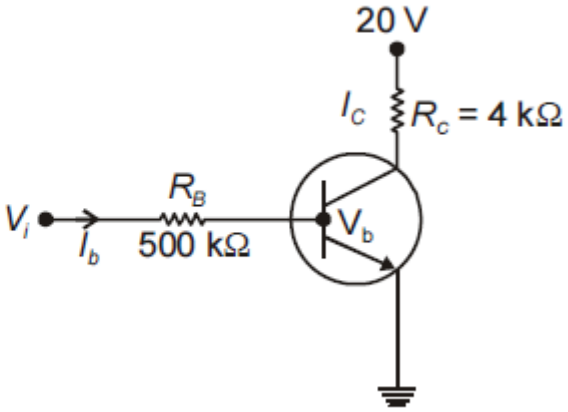
41. **Correct option is (1)**

Solution:

$V_{BE} = 0$

$V_{CE} = 0$

$V_b = 0$



$$I_C = \frac{(20-0)}{4\times10^3}$$

$I_C = 5 \times 10^{-3} = 5\ mA$

$V_i = V_{BE} + I_B R_B$

$V_i = 0 + I_B R_B$

$20 = I_B \times 500 \times 10^3$

$$I_B = \frac{20}{500\times10^3} = 40\ \mu A$$

$$\beta = \frac{I_C}{I_b} = \frac{25\times10^{-3}}{40\times10^{-6}} = 125$$

42. **Correct option is (4)**

Solution:

$$\phi = at(T-t) = aTt - at^2$$

$$\varepsilon = -\frac{d\phi}{dt} = -(aT - 2at)$$

$$P = -\frac{\varepsilon^2}{R} = \frac{(aT-2at)^2}{R}$$

$$H = \int_0^T Pdt = \int_0^T \frac{(aT-2at)^2}{R}$$

$$= \frac{a^2T^3}{3R}$$

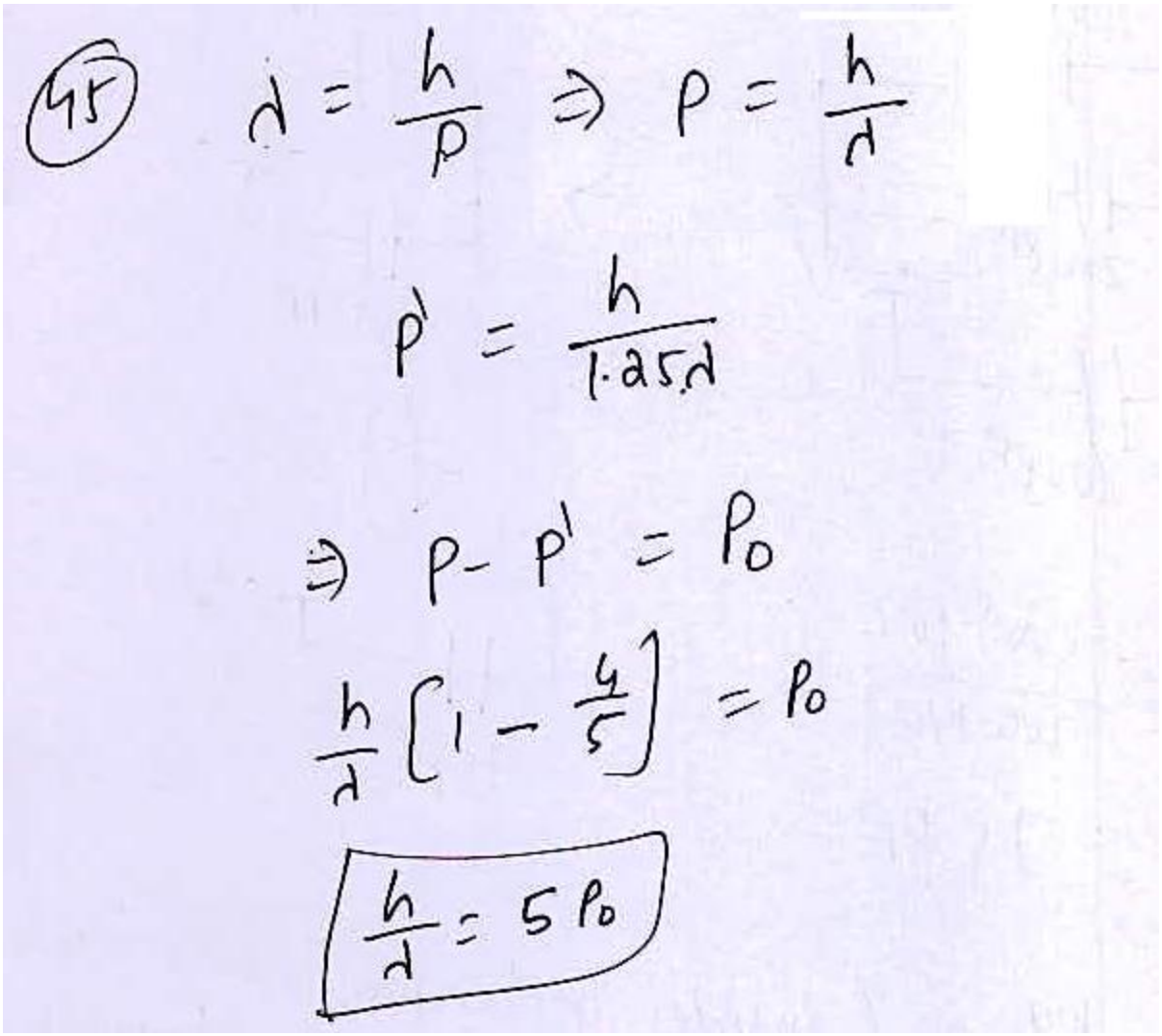
44. **Solution**:

