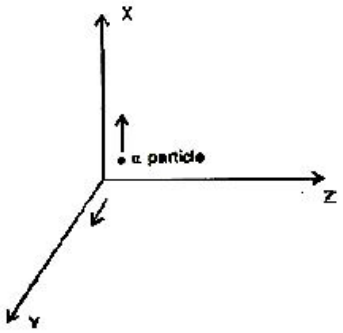
CBSE 12th Physics
Unsolved Important Questions
Chapter 4

1 Mark Questions:

Q.1. Why should the spring. suspension in a moving coil galvanometer have low torsional constant?

Q.2. An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of the magnetic field?

Q.3. A beam of particles projected along + x - axis, experiences a force due to a magnetic field along the + y - axis. What is the direction of the magnetic field?

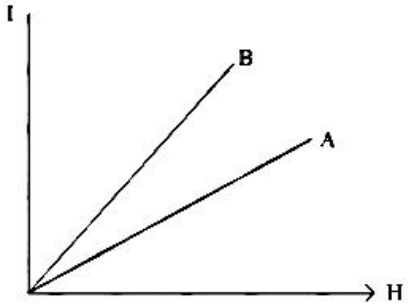


Q.4. The motion of copper plate is damped when it is allowed to oscillate between the two poles of a magnet. What is the cause of this damping?

Q.5. Write the expression, in a vector form, for the magnetic Lorentz force $\vec{F}$ experienced by a change q moving with velocity $\vec{V}$ in a magnetic field $\vec{B}$. What is the direction of the magnetic force?

2 Mark Questions:

Q.6. The following figure show the variation of intensity of magnetization versus the applied magnetic field intensity, H for two magnetic materials A and B:



(a) Identify the materials A and B.

(b) Why does the material B, have larger susceptibility than A, for a given field at constant temperature?

Q.7. Using Ampere's circuital law, obtain an expression for the magnetic field along the axis of a current solenoid of length and having N number of turns.

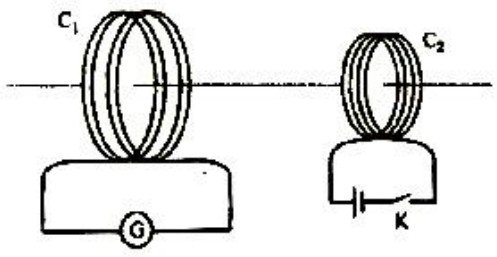
Q.8. What is the magnitude of the equatorial and axial field due to a bar magnet of length?5. 0 cm at a distance of 50cm from its mid-point? the magnetic moment of the bar magnet is 0.40 Am^2.

Q.9. Write the expression for Lorentz magnetic force on a particle of charge 'q' moving with velocity $\vec{v}$ in a magnetic field $\vec{B}$.

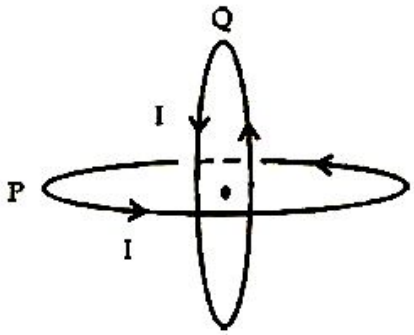
Q.10. A circular coil of N turns and radius R carries a current I. It is unwound and rewound to make another coil of radius R/2. Current I remaining the same. Calculate the ratio of the magnetic moments of the new coil and the original coil.

Q.11. Write two properties of a material suitable for making (a) a permanent magnet, and (b) an electromagnet.

Q.12. A current is induced in coil C_1 due to the motion of current carrying coil C_2 .
(a)Write any two ways by which a large deflection can be obtained in the galvanometer G.
(b) Suggest an alternative device to demonstrate the induced current in place of a galvanometer.



Q.13. 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 center as shown in the figure. Find the magnitude and direction of the net magnetic field at the common center of the two coils.



Q.14. Calculate the force per unit length on a long straight wire carrying current of 4A due to a parallel wire carrying 6A current. Distance between the wires is 3 cm.

Q.15. An ammeter of resistance 0.80Ω can measure current up to 1.0A.

