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)

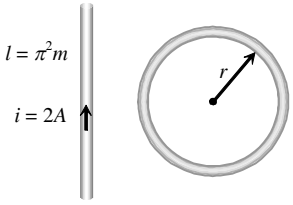
TEST DATE : 07 - 03 - 2020

TEST SYLLABUS : 05

HINT – SHEET

1. If a wire of length ℓ is bent in the form of a circle of radius r then $2\pi r = l \Rightarrow r = \frac{l}{2\pi}$

$$r = \frac{l}{2\pi} = \frac{\pi^2}{2\pi} = \frac{\pi}{2}$$



Magnetic field due to straight wire $B_1 = \frac{\mu_0}{4\pi}\cdot\frac{2i}{r} = \frac{\mu_0}{4\pi}\times\frac{2\times 2}{1\times 10^{-2}}$ also magnetic field due to circular loop $B_2 = \frac{\mu_0}{4\pi}\cdot\frac{2\pi i}{r} = \frac{\mu_0}{4\pi}\cdot\frac{2\pi\times 2}{\pi/2}$

$$\Rightarrow \frac{B_2}{B_1} = \frac{1}{50}$$

2. By Fleming left hand rule.

3. $\vec{\tau} = \vec{M}\times\vec{B} \Rightarrow \vec{\tau} = 50\hat{i}\times(0.5\hat{i}+3\hat{j})$

$= 150\left(\hat{i}\times\hat{j}\right) = 150\hat{k}N\times m.$

4. $U = \frac{1}{2}Li^2 = \frac{1}{2}\times(50\times10^{-3})\times(4)^2 = 400\times10^{-3} = 0.4J$

5. Reading of ammeter $= i_{rms} = \frac{V_{rms}}{X_C} = \frac{V_0\omega C}{\sqrt{2}}$

$$= \frac{200\sqrt{2}\times100\times(1\times10^{-6})}{\sqrt{2}} = 2\times10^{-2}A = 20\ mA$$

6. $B = \frac{\mu_0}{4\pi}\times\frac{2i}{r} = 10^{-7}\times\frac{2\times1}{10^{-2}} = 2\times10^{-5}$ Tesla

7. $C\theta = NBiA$

Current Sensitivity $= \frac{\theta}{i} = \frac{NBA}{C}$

8. At magnetic equator, the angle of dip is 0°. Hence the vertical component $V = I\sin\phi = 0.$

9. $\phi = (\mu_0 ni)(n)(\pi r^2)$

$\phi = (C)n^2 i$

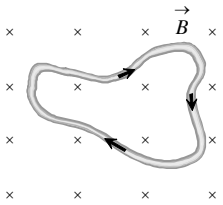
$L \propto n^2$

$L' \propto (2n)^2 = 4L$

10. $V_0 = \sqrt{2}\,V_{rms} = 10\sqrt{2}$

11. $T = \frac{2\pi m}{qB} = \frac{2\pi r}{v} = \frac{2\times3.14\times0.45}{2.6\times10^7} = 1.08\times10^{-7}$ sec

12. As shown in figure, since $\vec{L} = 0$



Hence according to $\vec{F} = i(\vec{L}\times\vec{B}) \Rightarrow \vec{F} = 0$

13. $B_H = B\cos\phi; \therefore B = \frac{B_H}{\cos\phi} = \frac{0.5}{\cos30^\circ} = \frac{0.5}{\sqrt{3}/2} = \frac{1}{\sqrt{3}}$

14. $|e| = L\frac{di}{dt} \Rightarrow 10 = L\times\frac{10}{1} \Rightarrow L = 1H$

15. $P = Vi\cos\phi = V\left(\frac{V}{Z}\right)\left(\frac{R}{Z}\right) = \frac{V^2R}{Z^2} = \frac{V^2R}{(R^2+\omega^2L^2)}$

16. Fleming's left hand rule is used to the determine the direction of force.

17. Since $\theta = 0°$ so $\tau = 0$ $(\because \tau = NiAB\sin\theta)$

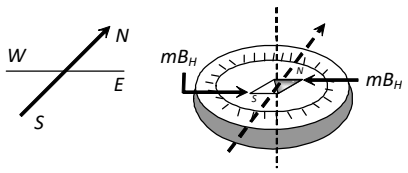
21. Since force is perpendicular to direction of motion. energy and magnitude of momentum remains constant

22. If the radius of circle is r, then $2\pi r = L \Rightarrow r = \frac{L}{2\pi}$

Area $= \pi r^2 = \frac{\pi L^2}{4\pi^2} = \frac{L^2}{4\pi}$

Magnetic moment $= IA = \frac{IL^2}{4\pi}$

23. Magnetic needle is a dipole which is in earth's uniform magnetic field and as a dipole in a uniform field does not experience any net force but may experience a couple as shown in figure, so the needle together with the cork will not translate i.e. move towards the north of the lake, but will rotate and set itself parallel to the field with it's north pole pointing north.



