LEADER & ACHIEVER COURSE

PHASE : MLI,J,K,M,N,O,R,S,MAZG,H,I,J,K,L,M,T,U,M4AA2A,M2AP1A,M2AP1B
TARGET : PRE-MEDICAL 2020

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

TEST DATE : 03 - 03 - 2020

TEST SYLLABUS : 04

HINT – SHEET

1. 8μC

Final charge $= \frac{2}{1\quad 2} \times (12 + 0)$

on bigger sphere $= \frac{2}{3} \times 12 = 8\mu C$

2. Since electric field is applied so as to oppose the motion of electron.

$$a = -\frac{eE}{m}(\text{retardation})$$

$$= -\frac{1.6\times10^{-19}\times10^{3}}{9.1\times10^{-31}} = -1.9758\times10^{14}\,ms^{-2}$$

Now, $u = 5 \times 10^6\ ms^{-1}$, $v = 0$

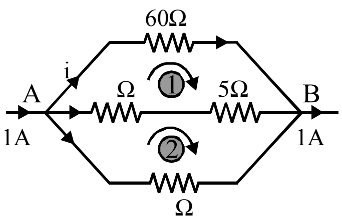
Using the relation : $v = u + at$, we get

$t = 2.844 \times 10^{-8}$ s

3. $I = ne\,Av_d =$ constant

If A increase v_d decrease.

4. Applying Kirchhoff's law in following figure.



At junction A :

$i + i_1 + i_2 = 1$ ...(i)

For Loop (i)

$-60i + (15 + 5)i_1 = 0$

$\Rightarrow i_1 = 3i$ ...(ii)

For loop (2)

$-(15 + 5)i_1 + 10\,i_2 = 0$

$\Rightarrow i_2 = i_1 = (3\,i) = 6i$

On solving equation (i), (ii) and (iii) we get $i = 0.1$ A

5. $v_d = \frac{1}{2}\left(\frac{eE}{m}\right)\left(\frac{\lambda}{\mu}\right)$

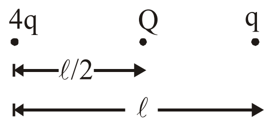
or $v_d = \frac{1}{2}E\left[\frac{1.6\times10^{-19}}{9.1\times10^{-31}}\right]\left[\frac{10^{-9}}{10^{5}}\right]$

$= 0.8 \times 10^{-3}\ E = 8 \times 10^{-4}\ E$

If $E = (1/8)$ V/m, then $v_d = 10^{-4}$ m/s

or $v_d = 10^{-2}$ cm/s

6.



$$(\text{Fnet})_q = \frac{k(q)(4q)}{\ell^2} + \frac{kQq}{(\ell/2)^2} = 0$$

$\boxed{Q = -q}$

7. Torque on a dipole is

$\tau = p \in \sin\theta$, which is not zero always

So angular momentum will not conserve.

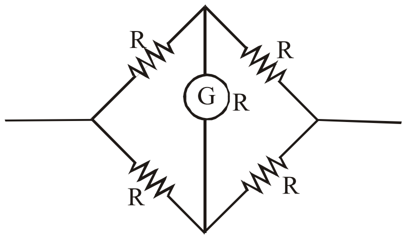
8. When no potential difference is applied then between two consecutive collision force on electron is zero.

9. $2 = \dfrac{\varepsilon}{2+r}$

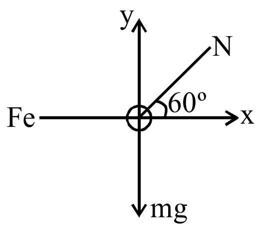
$0.5 = \dfrac{\varepsilon}{9+r}$ or $\dfrac{2}{0.5} = \dfrac{9+r}{2+r}$

$\therefore\ r = \dfrac{1}{3}\Omega$

10. $R_{eq} = \dfrac{2R}{2} = R$



11. Two bowl, exerts a normal force N on each bead, directed along line or at 60º above the horizontal. Consider the free body diagram of the bead on the left with the electric force Fe applied.



