

O P JINDAL SCHOOL, SAVITRINAGAR

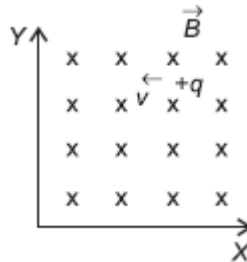
CLASS TEST & PRACTICE

CLASS XII PHYSICS

TOPIC : MOVING CHARGES AND MAGNETISM

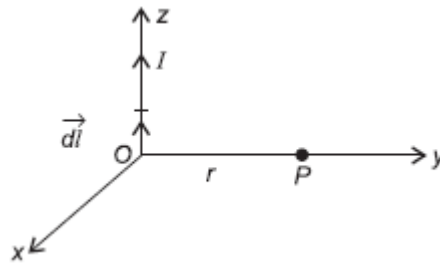
- 1 Show that the period of a revolution of an ion is independent of its speed and radius of the orbit. Write two important uses of a cyclotron. 2

- 2 A point charge is moving with a constant velocity perpendicular to a uniform magnetic field as shown in the figure. What should be the magnitude and direction of the electric field so that the particle moves undeviated along the same path?



- 3 A straight wire of length L is bent into a semicircular loop. Use Biot–Savart law to deduce an expression for the magnetic field at its centre due to the current I passing through it. 2

- 4 State Biot-Savart law. A current I flows in a conductor placed perpendicular to the plane of the paper. Indicate the direction of the magnetic field due to a small element $d\vec{l}$ at point P situated at a distance r from the element as shown in the figure.



- 5 Two charged particles traverse identical helical paths in a completely opposite sense in a uniform magnetic field $\mathbf{B} = B_0 \hat{k}$.
 - (a) They have equal z-components of momenta.
 - (b) They must have equal charges. 1
 - (c) They necessarily represent a particle-antiparticle pair.
 - (d) The charge to mass ratio satisfy:
$$\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$$

- 6 Biot-Savart law indicates that the moving electrons (velocity v) produce a magnetic field \mathbf{B} such that 1

- (a) $B \perp v$.
 (b) $B \parallel v$.
 (c) it obeys inverse cube law.
 (d) it is along the line joining the electron and point of observation.
- 7 A current carrying circular loop of radius R is placed in the x - y plane with centre at the origin. Half of the loop with $x > 0$ is now bent so that it now lies in the y - z plane. [NCERT Exemplar]
- (a) The magnitude of magnetic moment now diminishes. 1
 (b) The magnetic moment does not change.
 (c) The magnitude of B at $(0,0,z)$, $z \gg R$ increases.
 (d) The magnitude of B at $(0,0,z)$, $z \gg R$ is unchanged.
- 8 An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?
- (a) The electron will be accelerated along the axis. 1
 (b) The electron path will be circular about the axis.
 (c) The electron will experience a force at 45° to the axis and hence execute a helical path.
 (d) The electron will continue to move with uniform velocity along the axis of the solenoid.
- 9 In a cyclotron, a charged particle
- (a) undergoes acceleration all the time.
 (b) speeds up between the dees because of the magnetic field. 1
 (c) speeds up in a dee.
 (d) slows down within a dee and speeds up between dees.
- 10 A circular current loop of magnetic moment M is in an arbitrary orientation in an external magnetic field B . The work done to rotate the loop by 30° about an axis perpendicular to its plane is
- (a) MB (b) $\sqrt{3} \frac{MB}{2}$ 1
 (c) $\frac{MB}{2}$ (d) zero