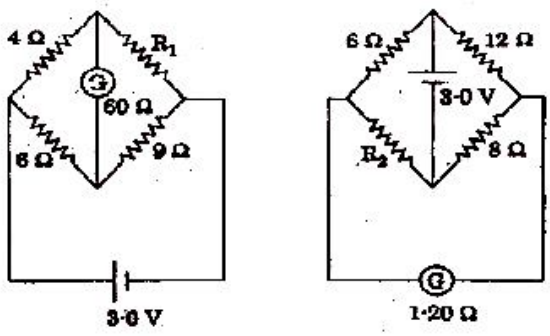
(i) What must be the value of shunt resistance to enable the ammeter to measure current up to 5.0A?

(ii) What is the combined resistance of the ammeter and the shunt?

3 Mark Questions:

Q.16. To increase the current sensitivity a moving coil galvanometer by 50 %, its resistance is increased so that the new resistance becomes twice its resistance becomes twice its initial resistance. By how fast does its voltage sensitivity change?

Q.17. Define the current sensitivity of a galvanometer. Writer its S.I. unit figure shows two circuits each having galvanometer and a battery of 3 V. when the galvanometers in each arrangement do not show any deflection, obtain the ration R_1/R_2.



Q.18. (a) Using biota-savart's law, derive the expression for the magnetic field in the vector form at a point on the axis of a circular current loop.

(b) What does a toroid consist of? find out the expression for the magnetic field a toroid for N turns of the coil having the average radius r and carrying a current I. show that the magnetic field in the open space inside and exterior to the toroid is zero.

Q.19. (a) Draw a schematic sketch of a cyclotron. Explain clearly the role of crossed electric and magnetic field in accelerating the charge. Hence derive the expression for the kinetic energy acquired by the particles.

(b) An - particle and a proton are released from the center of the cyclotron and made to Accelerate.

(i) Can both be accelerated at the same cyclotron frequency? give reason to justify your answer.

(ii) When they are accelerated in turn, which of the two will have higher velocity at the exit slit of the Dees?

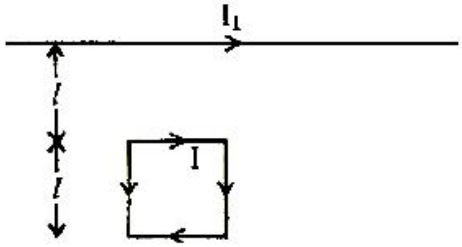
Q.20. (a) State Biot – Savart law and express this law in the vector form.

(b) Two identical circular coils, P and Q each of radius R, carrying currents 1A and $\sqrt{3}\,A$ respectively, are placed concentrically and perpendicular to each other lying in the XY and YZ planes. Find the magnitude and direction of the net magnetic field at the centre of the coils

Q.21. Derive the expression for force per unit length between two long straight parallel current carrying conductors. Hence define one ampere.

Q.22. Write the expression for the magnetic moment ($\vec{m}$)due to a planar square loop of side 'l' carrying a steady current I in a vector form.

In the given figure this loop is placed in a horizontal plane near a long straight conductor carrying a steady current i_1 at a distance l as shown. Give reasons to explain that the loop will experience a net force but no torque. Write the expression for this force acting on the loop.



Q.23. A long straight wire of a circular cross-section of radius 'a' carries a steady current 'I'. The current is uniformly distributed across the cross-section. Apply Ampere's circuital law to calculate the magnetic field at a point 'r' in the region for (i) r < a and (ii) r > a.

Q.24. State the underlying principle of working of a moving coil galvanometer. Write two reasons why a galvanometer cannot be used as such to measure current in a given circuit. Name any two factors on which the current sensitivity of a galvanometer depends.

Q. 25 (a) State Ampere's circuital law, expressing it in the integral form.

(b) Two long coaxial insulated solenoids, S_1 and S_2 of equal lengths are wound one over the other as shown in the figure. A steady current "I" flow through the inner solenoid S_1 to the other end B, which is connected to the outer solenoid S_2 through which the same current "I" flows in the opposite direction so as to come out at end A. If n_1 and n_2 are the number of turns per unit length, find the magnitude and direction of the net magnetic field at a point

(i) inside on the axis and

(ii) outside the combined system.

Q.26. (a) Define the term 'self-inductance' and write its S.I. unit.