N sin 60º = mg

N cos 60º = Fe = $\dfrac{KQ^2}{R^2}$

$N \times \dfrac{\sqrt{3}}{2} \quad mg$

$N \quad \dfrac{2mg}{\sqrt{3}}$

$N \times \dfrac{1}{2} \quad \dfrac{KQ^2}{R^2}$

$\dfrac{2mg}{\sqrt{3}} \times \dfrac{1}{2} \quad \dfrac{KQ^2}{R^2}$

$Q \quad R\left(\dfrac{mg}{\sqrt{3}k}\right)^{1/2}$

12. Two conducting surfaces facing each other have equal and opposite charges

$E_A = \dfrac{\sigma_1 - \sigma_2}{2\varepsilon_0}$

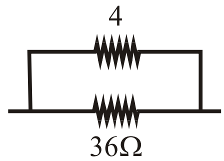
$E_A = \dfrac{\sigma_1}{\varepsilon_0} = -\dfrac{\sigma_2}{\varepsilon_0}$

Since $\sigma_1 = -\sigma_2$

13. $R \propto \ell^2$

If length is doubled then Resistance becomes four times

14.

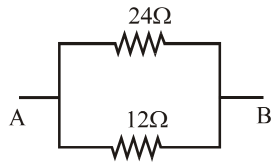


$R_S : R_G = \dfrac{1}{9}$

$\therefore\ I_s : I_g = \dfrac{9}{1}$

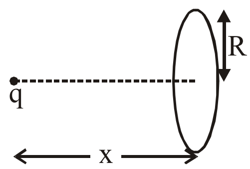
$\therefore\ \dfrac{9}{10}$th current goes through shunt

15.



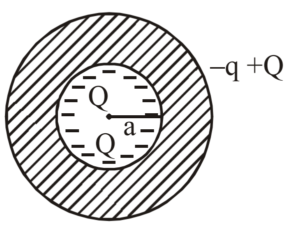
$R_{eq} = \dfrac{24 \times 12}{36} = 8\Omega$

16.



$\phi = \dfrac{q}{2\varepsilon_0}\left(1 - \dfrac{x}{\sqrt{R^2 + x^2}}\right)$

17. –Q on inner surface



and –q + Q on outer surface.

18. $V = IR$

$V^2 = I^2R^2$

$V^2 \propto I^2$

$\downarrow \quad \downarrow$

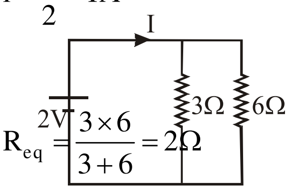
$y \propto x$

straight line

19. $P = V^2 / R$

As the same lamp is used across half the voltage, the power P consumed will become one fourth, i.e., 25 W.

20. $i = \frac{2}{2} = 1A$



$R_{eq} = \frac{3 \times 6}{3+6} = 2\Omega$

21. Let charge on S_1 is q it's potential must be zero.

$$\frac{kq}{R} + \frac{k2Q}{3R} = 0$$

$$q = -\frac{2}{3}Q$$

So enclosed charge in S_3 will be

$$q_{en} = 2Q - \frac{2}{3}Q = \frac{4}{3}Q$$

$$\phi = \frac{4}{3}\frac{Q}{\varepsilon_0}$$

22. Capacitor is charge & battery disconnected Q is constant.

23. $T \uparrow R \downarrow \sigma \uparrow$

24. Lines terminate in charge so both negative.

25. (i) Discharging of cell $v = \varepsilon - ir$

(ii) Charging of cell; $v = \varepsilon + ir$

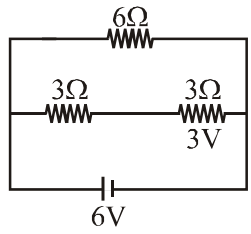
(iii) $v = \varepsilon$

26. Potential of conducting sphere is constant inside it & on its surface.

27. W.D $= \frac{8^2}{2C} = \frac{1}{2}CV^2 = \frac{8V}{2}$

W.D $= \frac{1}{2}\frac{\left(8 \times 10^{-18}\right)^2}{100 \times 10^{-6}} = 32 \times 10^{-32}$ joule.

