PHYSICS

151. A long wire carries a steady current. It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be

(1) 2nB (2) n^2B
(3) nB (4) $2n^2B$

152. A small circular loop of conducting wire has radius a and carries current I. It is placed in a uniform magnetic field B perpendicular to its plane such that when rotated slightly about its diameter and released, it starts performing simple harmonic motion of time period T. If the mass of the loop is m, then

(1) $T=\sqrt{\frac{2m}{IB}}$ (2) $T=\sqrt{\frac{\pi m}{2IB}}$
(3) $T=\sqrt{\frac{2\pi m}{IB}}$ (4) $T=\sqrt{\frac{\pi m}{IB}}$

153. A charge q i s spread uniformly over an insulated loop of radius r. If it is rotated with an angular velocity ω with respect to normal axis then the magnetic moment of the loop is

(1) $\frac{1}{2}q\omega r^2$ (2) $\frac{4}{3}q\omega r^2$
(3) $\frac{3}{2}q\omega r^2$ (4) $q\omega r^2$

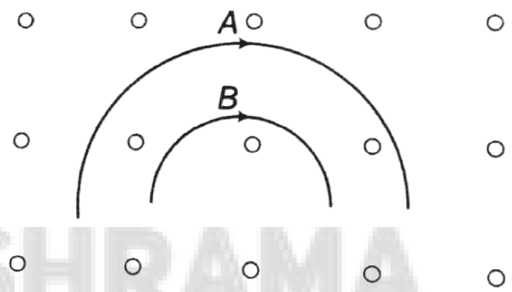
154. A galvanometer of resistance G is converted into a voltmeter of range 0-1V by connecting a resistance R_1 in series with it. The additional resistance that should be connected in series with R_1 to increase the range of the voltmeter to 0-2V will be

(1) G (2) R_1
(3) $R_1 - G$ (4) $R_1 + G$

155. If a current is passed through a spring then the spring will

(1) expand
(2) compress
(3) remains same
(4) none of these

156. Two particles A and B of masses m_A and m_B respectively and having the same charge are moving in a plane. A uniform magnetic field exists perpendicular to this plane. The speeds of the particles are v_A and v_B respectively and the trajectories are as shown in the figure. Then



(1) $m_Av_A < m_Bv_B$
(2) $m_Av_A > m_Bv_B$
(3) $m_A < m_B$ and $v_A < v_B$
(4) $m_A = m_B$ and $v_A = v_B$

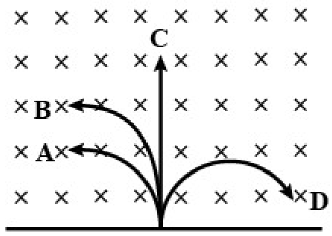
157. A charged particle is released from rest in a region of steady and uniform electric and magnetic fields which are parallel to each other. The particle will move in a

(1) straight line (2) circle
(3) helix (4) cycloid

158. A proton, a deutron and an α-particle having the same kinetic energy are moving in circular trajectories in a constant magnetic field. If r_p, r_d and r_α denote, respectively the radii of the trajectories of these particles, then

(1) $r_\alpha = r_p < r_d$ (2) $r_\alpha > r_d > r_p$
(3) $r_\alpha = r_d > r_p$ (4) $r_p = r_d = r_\alpha$

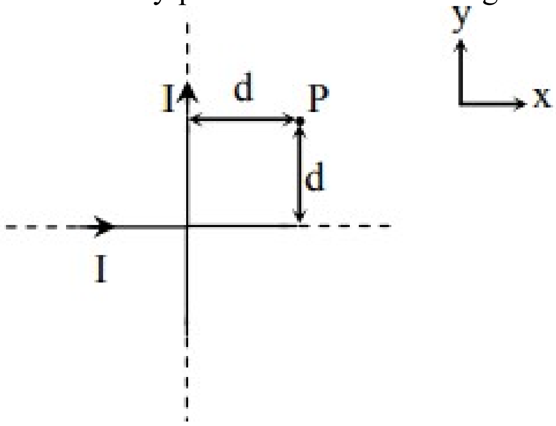
159. A neutron, a proton, an electron and an alpha particle enter a region of constant magnetic field with equal velocities. The magnetic field is along the inward normal to the plane of the paper. The tracks of the particles are labelled in figure. The electron follows track … and the alpha particle follows track …



(1) D, B (2) C, A

(3) A, D (4) A, C

160. Two very long, straight and insulated wires are kept at 90° angle from each other in xy-plane as shown in the figure.



These wires carry currents of equal magnitude I, whose directions are shown in the figure. The net magnetic field at point P will be

(1) Zero (2) $\frac{+\mu_0 I}{\pi d}(\hat{z})$

(3) $-\frac{\mu_0 I}{2\pi d}(\hat{x}+\hat{y})$ (4) $\frac{\mu_0 I}{2\pi d}(\hat{x}+\hat{y})$