25. $X_L = 100 \times 10^{-3} \times 100\pi = 10\pi$

$X_C = \frac{1}{10\times10^{-12}\times100\pi} = 10^8\pi$

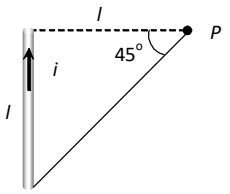
as X_C is greater than X_L so, V_A is greater then V_B

Hence A will glow with more brightness

26. For no deflection in mutually perpendicular electric and magnetic field $v = \frac{E}{B} = \frac{3.2\times10^5}{2\times10^{-3}} = 1.6\times10^8\ m/s$.

If electric field is removed then due to only magnetic field radius of the path described by electron $r = \frac{mv}{qB} = \frac{9.1\times10^{-31}\times1.6\times10^8}{1.6\times10^{-19}\times2\times10^{-3}} = 0.45\ m$

27. The given situation can be redrawn as follow.



As we know the general formula for finding the magnetic field due to a finite length wire

$B = \frac{\mu_0}{4\pi}\cdot\frac{i}{r}(\sin\phi_1 + \sin\phi_2)$

Here $\phi_1 = 0^o, \phi = 45^o$

$\therefore B = \frac{\mu_0}{4\pi}\cdot\frac{i}{r}(\sin0^o + \sin45^o) = \frac{\mu_0}{4\pi}\cdot\frac{i}{\sqrt{2}l} \Rightarrow B = \frac{\sqrt{2}\mu_0 i}{8\pi l}$

28. $I = \frac{e}{R} = \frac{-N(d\phi/dt)}{R} = \frac{10\times10^8\times10^{-4}\times10^{-4}\times10}{20} = 5$

29. $I_{av} = \frac{\int_0^{T/2} i\,dt}{\int_0^{T/2} dt} = \frac{\int_0^{T/2} I_0\sin(\omega t)dt}{T/2}$

$= \frac{2I_0}{T}\left[\frac{-\cos\omega t}{\omega}\right]_0^{T/2} = \frac{2I_0}{T}\left[-\frac{\cos\left(\frac{\omega T}{2}\right)}{\omega} + \frac{\cos0^o}{\omega}\right]$

$= \frac{2I_0}{\omega T}[-\cos\pi + \cos0^o] = \frac{2I_0}{2\pi}[1+1] = \frac{2I_0}{\pi}$

30. λ lies between 10^{-6} m and 10^{-8} m.

31. $M = NiA = 20\times\frac{22}{7}(4\times10^{-2})^2 3 = 0.3\,A-m^2$

32. For a magnet $B = \frac{\mu_0}{4\pi}\cdot\frac{2M}{x^3}$ (Nearly)

$\Rightarrow \frac{B_1}{B_2} = \left(\frac{x_2}{x_1}\right)^3 = \left(\frac{2x}{x}\right)^3 = \frac{8}{1}$

(Approx.)

33. According to Fleming right hand rule, the direction of B will be perpendicular to the plane of paper and act downward.

34. $X_L = R,\ X_C = R/2$

$$\therefore \tan\phi = \frac{X_L - X_C}{R} = \frac{R - \frac{R}{2}}{R} = \frac{1}{2} \Rightarrow \phi = \tan^{-1}(1/2)$$

Also $Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{R^2 + \frac{R^2}{4}} = \frac{\sqrt{5}}{2}R$

35. $c = \frac{E}{B} \Rightarrow B = \frac{E}{c} = \frac{18}{3\times10^8} = 6\times10^{-8}T$

36. $F = \frac{\mu_0}{4\pi}.\frac{2i_1i_2}{a}\times l \Rightarrow F = 10^{-7}\times\frac{2\times10\times2}{(10\times10^{-2})}\times2 = 8\times10^{-5}N$

37. $F = 10^{-7}\times\frac{m^2}{r^2} = \frac{10^{-7}(1)^2}{(1)^2} = 10^{-7}N$

38. $e = Bvl \Rightarrow e \propto v \propto gt$

39. $V = \sqrt{V_R^2 + (V_L - V_C)^2} = \sqrt{(40)^2 + (60-30)^2} = 50V$

40. E_x and B_y would generate a plane EM wave travelling in z-direction. $\vec{E}$, $\vec{B}$ and $\vec{k}$ form a right handed system $\vec{k}$ is along z-axis. As $\hat{i}\times\hat{j} = \hat{k}$.