28.



29. E_x is slope of V–x graph.

30. Emf of cell, $E = Xl = \frac{V}{l} = \frac{iR}{L} \times l$

$\therefore \quad E = \frac{e}{(R_1 + R_2 + r)} \times \frac{R}{L} \times l$

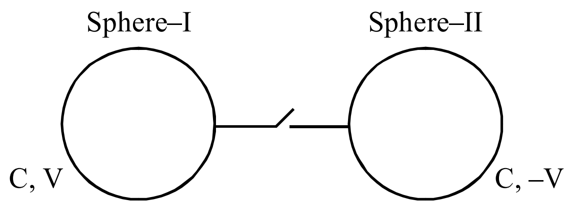
$0.4 = \frac{e}{(R_1 + R_2 + r)} \times \frac{R}{L} \times l$

$\therefore \quad l = 8$ m

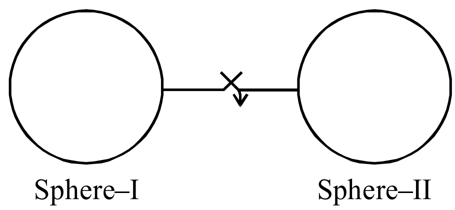
31. $U = \frac{kQq}{a} + \frac{kQq}{a} + \frac{kq^2}{a} = 0$

$\Rightarrow Q = -\frac{q}{2}$

32.



Before connection



after connection

$V_C = \frac{CV - CV}{C + C} = 0$

$V_C = 0$

$u_i = \frac{1}{2}CV^2 + \frac{1}{2}C(-V)^2 = CV^2$

$u_f = \frac{1}{2}(C_1 + C_2)(VC)^2 = 0$

$\boxed{\Delta u = u_f - u_i = CV^2}$

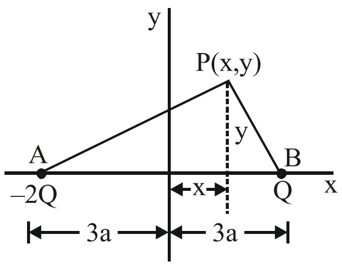
33. Kirchhoff's first law is based on the law of conservation of charge.

34. U = qV = 2e × 3V = 6eV

35. $S = \frac{100}{9999}$; $I_S = 10 - 10^{-3} = 9.999\Omega$

$$P = I_S^2 \cdot S = (9.999)^2 \times \frac{100}{9999} = 0.9999W$$

36.



$$V_P = \frac{1}{4\pi \epsilon_0 R}\left[\frac{-2Q}{AP} + \frac{Q}{BP}\right]$$

$$\frac{1}{4\pi \epsilon_0 R}\left[\frac{-2Q}{\left[(3a\quad x)^2\quad y^2\right]^{\frac{1}{2}}}\quad \frac{Q}{\left[(3a-x)^2\quad y^2\right]^{\frac{1}{2}}}\right]$$

$V_P = 0$

$$\frac{4}{(3a+x)^2+y^2} = \frac{1}{(3a-x)^2+y^2}$$

$4(3a - x)^2 + 4y^2 = (3a + x)^2 + y^2$

$4(9a^2 - 6ax + x^2) + 4y^2 = 9a^2 + 6ax + x^2 + y^2$

$3x^2 + 3y^2 - 30ax + 27a^2 = 0$

$x^2 + y^2 - 10ax + 9a^2 = 0$

This is equation of circle, hence the locus is a circle.

37. $V = \frac{q_1+q_2}{C_1+C_2} = \frac{0+C_0V}{C_0+C_0K} = \frac{V}{K+1}$

38. Current flowing in circuit

$$i = \frac{nE}{nr} = \frac{5}{0.2} = 25A$$

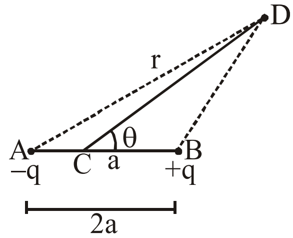
Terminal potential difference across the terminals of battery numbered 8,

V = E – ir = 5 – 25 × 0.2 = 0

V = 0

Hence, voltmeter reading is zero. So, choice (4) is correct.