$$\omega = \frac{v}{r}$$

$$\frac{2\pi}{T} \propto \frac{Z}{n} \times \frac{Z}{n^2}$$

$$T \propto n^3$$

$$\frac{T_1}{T_2} = \left(\frac{n_1}{n_2}\right)^3 = 8$$



47. Acidic strength $\propto \frac{[-I,-M]}{[+I,+M]}$

50. We know $K_p = K_x(P)^{\Delta n}$

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

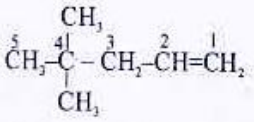
So $Kc = K_x \left(\frac{P}{RT}\right)^{\Delta n}$

$K_C = K_x \left(\frac{1}{V}\right)^{\Delta n}$

52. Reactivity towards hydrolysis $\propto$ stability of carbocation.

54. $H_2O + H_2O \rightleftharpoons H_3O^+ + OH^-$

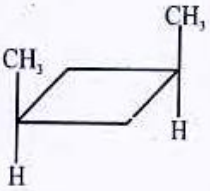
$K = \frac{[H_3O^+][OH^-]}{[H_2O]^2} = \frac{10^{-7} \times 10^{-7}}{(55.5)^2}$

55. 

4,4–Dimethyl–1–pentene

60. $CH_3 - C \equiv C - CH_3$

linear structure, so zero dipole moment

61. 

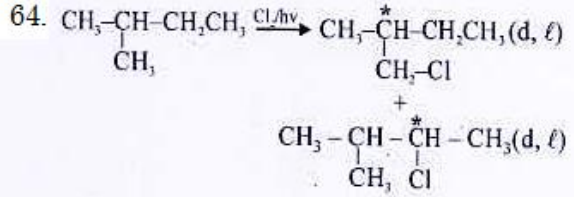
* No chiral - C

* Achiral molecule

63. $X_{C_2H_5OH} = 0.04 \quad \therefore X_{H_2O} = 1 - 0.04 = 0.96$

$\frac{X_{C_2H_5OH}}{X_{H_2O}} = \frac{n_{C_2H_5OH}}{n_{H_2O}} = \frac{0.04}{0.96} = \frac{1}{24}$

$\text{Molality} = \frac{n_{C_2H_5OH}}{W(kg)} = \frac{1\text{mol}}{\frac{(24\times18)}{1000}\text{kg}}$

64. 

* 2 enantiomeric pairs

65. $HCHO + PhCHO \xrightarrow{conc.NaOH} HCOONa + PhCH_2-OH$

68. $Ca^{2+} + 2e^- \longrightarrow Ca$

$2F \qquad 1\text{mol} = 40\text{g Ca}$

$\therefore$ to produce 20 g Ca $\rightarrow$ 1F is required

69. 

* 4π-electrons (does not follow Huckel's rule)

* Not aromatic compound.

70. Alcohol can be reduced in to alkane into acidic medium.

72. $KClO_3 \longrightarrow KCl + \frac{3}{2} O_2$

$1\text{mol} \qquad \frac{3}{2}\text{mol}$

$122.5 \qquad \frac{3}{2} \times 32 = 48\text{g}$

48g O_2 is produced from 122.5g of pure $KClO_3$

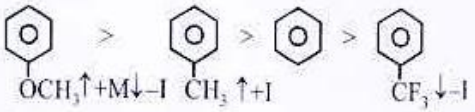
$\therefore$ 80% $KClO_3$ needed $= \frac{122.5 \times 100}{80} = 153.12\text{g}$

74. Ph – $\ddot{N}H_2$ * ℓp is delocalised

* less basic

76. $\Delta E \uparrow \Rightarrow \lambda \downarrow$

77. Equal volume of different gases have same no. of molecules under similar conditions of T & P

78. 

* Max. electron–density

* Max. reactive towards ESR

81. Molecular weight of $C_{12}H_{22}O_{11}$

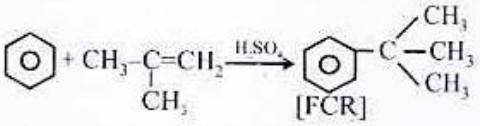
$= 12 \times 12 + 22 + 11 \times 16$

$= 144 + 22 + 176 = 342$

$\because$ heat evolved on combustion of 342 g sucrose $= 5.65 \times 10^3$ kJ

$\therefore$ heat evolved on combustion of 1000 g sucrose

$= \frac{5.65 \times 10^3}{342} \times 1000 = 16.52 \times 10^3$ kJ

83. 

