1. \( v = \omega \sqrt{a^2 - x^2} \Rightarrow x = \sqrt{a^2 - \frac{v^2}{\omega^2}} \left( \cdot \omega^2 = \frac{k}{m} \right) \)

\[ x = \sqrt{a^2 - \frac{v^2 m}{k}} = \sqrt{\frac{(0.5)^2 - (0.4)^2 \times (10)}{10}} \]

\[ = \sqrt{0.25 - 0.16} = \sqrt{0.09} = 0.3m \]

2. \( \Delta \lambda = \lambda \times \frac{V}{c} = 5700 \times \frac{100 \times 10^3}{3 \times 10^8} \)

\[ = 1.9 \mu \]

3. K.E. = \( \frac{1}{2} mv^2 = \frac{1}{2} m \omega^2 \left( A^2 - x^2 \right) \)

at \( x = 0, \) K.E. = \( \frac{1}{2} m v^2_{\text{max}} = \frac{1}{2} m \omega^2 A^2 \)

at \( x = \frac{A}{2}, \) K.E. = \( \frac{1}{2} m v^2 = \frac{1}{2} m \omega^2 \left[ A^2 - \left( A^2 \right)^2 \right] \)

\[ = \frac{3}{4} \left[ \frac{1}{2} m \omega^2 A^2 \right] \Rightarrow \frac{\text{KE}_{x=0}}{\text{KE}_{x=A/2}} = \frac{4}{3} \]

4. \( I \propto A^2 \)

\[ \therefore \frac{I_{\text{max}}}{I_{\text{min}}} = \left( \frac{A_1 + A_2}{A_1 - A_2} \right)^2 = \frac{16}{4} = 4 : 1 \]

5. \( \alpha = \frac{\tau}{I} = \frac{30}{2} = 15 \text{ rad/sec}^2 \)

Now \( \theta = 0 + \frac{1}{2} \alpha t^2 = \frac{1}{2} \times 15 \times (10)^2 = 750 \text{ rad} \)
7. \[ T = 2\pi \sqrt{\frac{\ell + K^2}{\ell}} \]

Here \( \ell = R, \) \( MK^2 = MR^2 \Rightarrow K = R \)

\[ \Rightarrow T = 2\pi \sqrt{\frac{R + R}{g}} = 2\pi \frac{2R}{g} \]

14. \[ v = \frac{2r^2}{9\eta} (\rho - \sigma) q \]

\[ \frac{v_1}{v_2} = \left[ \frac{\rho_1 - \sigma}{\rho_2 - \sigma} \right] \]

\[ 0.2 \frac{v_2}{v_2} = \left[ \frac{19.5 - 1.5}{10.5 - 1.5} \right] \]

\[ v_2 = 0.1 \text{ m/s} \]

18. \[ k = yr_0 \]

\[ r_0 = \frac{k}{y} = \frac{3.6 \times 10^{-3}}{1.2 \times 10^{11}} = 3 \times 10^{-20} \text{ m} \]

21. \[ \frac{1}{F} = \frac{1}{f_1} - \frac{1}{f_2} \]

The combination is convex; therefore \( F \) must be positive. This is possible when \( f_2 > f_1 \). This gives \( F \) greater than \( f_1 \). So, the image will shift away from the lens system.

23. \[ \frac{1}{f} = (\mu - 1) \left( \frac{1}{R_1} + \frac{1}{R_2} \right) \]

or \[ \frac{1}{f} = (1.5 - 1) \left( \frac{1}{R_1} + \frac{1}{2R} \right) \]

Solving, we get \( R = 4.5 \text{ cm} \).

