

ASSIGNMENT FOR CLASS – XII:

PHYSICS - CLASS XI

Important Questions in Magnetic Effects of Current and Magnetism

1. An electron travels on a circular path of radius 10m in a magnetic field of 2×10^{-3} T. Calculate the speed of electron. What is the potential difference through which it must be accelerated to acquire this speed? [Ans. : Speed = 3.56×10^9 m/s; $V = 3.56 \times 10^7$ volts]
2. A ship is to reach a place 15° south of west. In what direction should it be steered if declination at the place is 18° west? [Ans. : 87° west of North]
3. Calculate the magnetic field due to a circular coil of 500 turns and of mean diameter 0.1m, carrying a current of 14A (i) at a point on the axis distance 0.12m from the centre of the coil (ii) at the centre of the coil. [Ans. : (i) 5.0×10^{-3} Tesla; (ii) 8.8×10^{-2} tesla]
4. An electron of kinetic energy 10 keV moves perpendicular to the direction of a uniform magnetic field of 0.8 milli tesla. Calculate the time period of rotation of the electron in the magnetic field.
[Ans. : 4.467×10^{-8} s.]
5. If the current sensitivity of a moving coil galvanometer is increased by 20% and its resistance also increased by 50% then how will the voltage sensitivity of the galvanometer be affected?
[Ans. : 25% decrease]
6. A uniform wire is bent into one turn circular loop and same wire is again bent in two turn circular loop. For the same current passed in both the cases compare the magnetic field induction at their centres.
[Ans. : Increased 4 times]
7. A horizontal electrical power line carries a current of 90A from east to west direction. What is the magnitude and direction of magnetic field produced by the power line at a point 1.5m below it?
[Ans. : 1.2×10^{-5} T south ward]
- *8. A galvanometer with a coil of resistance 90Ω shows full scale deflection for a potential difference 225 mV. What should be the value of resistance to convert the galvanometer into a voltmeter of range 0V to 5V. How should it be connected?
[Ans. : 1910Ω in series]

State Biot-Savart law. Use it to obtain the magnetic field at an axial point, distance d from the centre of a circular coil of radius 'a' and carrying current I . Also compare the magnitudes of the magnetic field of this coil at its centre and at an axial point for which the value of d is $\sqrt{3}a$.

Write an expression for the force experienced by a charged particle moving in a uniform magnetic field B . With the help of diagram, explain the principle and working of a cyclotron. Show that cyclotron frequency does not depend on the speed of the particle.

Name all the three elements of earth magnetic field and define them with the help of relevant diagram.

Describe the path of a charged particle moving in a uniform magnetic field with initial velocity

- (i) parallel to (or along) the field.
- (ii) perpendicular to the field.
- (iii) at an arbitrary angle θ ($0^\circ < \theta < 90^\circ$).

Obtain an expression for the magnetic moment of an electron moving with a speed 'v' in a circular orbit of radius 'r'. How does this magnetic moment change when :

- (i) the frequency of revolution is doubled?
- (ii) the orbital radius is halved?

What will be (i) Pole strength (ii) Magnetic moment of each of new piece of bar magnet if the magnet is cut into two equal pieces :

- (a) normal to its length?
- (b) along its length?

A steady current I flows along an infinitely long straight wire with circular cross-section of radius R . What will be the magnetic field outside and inside the wire at a point r distance far from the axis of wire?

A circular coil of n turns and radius R carries a current I . It is unwound and rewound to make another square coil of side 'a' keeping number of turns and current same. Calculate the ratio of magnetic moment of the new coil and the original coil.

A 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 remaining the same. Calculate the ratio of the magnetic moment of the new coil and original coil.

At a place horizontal component of the earths magnetic field is B and angle of dip at the place is 60° . What is the value of horizontal component of the earths magnetic field.

- (i) at Equator; (ii) at a place where dip angle is 30°

A galvanometer coil has a resistance G . 1% of the total current goes through the coil and rest through the shunt. What is the resistance of the shunt?

Prove that the magnetic moment of a hydrogen atom in its ground state is $eh/4\pi m$. Symbols have their usual meaning.