PHYSICS

141. A and B are two points on a uniform ring of resistance R. The $\overset{\frown}{ACB} = \theta$, where C is the centre of the ring. The equivalent resistance between A and B is

(1) $\frac{R\theta(2\pi-\theta)}{4\pi^2}$ (2) $R\left(1-\frac{\theta}{2\pi}\right)$

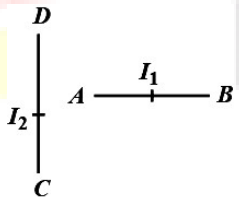
(3) $\frac{R\theta}{2\pi}$ (4) $\frac{R(2\pi-\theta)}{4\pi}$

142. A moving coil galvanometer has a resistance of 900 Ω. In order to send only 10% of the main current through this galvanometer, the resistance of the required shunt is

(1) 0.9 Ω (2) 100 Ω

(3) 405 Ω (4) 90 Ω

143. A current I_1 carrying wire AB is placed near another long wire CD carrying current I_2. If wire AB is free to move, it will have



(1) rotational motion only

(2) translational motion only

(3) rotational as well as translational motion

(4) neither rotational nor translational motion

144. The velocity of certain ions that pass undeflected through crossed electric field E = 7.7 kV m^{-1} and magnetic field B = 0.14 T is

(1) 18 km s^{-1} (2) 77 km s^{-1}

(3) 55 km s^{-1} (4) 1078 km s^{-1}

145. A charged particle moves through a magnetic field perpendicular to its direction. Then

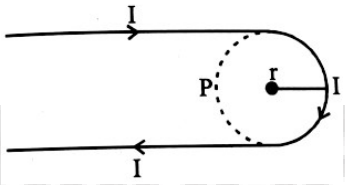
(1) kinetic energy changes but the momentum is constant

(2) the momentum changes but the kinetic energy is constant

(3) both momentum and kinetic energy of the particle are changes

(4) both momentum and kinetic energy of the particle are constant

146. A hairpin like shape as shown in figure is made by bending a long current carrying wire. What is the magnitude of a magnetic field at point P which lies on the centre of the semicircle?



(1) $\frac{\mu_0 I}{4\pi r}(2+\pi)$ (2) $\frac{\mu_0 I}{4\pi r}(2-\pi)$

(3) $\frac{\mu_0 I}{2\pi r}(2-\pi)$ (4) $\frac{\mu_0 I}{2\pi r}(2+\pi)$

147. A large solenoid of windings of 400 turns per meter carries a current 5 A. The magnetic field at the centre of the solenoid is about

(1) 1.2 mT (2) zero

(3) 5.0 mT (4) 2.5 mT

148. A long, straight wire of radius a carries a current distributed uniformly over its cross-section. The ratio of the magnetic fields due to the wire at distance $\frac{a}{3}$ and 2a, respectively from the axis of the wire is

(1) $\frac{2}{3}$ (2) 2

(3) $\frac{1}{2}$ (4) $\frac{3}{2}$

149. A square loop is carrying a steady current I and magnitude of its magnetic dipole moment is m. If this square loop is changed to a circular loop and it carries the same current, the magnitude of the magnetic dipole moment of circular loop will be

(1) $\frac{m}{\pi}$ (2) $\frac{3m}{\pi}$

(3) $\frac{2m}{\pi}$ (4) $\frac{4m}{\pi}$

150. A current i ampere flows along an infinitely long straight thin walled tube, then the magnetic induction at any point inside the tube is

(1) $\frac{\mu_0}{4\pi}.\frac{2i}{r}$ tesla (2) Zero

(3) infinite (4) $\frac{2i}{r}$ tesla