O P JINDAL SCHOOL, SAVITRINAGAR

CLASS TEST & PRACTICE

CLASS XII PHYSICS TOPIC : MOVING CHARGES AND MAGNETISM

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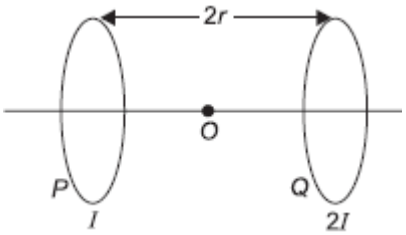
1 Two identical circular loops, P and Q, each of radius r and carrying currents I and 2I respectively are lying in parallel planes such that they have a common axis.



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The direction of current in both the loops is clockwise as seen from O which is equidistant from both loops. Find the magnitude of the net magnetic field at point O.

2 A circular coil of N turns and radius R carries a current I. It is unwound and rewound to make another coil of radius R/2, current I remaining the same. Calculate the ratio of the magnetic moments of the new coil and the original coil. 2

3 A wire of uniform cross-section is bent into a circular loop of radius R. Consider two points A and B on the loop, such that ∠ AOB = θ as shown. If now a battery is connected between A and B, show that the magnetic field at the centre of the loop will be zero irrespective of angle θ.

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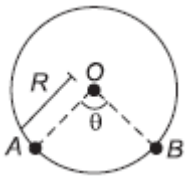

4 How is a moving coil galvanometer converted into a voltmeter? Explain, giving the necessary circuit diagram and the required mathematical relation used. 2

5 Define the current sensitivity of a moving coil galvanometer. “Increasing the current sensitivity may not necessarily increase the voltage sensitivity.” Justify this statement. 2

6 Deduce the expression for the magnetic dipole moment of an electron orbiting around the central nucleus. 2

7 A charged particle of mass *m* and charge q moving at uniform velocity *v*, enters a uniform magnetic field *B* acting normal to the plane of the paper. Deduce expression for the (*i*) radius of the circular path in which it travels and (*ii*) kinetic energy of the particle. 2

8 A charge q moving in a straight line is accelerated by a potential difference V. It enters into a uniform magnetic field B perpendicular to its path. Deduce, in terms of V, an expression for the radius of the circular path in which it travels. 2

9 (a) Write the expression for the magnetic force acting on a charged particle moving with velocity v in the presence of magnetic field B.
(b) A neuron, an electron and an alpha particle moving with equal velocities, enter a uniform magnetic field going into the plane of the paper as shown. Trace their paths in the field and justify your answer.

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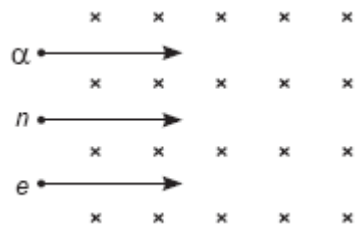

10 An α-particle and a proton moving with the same speed enter the same magnetic field region at right angles to the direction of the field. Show the trajectories followed by the two particles in the region of the magnetic field. Find the ratio of the radii of the circular paths which the two particles may describe.

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