25. \[ \mu = \frac{\text{Real depth}}{\text{Apparent depth}} \]

\[ \therefore \text{Due to first liquid,} \quad \sqrt{2} = \frac{d}{x_1} \text{ or } x_1 = \frac{d}{\sqrt{2}} \]

Due to the second liquid, \( n = \frac{d}{x_2} \)

\[ \therefore x_2 = \frac{d}{n} \]

27. For first minimum, putting \( n = 1 \) in the condition for minima given as

\[ d \sin \theta = \lambda \]

we obtain:

\[ d \sin \theta = \lambda \quad \cdots (1) \]

where \( \sin \theta = \frac{x/2}{D} = \frac{x}{2D} \quad \cdots (2) \]

From (1) and (2), we get:

\[ \frac{\lambda}{d} = \frac{x}{2D} \]

or

\[ x = \frac{2AD}{d} = \frac{2 \times (600 \times 10^{-4}) \times 2}{10^{-3}} \]

\[ = 2.4 \text{ mm} \]

29. \[ KE_f = \frac{1}{4} KE_i \]

\[ \frac{1}{2} mV^2 = \frac{1}{4} \left( \frac{1}{2} mV_0^2 \right) \]

\[ V = \frac{V_0}{2} \]

\[ V = u + at \quad (a = \mu g) \]

\[ \frac{V_0}{2} = V_0 - \mu g t_0 \]

\[ \mu g t_0 = \frac{V_0}{2} \]

\[ \mu = \frac{V_0}{2gt_0} \]

31. \[ \frac{4m_m}{(m_1 + m_2)^2} \]

33. \[ W = \frac{m(g \sin 30^\circ) \ell}{2n^2} \]

35. If length \( AB = x \)

\[ (mg \sin \theta + \mu mg \cos \theta) x \]

\[ mgx \left( \frac{h + \frac{uf}{x}}{x} + \frac{\mu \ell}{x} \right) \]

37. \[ \frac{3}{v_{av}} = \frac{1}{v} + \frac{1}{2v} + \frac{1}{3v} \]
38. \[ PV = \frac{M}{M_w}RT \]
\[ P \propto MT \]
\[ \frac{P_1}{P_2} = \frac{M_1T_1}{M_2T_2} \]
\[ \Rightarrow \frac{720}{P_2} = \frac{M}{3M/4} \times \frac{313}{626} \]
\[ P_2 = 1080 \text{ kPa} \]

39. For avoiding collision: \( v_r < 0 \)
\[ U_r^2 + 2aS_r < 0 \] [III Eq. in motion]
\[ (V_1-V_2)^2 + 2(-a)d < 0 \]
\[ (V_1-V_2)^2 < 2ad \]
\[ d > \left(\frac{v_1-v_2}{2a}\right)^2 \]

40. \[ \eta = \frac{W}{Q} = 1 - \frac{T_2}{T_1} \]
\[ = \frac{W}{6} = 1 - \frac{400}{500} \]
\[ \Rightarrow W = 1.2 \text{ Kcal} \]

41. \[ H_1H_2 = \frac{u^2\sin^2\theta - \cos^2\theta}{2g} = \left(\frac{u^2\sin\theta \cos\theta}{g}\right)^2 \]
\[ \Rightarrow R^2 = 16 \text{H}_1 \text{H}_2 \]
\[ \Rightarrow R = 4 \sqrt{\text{H}_1 \text{H}_2} \]

42. \[ \Delta Q = \Delta W + dU \]
\[ 100 = 20 + dU \]
\[ dU = 80 \text{ J} \]
For Reverse
\[ dU_r = -80 \]
\[ \Rightarrow \Delta Q_r = \Delta W_r + dU_r \]
\[ -20 = \Delta W_r - 80 \]
\[ \Delta W_r = 60 \text{ J} \]

43. \[ F = f_i + f_2 \]
\[ = 0.2 \times 100 \times g + 0.3(100+200)g \]
\[ = 1100 \text{ N} \]

44. \[ \frac{Q}{t} = e \sigma A(T_4 - T_0^4)t \]
\[ = 0.4 \times 5.67 \times 10^{-8} \times 200 \times 10^{-4} \times \left[800^4 - 300^4\right] \]
\[ = 182 \text{ J/sec.} \]

45. \[ T \sin 30^\circ = 2 \] ............(1)
\[ T \cos 30^\circ = T_1 \] ............(2)
\[ (1)+(2) \]
\[ \tan 30^\circ = \frac{2}{T_1} \]
\[ T_1 = 2\sqrt{2} \text{ kg-wt.} \]

46. \[ \text{Ph–CH}_2–\text{O–Ph} \xrightarrow{\text{Hi}} \text{Ph–CH}_2–\text{I+Ph–OH} \]

