BCM SCHOOL, BASANT AVENUE, DUGRI ROAD, LUDHIANA

ASSIGNMENT

SUBJECT – PHYSICS

CLASS – XII

CHAPTER – MOVING CHARGES & MAGNETISM

CHAPTER 4

Moving Charges and Magnetism

1. MOTION AND FORCE IN A MAGNETIC FIELD

Objective Qs (1 mark)

1. An electron is moving along positive x-axis in a magnetic field which is parallel to the positive y-axis. In what direction will the magnetic force be acting on the electron?
   (a) Along $-x$ axis
   (b) Along $-z$ axis
   (c) Along $+z$ axis
   (d) Along $-y$ axis

   [CBSE SQP 2023]

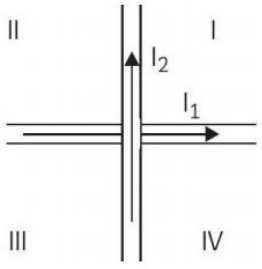
2. An ammeter of resistance 0.81Ω reads up to 1 A. The value of the required shunt to increase the range to 10 A is:
   (a) 0.9Ω
   (b) 0.09Ω
   (c) 0.03Ω
   (d) 0.3Ω

   [CBSE SQP 2023]

3. An electron with angular momentum L moving around the nucleus has a magnetic moment given by:
   (a) $\frac{eL}{2m}$
   (b) $\frac{eL}{3m}$
   (c) $\frac{eL}{4m}$
   (d) $\frac{eL}{m}$

   [CBSE SQP 2023]

4. Two wires carrying currents I_1 and I_2 lie, one slightly above the other in a horizontal plane as shown in figure.



The region of vertically upward strongest magnetic field is:
(a) I

(b) II
(c) III
(d) IV

[CBSE Term-1 2021]

5. A current carrying wire kept in a uniform magnetic field will experience a maximum force when it is:

   (a) perpendicular to the magnetic field

   (b) parallel to the magnetic field

   (c) at an angle of $45°$ to the magnetic field

   (d) at an angle of $60°$ to the magnetic field

   [CBSE Term-1 2021]

6. A straight conducting rod of length l and mass m is suspended in a horizontal plane by a pair of flexible strings in a magnetic field of magnitude B. To remove the tension in the supporting strings, the magnitude of the current in the wire is:
   (a) $\frac{mgB}{l}$
   (b) $\frac{mgl}{\mathrm{B}}$
   (c) $\frac{mg}{lB}$
   (d) $\frac{\mathrm{lB}}{mg}$

   [CBSE Term-1 2021]

7. An electron is released from rest in a region of uniform electric and magnetic fields acting parallel to each other. The electron will:

   (a) move in a straight line

   (b) move in circle

   (c) remain stationary

   (d) move in a helical path

   [CBSE 2020]

8. A charge particle after being accelerated through a potential difference V enters in a uniform magnetic field and moves in a circle
   of radius r. If V is doubled, the radius of the circle will become:
   (a) $2r$
   (b) $\sqrt{2}r$
   (c) $4r$
   (d) $\frac{r}{\sqrt{2}}$

   [CBSE 2020]

9. The time period of a charged particle undergoing a circular motion in a uniform magnetic field is independent of:

   (a) speed of the particle

   (b) mass of the particle

   (c) charge of the particle

   (d) magnetic field of the particle

   [CBSE 2020]

   For Question 10, two statements are given one labelled Assertion (A) and other labelled Reason (R). Select the correct answer to these questions from the options as given below.

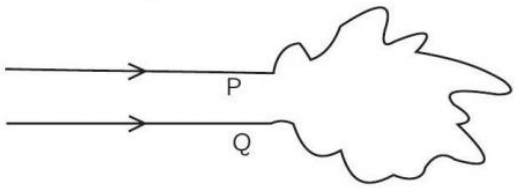
   (a) If both Assertion and Reason are true and Reason is correct explanation of Assertion.

   (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

   (c) If Assertion is true but Reason is false.

   (d) If both Assertion and Reason are false.

10. Assertion (A): A wire bent into an irregular shape with the points P and Q fixed. If a current I is passed through the wire, then the area enclosed by the irregular portion of the wire increases.

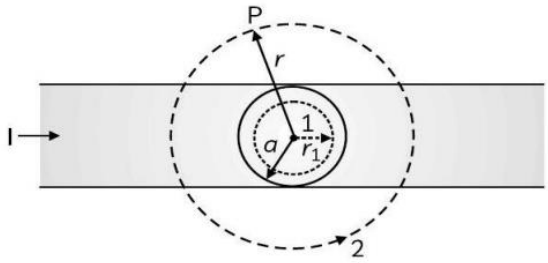


   Reason (R): Opposite currents carrying wires repel each other.

   [Delhi Gov. SQP 2022]

Very Short & Short Qs (1-3 marks)

11. The given figure shows a long straight wire of a circular cross-section (radius a) carrying steady current I. The current I is uniformly distributed across this cross-section. Calculate the magnetic field in the region:
    (A) $r < a$ and (B)
    (B) $r > a$

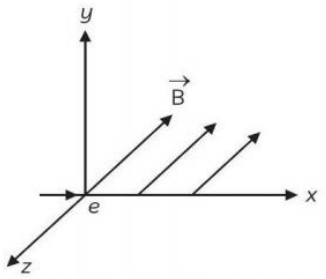


[CBSE SQP 2023]

12. An electron with charge $-e$ and mass m travels at a speed v in a plane perpendicular to a magnetic field of magnitude B. The electron follows a circular path of radius R. In a time, t, the electron travels halfway around the circle. What is the amount of work done by the magnetic field?

    [CBSE 2021]

13. An electron moves along $+x$ direction. It enters into a region of uniform magnetic field B directed along $-z$ direction as shown in figure. Draw the shape of trajectory followed by the electron after entering the field.



    [CBSE 2020]

14. An α-particle is accelerated through a potential difference of 10kV and moves along x-axis. It enters in a region of uniform magnetic field B $= 2 \times 10^{-3}$ T acting along y-axis. Find the radius of its path. (Take mass of α-particle $= 6.4 \times 10^{-27}$ kg) [CBSE 2020]

15. A proton, a deuteron and an alpha particle, are accelerated through the same potential difference and then subjected to a uniform magnetic field, perpendicular to the direction of their motions. Compare (A) their kinetic energies, and (B) if the radius of the circular path described by proton is 5 cm, determine the radii of the paths described by deuteron and alpha particle.

    [CBSE 2019]

16. A charged particle q is moving in the presence of a magnetic field B which is inclined to an angle $30°$ with the direction of the motion of the particle. Draw the presence of the field and explain how the particle describes this path. [CBSE 2019]