39.



potential at D $V_D = \frac{kq}{BD} - \frac{kq}{AD}$

BD = r – a cos θ , AD = r + a cos θ

$$V_D = \frac{kq}{r - a\cos\theta} - \frac{kq}{r + a\cos\theta}$$

use (r > > a cos θ, & P = q.2a)

$$\Rightarrow V_D = \frac{kq(2a\cos\theta)}{r^2} = \frac{kp\cos\theta}{r^2}$$

40. $U = \frac{1}{2}CV^2 = \frac{1}{2}(5 \times 10^{-6})(4)$

$= 10 \times 10^{-6}$

41. F = qE = ma

$$a = \frac{eE}{m}$$

42. $U_i = \frac{1}{2}CV^2 + \frac{1}{2}CV^2 = CV^2$

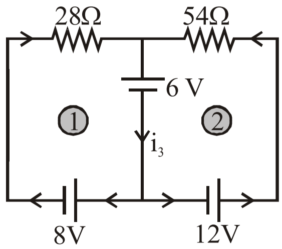
when the switch is open and dielectric is inserted between plates of capcitors. The new P.d. would be $V \& \frac{V}{K}$

So, $U_f = \frac{1}{2}(KC)V^2 + \frac{1}{2}KC\left(\frac{V}{K}\right)^2$

$$= CV^2\left(\frac{K}{2} + \frac{1}{2K}\right)$$

Finally $\frac{U_i}{U_f} = \frac{1}{\frac{K}{2} + \frac{1}{2K}} = \frac{1}{\frac{3}{2} + \frac{1}{6}} = \frac{3}{5}$

43. Suppose current through different paths of the circuit is as follows.



After applying KVL for loop (1) and loop (2)

We get $28i_1 = -6 - 8 \Rightarrow i_1 = -\frac{1}{2}A$

and $54i_2 = -6 - 12 \Rightarrow i_2 = -\frac{1}{3}A$

Hence $i_3 = i_1 + i_2 = -\frac{5}{6}A$

44. $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{R^2}$

As q is constant, so $E \propto \frac{1}{R^2}$

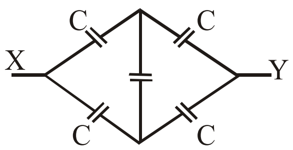
Radius is halved. Therefore, electric field will become 4 times or 4E.

Further, $V = \frac{1}{4\pi\varepsilon_0}\frac{q}{R}$.

As q is constant, so $V \propto \frac{1}{R}$

Radius is halved, so potential will become two time or 2V.

45.



It is a wheat stone bridge

$C_{XY} = C = 4\mu F$

47. $Na_2SO_4 \longrightarrow 2Na^+ + SO_4^{-2}$ (n = 3)

$Al(NO_3)_3 \longrightarrow Al^{+3} + 3NO_3^-$ (n = 4)

$Al_2(SO_4)_3 \longrightarrow 2Al^{+3} + 3SO_4^{-2}$ (n = 5)

$K_3[Fe(CN)_6] \longrightarrow 3K^+ + [Fe(CN)_6]^{-3}$ (n = 4)

48. $\underset{(+2)}{S_2O_3^{-2}} \longrightarrow \underset{(+2.5)}{S_4O_6^{-2}}$

