# O P JINDAL SCHOOL, SAVITRINAGAR

***CLASS TEST & PRACTICE***

CLASS XII PHYSICS TOPIC : MOVING CHARGES AND MAGNETISM

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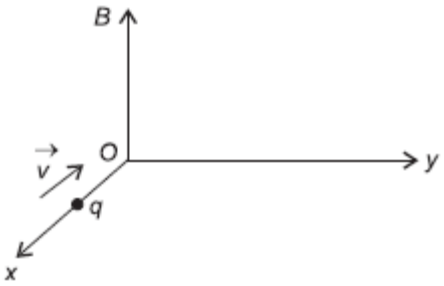
1 A straight wire of length *L*, carrying a current *I*, stays suspended horizontally in mid air in a region where there is a uniform magnetic field $\vec{B}$. The linear mass density of the wire is λ. Obtain the magnitude and direction of this magnetic field. 2

2 A particle of charge *q* and mass *m* is moving with velocity $\vec{v}$. It is subjected to a uniform magnetic field $\vec{B}$ directed perpendicular to its velocity. Show that it describe a circular path. Write the expression for its radius. 2

3 Write the expression for Lorentz magnetic force on a particle of charge *q* moving with velocity $\vec{v}$ in a magnetic field $\vec{B}$. Show that no work is done by this force on the charged particle. 2

4 A charge q moving along the x-axis with a velocity $\vec{v}$ is subjected to a uniform magnetic field B acting along the z-axis as it crosses the origin O. 2




(i) Trace its trajectory.

(ii) Does the change gain kinetic energy as it enters the magnetic field? Justify your answer.

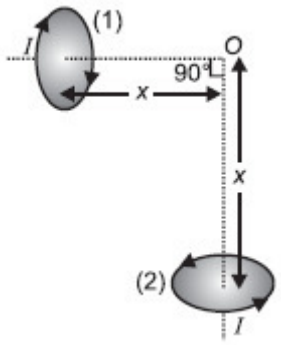
5 (i) Name the machine which uses crossed electric and magnetic fields to accelerate the ions to high energies. With the help of a diagram, explain the resonance condition. 2
(ii) What will happen to the motion of charged particle if the frequency of the alternating voltage is doubled?

6 What is velocity selector? Write its uses. 2

7 Both, the electric and magnetic fields can deflect a moving electron. What is the difference between these deflections? 2

8 State the underlying principle of a cyclotron. Write briefly how this machine is used to accelerate charged particles to high energies. 2

9 Two very small identical circular loops, (1) and (2), carrying equal currents I are placed vertically (with respect to the plane of the paper) with their geometrical axes perpendicular to each other as shown in the figure. Find the magnitude and direction of the net magnetic field produced at the point O.

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10 Two identical circular wires P and Q each of radius R and carrying current I are kept in perpendicular planes such that they have a common centre as shown in the figure. Find the magnitude and direction of the net magnetic field at the common centre of the two coils.

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