87. None of the element change its oxidation number

88. Reactivity towards conc. HCl $\propto$ stability of carbocation.

91. (1) NCERT XI Pg.10

92. (2) page no. 22, 1st paragraph

93. (2) page no. 17, 1st paragraph

94. (1) NCERT XI page 32, 33

95. (4) NCERT XI page 9,10,11

96. (4) Cell sap

97. (1) Formation of rRNA

98. (3) RIBOSOMES PEROFORM THE FUNCTION OF PROTEIN SYNTHESIS

99. (1) NCERT XI, Pg No. 168
100. (1) NCERT XI, Pg No.166
101. (2) NCERT pg no 81
102. (3) NCERT pg no 42,43
103. (1) NCERT pg no73
104. (1) page no. 88 , 89 , 6.2.1 Epidernal tissue system
105. (3) page no. 86 , 6.1.2.1 Simple tissnes
106. (2) Root pressure
107. (4) 0 and less than 0.
108. (3) Pg. no. 196
109. (3) Pg. no. 204
110. (1) Etiolation is observed in plants grown in dark
111. (4) NCERT XI PG 21,22
112. (1) HSC pg no 74
113. (3) page no 232 , 14.4.2 ETS
114. (2) page no 235 , 14.6 , Amphibolic Pathway
115. (2) page no 230 fig , 14.2
116. (4) NCERT XI page 244
117. (4) NCERT XI page 248
118. (3)NCERT XI – PG 21
119. (2) NCERT XII page 6
120. (2) NCERT XI-78-81
121. (3) Cross pollintion
122. (3) Clones are identical
123. (2) page no. 90 , 1st paragraph
124. (1) page no 90-91
125. (1) page no 75 , 5.2.2 law of segregation
126. (2) NCERT XII, Pg. no. 108
127. (4)

Coding strand: 5'TACGTAG3'
Template strand: 3'ATGCATC5'
mRNA: 5'UACGUAG3'

128. (1) DNA with more A=T will melt first
129. (3) NCERT XII page 174,175
130. (4) NCERT XII page 176
131. (4) Sulphur is absent in DNA
132. (1) NCERT pg no 172
133. (4) A and D are correct
134. (3) NCERT XII 272
135. (2) NCERT-XII Pg.no.243
136. (1) NCERT-XII Pg.no.243
137. (3) NCERT XII page 260
138. (1) NCERT XII page 261
139. (1) NCERT XII 277
140. (3) NCERT pg no 203
141. (3) Epithelial tissue- cells compactly packed with negligible matrix.
142. (2) As matrix of bone is solid, osteocytes are placed in fluid filled lacunae.
143. (4) Gizzard also called proventriculus as its above ventriculus ie stomach.
144. (3) Nymph moults 13 times.
145. (3) Menstrual, proliferative and ovulatory phase.
146. (1) Primary spermatocyte undergoes meiosis I.
147. (4) XII NCERT pg 54.
148. (2) Patient suffering from amoebiasis.

149. (2) Artificial acquired passive immunity developed by providing readymade antibodies against toxin ie Antitoxin.

150. (1) Plasmodium ovale, viviax and falciparum causes benign tertian fever , P. malariae causes quartan fever and P. falciparum is malignant.

151. (2) Jelly fish have radial symmetry.Crab,Round worms are true coelomates.

152. (4) In Chameleon pharyngeal gill slits are present.Non chordates like scorpion have dorsal heart.Post anal tail is present in Chordates.

153. (4) Pg 55 Last para

154. (3) Astrocytes arrange themselves forming blood brain barrier.

155. (3) Acetyl choline neurotransmitter is produced by vagus nerve which decreases the heart beat.

156. (4) Pg 323 3rdpara

157. (4) parathormone increases calcium level in blood and thus deficiency causes less calcium level affecting clotting.

158. (3) Excessive secretion of adrenal cortex hormones is due to adrenal cancer.

159. (1) cortisol causes gluconeogenesis which is opposite to action of insulin.

160. (3) Divergent evolution or adaptive radiation due to difference in habitats.

161. (1)

162. (2)

163. (4) Vasectomy prevents transport of sperm ie semen released without sperms ie seminal plasma.

164. (3) AIDS is last stage when T-cells count is less than 200 per cubic mm of blood.

165. (4) Saltation- Hugo de Vries

166. (4) Recombination disturbs Hardy Weinberg equation as it causes evolution.

167. (4) A normal or wild E.coli is antibiotic sensitive.

168. (4) DNA ligase- molecular glue

169. (1)

170. (1) disarmed retrovirus used as vector for transferring genes in animal cells.

171. (3) XI NCERT pg 143

172. (4) Birds and reptiles- Uricotelic

173. (1) Stroke volume for each ventricle is 70ml

174. (2)

175. (2)

176. (3) ATPase needs Mg as cofactor.

177. (3) Protein like albumin is chief osmoregulator.

178. (1) Mitral valves close during ventricular systole while aortic valves close during diastole.

179. (3)

180. (2)