n = (2.5 – 2) × 2

= 1

1 mole $\longrightarrow$ 1 F

= 96500 C

49. For BCC $4r = \sqrt{3}\,a$

51. x = K·t

= 0.5 × 10 × 60 × 10

= 0.3 M

52. $P = 180\,x_A + 90$

if pure A than $x_A = 1$

$P_T = P_A^o = 270$

if pure B than $x_B = 1$, $x_A = 0$

$P_T = P_A^o = 90$

Ratio 3 : 1

53. Q = It

Q = 30 × 2 × 60 × 60

= 216000 C

Number of Faraday = $\frac{216000}{96500}$

= 2.24 F

$2H_2O(\ell) \longrightarrow 4H^+(aq) + O_2 + 4e^-$

4F produced $\longrightarrow$ 1 mole of O_2 or

= 32 g or

= 22.4 L

$\therefore$ 2.24 F produced $\longrightarrow \frac{22.4}{4} \times 2.24$

= 12.544 L

54. L.R.R. = $\frac{r^+}{r^-} = \frac{30}{60} = 0.5$

56. $Pt^{+4}(aq) + 4e^- \longrightarrow Pt(s)$

From 4 mole electrons = 4F charge,

4F charge = 1mol pt.

$\therefore$ From 0.8 F charge, $\frac{1}{4} \times 0.8 = 0.2$ mole Pt is deposited

57. Consider one litre solution

Weight of solution = 1200 g

Weight of solute = 1200 × 0.4 = 480 g

Moles of solute = $\frac{480}{98} = 4.898 = 4.9$

60. $\Delta H = (Ea)_f - (Ea)_b$

ΔH remains same after addition of catalyst

$-40 = 80 - (Ea)_b$

$(Ea)_b$ before catalyst addition = 120

$\Delta H = (Ea)_f - (Ea)_b$

$-40 = 60 - (Ea)_b \Rightarrow (Ea)_b = 100$

$(Ea)_b$ after addition of catalyst = 100

$\therefore$ Ratio = $\frac{120}{100} = 1.2$

61. $E^o_{cell} = (SRP)_{cathode} - (SRP)_{anode}$

$E^o_{cell} = 1.23 - (-0.44)$

$E^o_{cell} = 1.67$ V

62. $i = \frac{\text{Theoretical molar wt}}{\text{Observed molar wt}} = \frac{58.5}{30} = 1.95$

$i = 1 - \alpha + n\alpha$

$1.95 = 1 - \alpha + 2\alpha$

$\alpha = 0.95$

64.
$$\left.\begin{aligned} A &\longrightarrow 4 \times \frac{1}{8} = \frac{1}{2} \\ B &\longrightarrow 6 \times \frac{1}{2} = 3 \\ C &\longrightarrow 6 \times \frac{1}{4} = \frac{3}{2} \end{aligned}\right\} \Rightarrow AB_6C_3$$

65. $r = K[A]^2[B]^{-1}$

If [A] & [B] are doubled

$r' = K[2A]^2[2B]^{-1}$

$r' = 2r$

66. $\pi = \frac{n}{V} \cdot RT = \frac{WRT}{M \times V}$

$M = \frac{WRT}{\pi V} = \frac{5 \times 0.083 \times 300}{1.66 \times \frac{500}{1000}}$

67. $\Lambda^\infty_{M(MgSO_4)} = \Lambda^\infty_{M(Mg^{+2})} + \Lambda^\infty_{M(SO_4^{-2})}$

$= 106.1 + 160$

$= 266.1\ cm^2\ mol^{-1}\ ohm^{-1}$

$\Lambda^\infty_{M(Al_2(SO_4)_3)} = 2 \times \Lambda^\infty_{M(Al^+)} + 3 \times \Lambda^\infty_{M(SO_4^{-2})}$

$= 2 \times 189 + 3 \times 160$

$= 858\ cm^2\ mol^{-1}\ ohm^{-1}$

68. In HCP Z = 6

Total volume = $Z \times \frac{4}{3}\pi r^3$

69. $\Delta G < 0$ So $\Delta H - T\Delta S$ is negative

70. $[A]_t = [A]_0\ e^{-Kt}$

71. (1) $HNO_3 + H_2O$ –ve deviation non ideal solution

(2) $C_2H_5OH + H_2O$ +ve deviation non ideal solution

(3) $CHCl_3$ + Acetone –ve deviation non ideal solution

(4) Toluene + Benzene ideal solution

72. Cell constant = 0.002 × 150

$= 0.3\ cm^{-1}$ ($\because \ell/A = GG^*$)