(b) Obtain the expression for the the mutual inductance of two long co-axial solenoids S_1 *and* S_2 wound one over the other, each of length L and radii r_1 *and* r_2 *and* n_1 *and* n_2 number of turns per unit length, when a current I is set up in the outer solenoid S_2.

Q.27. (i) Obtain the expression for the cyclotron frequency.

(ii) A deuteron and a proton are accelerated by the cyclotron. Can both be accelerated with the same oscillator frequency? Give reason to justify your answer.

Q.28. A bar magnet of magnetic moment 6 J/T is aligned at 60° with a uniform external magnetic field of 0.44 T. Calculate (a) the work done in turning the magnet of align its magnetic moment (i) normal to the magnetic field, (ii) opposite to the magnetic field, and (b) the torque on the magnet in the final orientation in case (ii).

5 Marks Questions:

Q.29. (a) Two straight long parallel conductors carry currents I_1 and I_2 in the same direction, deduce the expression for the force per unit length between them. Depict pattern of magnetic field lines around them.

(b) A rectangular current carrying loop EFGH is kept in a uniform magnetic field as shown in the figure.

(i) what is the direction of the magnetic moment of the current loop?

(ii) when is the torque acting on the loop
(A) maximum, (B) Zero?

Q.30. (a) With the help of a diagram, explain the principle and working of a moving coil galvanometer.

(b) What is the importance of a radial magnetic field and how is it produced?

(c) Why is it that while using a moving coil galvanometer as a voltmeter a high resistance series is.

Q.31. (a) Using Ampere's circuital law, obtain the expression for the magnetic field due to a long solenoid at a point inside the solenoid on its axis.

(b) In what respect is a toroid different from a solenoid? Draw and compare the pattern of the magnetic field lines in the two cases.

(c) How is the magnetic field inside a given solenoid made strong?

Q.32. (a) Write the expression for the force, $\vec{F}$, acting on a charged particle of charge 'q' moving with a velocity $\vec{v}$ in the presence of both electric field $\vec{E}$ and magnetic field $\vec{B}$. Obtain the condition under which the particle moves undeflected through the fields.
(b) A rectangular loop of size $l \times b$ carrying a steady current I is placed in a uniform magnetic field $\vec{B}$. Prove that the torque $\vec{\tau}$ acting on the loop is given by $\vec{\tau} = \vec{m} \times \vec{B}$, where m is the magnetic moment of the loop.

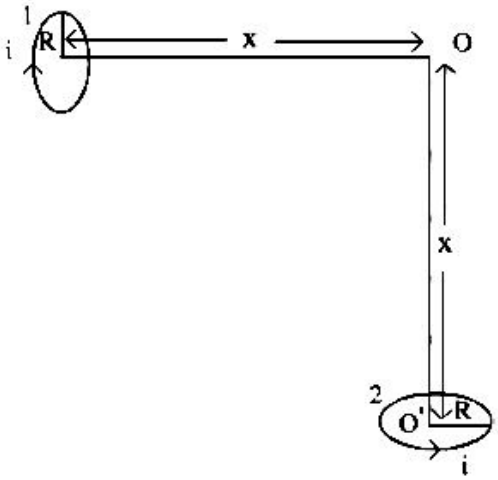
Q.33. (a) Explain giving reasons, the basic difference in converting a galvanometer into (i) a voltmeter and (ii) and ammeter.

(b) Two long straight parallel conductors carrying steady currents I_1 and I_2 are separated by a distance 'd'. Explain briefly, with the help of a suitable diagram, how the magnetic field due to one conductor acts on the other. Hence deduce the expression for the force acting between the two conductors. Mention the nature of this force.

Q.34. Deduce an expression for the frequency of revolution of a charged particle in a magnetic field and show that it is independent of velocity or energy of the particle.

Q.35. (a) Using Biota-Savart's law, derive an expression for the magnetic field at the center of a circular coil of radius R, number of turns N, carrying current.

(b) two small identical circular coils marked 1, 2 carry equal currents and are placed with their geometric axis perpendicular to each other as shown in the figure.
Derive an expression for the resultant magnetic field at O.



Q.36. State Biot-Savart law, giving the mathematical expression for it. Use this law to derive the expression for the magnetic field due to a circular coil carrying current at a point along its axis. How does a circular loop carrying current behave as a magnet?