41. $\tau = MB\sin\theta \Rightarrow \tau_{max} = NiAB \qquad (\theta = 90°)$

42. Potential energy $U = -MB\cos\theta$

$\Rightarrow U_{max} = MH(\text{at}\ \theta = 180°)$

43. $e = M\frac{di}{dt} = 0.2\times5 = 1V$

44. $X_C = \frac{1}{2\pi\nu C} \Rightarrow X_C \propto \frac{1}{\nu}$

45. The charging of inductance is given by :

$$I = I_0[1-e^{-Rt/L}]$$

$$\therefore \quad \frac{I_0}{2} = I_0[1-e^{-Rt/L}]$$

$$\text{or} \quad -e^{-Rt/L} = \frac{1}{2}$$

$$\text{or} \quad \frac{Rt}{L} = \log 2$$

$$\text{or} \quad t = \frac{0.693\times300\times10^{-3}}{2} = 0.1\ \text{s.}$$

91. NCERT XII, Pg. # 85

92. NCERT Pg. # 107

93. NCERT Pg. # 181

94. NCERT Pg. # 174

95. NCERT Pg. # 201

96. NCERT Pg. # 211

97. NCERT XII, Pg. # 77, table 5.2

Four phenotypes

A, B, AB and O.

98. NCERT XII Pg. # 87 para 5.6.1

99. NCERT XII, Pg. # 171

100. NCERT XII, Pg. # 101, 10.1

101. NCERT XII, Pg. # 86

102. NCERT Pg. # 101

103. NCERT Pg. # 182

104. NCERT Pg. # 176

105. NCERT Pg. # 201

106. NCERT Pg. # 212

107. Module 2 Pg. # 17

Parents AABBCC × aabbcc

↓

AaBbCc (Intermediate colour in offspring)

108. NCERT XII Pg. # 99 fig. 6.4 b

109. NCERT XII, Pg. # 176 para 9.3

110. NCERT XII, Pg. # 103, 10.2.3

111. NCERT Pg. # 91

112. NCERT Pg. # 109

114. NCERT Pg. # 177

115. NCERT Pg. # 203

116. NCERT Pg. # 213

117. Module 2 Pg. # 15

118. NCERT XII, Pg. # 104, 106

119. NCERT XII, Pg. # 177

120. NCERT XII, Pg. # 186 fig. 10.8

121. NCERT Pg. # 137

122. NCERT XII, Pg. # 112

123. NCERT Pg. # 185

124. NCERT Pg. # 176

125. NCERT Pg. # 199

126. NCERT Pg. # 214

127. NCERT XII, Pg. # 83

128. NCERT XII, Pg. # 104

129. NCERT XII, Pg. # 177

130. NCERT XII. Pg. # 211, 12.3

131. NCERT Pg. # 88

132. NCERT Pg. # 115

133. NCERT Pg. # 187

134. NCERT Pg. # 195

135. NCERT Pg. # 209

136. NCERT Pg. # 213

137. Colour blindness - X linked recessive

woman CC × man C-

↓

Cc Cc C_ C_

Normal colourblind

daughters sons

138. NCERT XII, Pg. # 102, Fig. 6.5

139. NCERT XII, Pg. # 194

140. NCERT XII. Pg. # 212, 12.2.3

141. NCERT XII, Pg. # 88

142. NCERT Pg. # 115

143. NCERT Pg. # 188

144. NCERT Pg. # 196

145. NCERT Pg. # 208

146. NCERT Pg. # 71

147. NCERT XII Pg. # 83

148. NCERT XII, Pg. # 108, Fig. 6.9

149. NCERT XII. Pg. # 200,201

150. NCERT XII. Pg. # 213

151. NCERT XII, Pg. # 96

152. NCERT Pg. # 121

153. NCERT Pg. # 181

154. NCERT Pg. # 199

155. NCERT Pg. # 209

156. NCERT Pg. # 71

157. NCERT XII, Pg. # 88

Carrier present in X-linked recessive trait.

158. NCERT XII, Pg. # 111

159. NCERT XII. Pg. # 196

160. NCERT XII. Pg. # 213

161. NCERT XII, Pg. # 99

162. NCERT XII, Pg. # 119

163. NCERT Pg. # 173

164. NCERT Pg. # 200

165. NCERT Pg. # 208

166. NCERT Pg. # 85

167. NCERT XII, Pg. # 91

168. NCERT XII, Pg. # 112, Table 6.1

169. NCERT XII. Pg. # 196 Fig. 11.1

170. NCERT XII Pg. # 214

171. NCERT XII, Pg. # 106

172. NCERT Pg. # 119

173. NCERT Pg. # 174

174. NCERT Pg. # 199

175. NCERT Pg. # 211

176. NCERT XII, Pg. # 71, table 5.1

Flower colour, flower position

pod shape, pod colour

seed shape, seed colour

177. Module 2 Pg. # 3 107

178. NCERT IX, Pg. # 115

Initiator codon – AUG

stop codon - UAA

UAG

UGA

179. NCERT XII. Pg. # 200 para 11.2.3

180. Transposons are jumping genes. DNA fragments become visible only after staining with ethidium bromide in gel electrophoresis.