$\kappa = \frac{\ell}{AR}$

$\kappa = \frac{0.3}{600} = 0.0005\ S\ cm^{-1}$

$\Lambda_M = \frac{\kappa \times 1000}{M}$

$= \frac{1000 \times 0.0005}{0.02}$

$= 25\ S\ cm^2\ mol^{-1}$

73. Cation vacancies = $10^{-7} \times N_A$

75. Arrenius equation

$K = Ae^{-\frac{Ea}{RT}}$

Ea = 0, K = A

$\therefore K_{310} = K_{300} = 3.2 \times 10^4\ S^{-1}$

76. Molarity is dependent on temperature

77. $\Delta G^\circ = -nFE^\circ$

$= -2 \times 96500 \times 0.54$

$= -104220$ J

79. Longmuir isotherm is

$$\frac{x}{m}=\frac{ap}{1+bp}$$

At high P

$1 + bp = bp$

then $\frac{x}{m}=\frac{ap}{bp}=\frac{a}{b}$

82. $E^\circ=\frac{0.059}{n}\log K$

$\Rightarrow 1.18=\frac{0.059}{4}\log K$

$\Rightarrow 80 = \log K$

$\Rightarrow 10^{80} = K.$

84. $Fe(OH)_3$ gives a positively charged sol as it absorbs Fe^{3+} ions from $FeCl_3$ solution.

