

WORKSHEET

Class: Class 12 | Subject: Physics

4: MOVING CHARGES AND MAGNETISM

Section A: Multiple Choice Questions (1 mark each)

1. A proton and an alpha particle enter a uniform magnetic field perpendicularly with the same speed. The ratio of the radii of their circular paths is:

- (A) 1:1
- (B) 1:2
- (C) 2:1
- (D) 4:1

2. A circular coil of radius R carries a current I . The magnetic field at its center is B . The magnetic field at a point on its axis at a distance R from the center is:

- (A) $B/\sqrt{2}$
- (B) $B/2$
- (C) $B/2\sqrt{2}$
- (D) $B/\sqrt{3}$

3. Two long parallel wires carry currents I_1 and I_2 in the same direction. The force on wire 2 due to wire 1 is F . If the current in wire 1 is doubled and the distance between the wires is halved, the force on wire 2 due to wire 1 will be:

- (A) F
- (B) $2F$
- (C) $4F$
- (D) $8F$

4. A galvanometer can be converted into an ammeter by using a:

- (A) high resistance in series

- (B) low resistance in series
- (C) high resistance in parallel
- (D) low resistance in parallel

5. The magnetic field inside a long straight solenoid carrying current is:

- (A) zero
- (B) uniform and along the axis
- (C) uniform but not along the axis
- (D) non-uniform

6. The torque on a current loop placed in a uniform magnetic field is maximum when the angle between the area vector and the magnetic field is:

- (A) 0°
- (B) 45°
- (C) 90°
- (D) 180°

Section B: Fill in the Blanks (1 mark each)

7. The force acting on a moving charge q with velocity v in a magnetic field B is given by $F = q(v \times B)$, also known as the _____ force.

8. To increase the current sensitivity of a moving coil galvanometer without altering its voltage sensitivity, one must decrease its _____.

9. The magnetic field due to a current carrying circular loop at its center is proportional to the _____ of the loop.

Section C: Short Answer Questions (2 marks each)

10. State the principle of a moving coil galvanometer. Explain how it can be converted into an ammeter.

11. Define magnetic susceptibility. How does it vary with temperature for a paramagnetic substance?

12. A charged particle is moving in a uniform magnetic field. Justify why the kinetic energy of the particle remains constant.

Section D: Long Answer Question (5 marks)

13. a) Derive an expression for the magnetic field at a point on the axis of a circular current loop.

b) Two identical circular loops, each of radius R and carrying current I , are placed coaxially with their centers separated by a distance R . Show that the magnetic field at a point midway between the centers on the axis is approximately 0.72 times the magnetic field at the center of either loop.