50. Gabriel phthalimide synthesis is used for preparation of aliphatic primary amines.

52. \[ \text{Ph Mg Br} \xrightarrow{\text{CO}} \text{Ph–C–O Mg Br} \]
\[ \xrightarrow{\text{H}_2\text{O}} \text{Ph–C–OH} \]

58. \[ \text{CH}_3\text{CH}_2–\text{Cl} \xrightarrow{\text{NaCN}} \text{CH}_3–\text{CH}_2–\text{CN} \]
\[ \xrightarrow{\text{Ni}} \text{CH}_3\text{CH}_2\text{CH}_2–\text{NH}_2 \]
\[ \xrightarrow{\text{Ni}} \text{CH}_3\text{CH}_2–\text{CH}_2–\text{NH–C–CH}_3 \]

60. \[ \text{CH}_3\text{COOH} \xrightarrow{\text{PCl}} \text{CH}_3–\text{C–Cl} \xrightarrow{\text{Ph–H}} \text{Ph–C–CH}_3 \]
\[ \xrightarrow{\text{Et Mg Br, H}_2\text{O}} \text{Ph–C–CH}_3 \]
62. \[ \text{CH}_3\text{C}=\text{CH}_2-\text{CH}_2-\text{CH}=\text{CH}_3 \xrightarrow{\text{\text{CH}_3\text{C}}=\text{CH}_2-\text{CH}_2-\text{CH}=\text{CH}_3} \text{CH}_3\text{C}=\text{CH}_2-\text{CH}_2-\text{CH}=\text{CH}_3 \]

75. No. of moles = \( \frac{\text{Gram amount of substance}}{M_w} \)
No. of atoms = no. of moles \( \times N_A \)
Gram amount is same for all M_w is minimum for B(s)

76. \( n^0 = A - Z \)
for S^{35}
\( n^0 = 35 - 16 = 19 \)

77. If \( n = 4 \)
\( 
\ell = 0 \\
\) then \( m = \) (only)

78. \( 5e^- + 8H^+ + \text{MnO}_4^- \rightarrow \text{Mn}^{2+} + 4H_2O \)

79. \( S^1 = \frac{K_w}{2C} \)
\( C = \frac{10g}{111g/mol \times 1L} \)

81. Option 4th is of weak base remaining all are salts of SAWB which have pH less than seven

87. \( K^I = \frac{1}{\sqrt{K}} \)

89. \( \Delta G = \Delta G^\circ + 2.303 \text{RT log}_{10} Q \)
91. NCERT (XII) Page # 187, Para = 1
93. NCERT (XII) Page # 176, Para = 3
95. NCERT (XII) Page # 144, Para = 2
97. NCERT (XII) Page # 187, Para = 3
104. NCERT XI Pg # 137, 138, 139
106. NCERT XI Pg # 139
108. NCERT XII Page # 147
109. NCERT XI, Page No.# 22,23,24
111. NCERT XI, Page No.# 10
116. NCERT (XI), Page No. 114, 2nd para
117. NCERT XI, Page No.# 38,39
118. NCERT (XI), Page No. 281, Last para
119. NCERT XI, Page No.# 14, Summary 2nd para
120. NCERT (XI), Page No. 102, 3rd para
121. NCERT XI, Page No.# 43.
123. NCERT XI, Page No.# 37, Pteridophytes (d)
126. NCERT, Pg # 322
151. NCERT (XII), Pg # 168,169
153. NCERT (XI), Pg # 262,263
157. NCERT (XII), Pg # 168,169
160. NCERT(XI) Page no. 68, II para
161. NCERT (XII), Pg # 228
164. NCERT(XI) Page no. 93, II para
167. NCERT (XII) Page # 27 (Eng.)
  Page # 28 (Hindi)
169. NCERT Page no. 50
171. NCERT Page no. 50
172. NCERT Page # 250
173. NCERT Page no. 51,53,57
175. NCERT Page no. 54
176. NCERT Page # 230
177. NCERT Page no. 55
178. NCERT Page # 212
179. NCERT Page # 189
180. NCERT Page # 196