85. $-\frac{d[N_2]}{dt}=\frac{1}{2}\frac{d[NO]}{dt}$

86. $\Delta T_f = K_f \times M$

$4 = \frac{20\times 30}{M_w\times 250}\times 1000$

$M_w=\frac{20\times 30\times 1000}{250\times 4}$

$= 600$

87. $E_1^o = x_1V$

$E_2^o = x_2V$

$E_3^o = ?$

$\Delta G_3^o=\Delta G_2^o-\Delta G_1^o$

$-E_3^o=-2x_2-(-1x_1)$

$E_3^o = 2x_2 - x_1$

88. For CsCl type

$r^+ + r^- =\frac{\sqrt{3}a}{2}$

90. $\frac{0.693}{t_{1/2}}=\frac{2.303}{t_{7/8}}\log\frac{1}{1/8}$

91. NCERT XII, Pg. # 43, Para-2 (E)
NCERT XII, Pg. # 46, Para-3 (H)

92. NCERT XII, Pg. # 61, Para-2 (E)
NCERT XII, Pg. # 68, Para-1 (H)

93. NCERT XII Pg. # 49 (E)
NCERT XII Pg. # 53 (H)

94. NCERT XII Pg. # 64 (E)
NCERT XII Pg. # 71 (H)

95. NCERT Pg. # 126

96. NCERT Pg. # 135,140, 141

98. NCERT Pg. # 21

99. NCERT XII Pg. # 31, Para-2.2.3

100. NCERT XII Pg. # 37, Para-2.4.3

101. NCERT XII, Pg. # 49, Fig.-3.8 (E)
NCERT XII, Pg. # 53, Fig.-3.8 (H)

102. NCERT XII, Pg. # 60,60,61, Para-1,2,2 (E)
NCERT XII, Pg. # 66,67,68, Para-3,3,2 (H)

103. NCERT XII Pg. # 51 (E)
NCERT XII Pg. # 55 (H)

104. NCERT XII Pg. # 60,61 (E)

105. NCERT Pg. # 132

107. NCERT Pg. # 140-141

108. NCERT Pg. # 27

109. Module-1 Pg. # 130

111. NCERT XII, Pg. # 50, Para-1 (E)
NCERT XII, Pg. # 55, Para-1 (H)

112. NCERT XII, Pg. # 62, Para-3-4 (E)
NCERT XII, Pg. # 69, Para-2 (H)

113. NCERT XII Pg. # 50 (E)
NCERT XII Pg. # 54 (H)

114. NCERT XII Pg. # 44 (E)
NCERT XII Pg. # 47 (H)

115. NCERT Pg. # 128

116. NCERT Pg. # 131

117. NCERT Pg. # 134, Fig.-7.7

118. NCERT Pg. # 28

119. NCERT XII Pg.#38,39 Para-2.5, Pg.#36, 37, Para-2.4.3

120. NCERT XII Pg. # 22(E), 23(H)

121. NCERT XII, Pg. # 51, Para-1 (E)
NCERT XII, Pg. # 55, Para-1 (H)

122. NCERT XII, Pg. # 64, Para-3 (E)
NCERT XII, Pg. # 72, Para-1 (H)

123. NCERT XII Pg. # 51 (E)
NCERT XII Pg. # 55, 56 (H)

124. NCERT Pg. # 140, 141

125. NCERT Pg. # 129

126. NCERT Pg. # 128

127. NCERT Pg. # 132

128. NCERT Pg. # 34

129. NCERT XII Pg. # 36, Para-2.4.3

131. NCERT XII, Pg. # 53, Para-1, Fig.-3.11(g) (E)
NCERT XII, Pg. # 57, Para-1, Fig.-3.11(g) (H)

132. Module, AIPMT-2010, Pg. # 91 (E/H)

133. NCERT XII Pg. # 54 (E)
NCERT XII Pg. # 59 (H)

134. NCERT Pg. # 135

135. NCERT Pg. # 134

136. NCERT Pg. # 129

137. NCERT Pg. # 133

138. NCERT Pg. # 35

139. NCERT XII Pg. # 34, Para-2.3

140. NCERT XII Pg. # 22(E), 24(H)

141. NCERT XII, Pg. # 53, Para-3 (E)
NCERT XII, Pg. # 58, Para-2 (H)

142. Module-1, Ex.-1, Pg. # 89, Q-12 (E/H)

143. NCERT XII Pg. # 53 (E)
NCERT XII Pg. # 58 (H)

144. NCERT Pg. # 141

145. NCERT Pg. # 134

146. NCERT Pg. # 135

148. NCERT Pg. # 30

149. NCERT XII Pg. # 28, Para-2.2.3

150. NCERT XII Pg. # 35(E), 37(H)

151. NCERT XII, Pg. # 152, Para-2 (E)
NCERT XII, Pg. # 166, Para-1 (H)

152. NCERT XII Pg. # 44 (E)
NCERT XII Pg. # 47 (H)

153. NCERT XII Pg. # 44, 45, 52, 53 (E)
NCERT XII Pg. # 46,48,56,57 (H)

154. NCERT Pg. # 127

155. NCERT Pg. # 136

156. NCERT Pg. # 132

157. NCERT Pg. # 20

158. NCERT Pg. # Mixed

159. NCERT XII Pg. # 26

160. NCERT XII Pg. # 36(E), 38(H)

161. NCERT XII, Pg. # 53, Para-2 (E)
NCERT XII, Pg. # 58, Para-3 (H)

162. NCERT XII Pg. # 46 (E)
NCERT XII Pg. # 49 (H)
Mons pubis, labia majora, labia minora, hymen, and clitoris are included in female external genitalia

163. NCERT XII Pg. # 50 (E)
NCERT XII Pg. # 54 (H)

164. NCERT Pg. # 127

165. NCERT Pg. # 140

167. NCERT Pg. # 21

168. NCERT Pg. # 36

169. NCERT XII Pg. # 35, Para-2.4.2

170. NCERT XII Pg. # 36(E), 38(H)

171. NCERT XII, Pg. # 60, Para-3 (E)
NCERT XII, Pg. # 67, Para-2 (H)

172. NCERT XII Pg. # 48 (E)
NCERT XII Pg. # 52 (H)

173. NCERT XII Pg. # 60 (E)
NCERT XII Pg. # 66 (H)

174. NCERT Pg. # 131

175. Module Pg. # 148,149

177. NCERT Pg. # 22

178. NCERT XII Pg. # 35, Para-2.4.2

179. NCERT XII Pg. # 36, Para-2.4.3

180. NCERT XII Pg. # 36(E), 38(H)