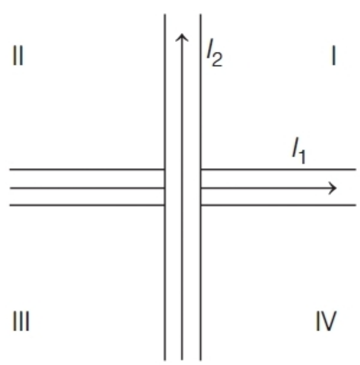
DCAM classes
Dynamic Classes for Academic Mastery

Objective Questions

(For Complete Chapter)

Multiple Choice Questions (MCQs)

1. 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 **CBSE 2021 (Term-I)**



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

2. The magnetic field at the centre of a current carrying circular loop of radius R is B_1. The magnetic field at a point on its axis at a distance R from the centre of the loop is B_2, then the ratio $\left(\frac{B_1}{B_2}\right)$ is

CBSE 2021 (Term-I)

(a) $2\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\sqrt{2}$ (d) 2

3. A constant current is flowing through a solenoid. An iron rod is inserted in the solenoid along its axis. Which of the following quantities will not increase?

CBSE 2021 (Term-I)

(a) The magnetic field at the centre
(b) The magnetic flux linked with the solenoid
(c) The rate of heating
(d) The self-inductance of the solenoid

4. A proton and an alpha particle move in circular orbits in a uniform magnetic field. Their speeds are in the ratio of $9:4$. The ratio of radii of their circular orbits $\left(\frac{r_p}{r_\alpha}\right)$ is **CBSE 2021 (Term-I)**

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{8}{9}$ (d) $\frac{9}{8}$

5. Two parallel conductors carrying current of 4.0 A and 10.0 A are placed 2.5 cm apart in vacuum. The force per unit length between them is **CBSE 2021 (Term-I)**

(a) 6.4×10^{-5} N/m (b) 6.4×10^{-2} N/m
(c) 4.6×10^{-4} N/m (d) 3.2×10^{-4} N/m

6. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a **CBSE 2021 (Term-I)**

(a) low resistance in parallel
(b) low resistance in series
(c) high resistance in parallel
(d) high resistance in series

7. A current carrying wire kept in a uniform magnetic field will experience a maximum force, when it is **CBSE 2021 (Term-I)**

(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

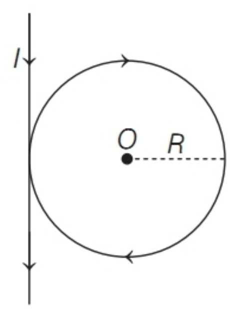
8. A straight conducting rod of length l and mass m is suspended in a horizontal plane by a pair of flexible strings in a magnetic field of magnitude B. To remove the tension in the supporting strings, the magnitude of the current in the wire is **CBSE 2021 (Term-I)**

(a) $\frac{mgB}{l}$ (b) $\frac{mgl}{B}$ (c) $\frac{mg}{lB}$ (d) $\frac{lB}{mg}$

9. A current of 10 A is flowing from east to west in a long straight wire kept on a horizontal table. The magnetic field developed at a distance of 10 cm due north on the table is **All India 2020**

(a) 2×10^{-5} T, acting downwards
(b) 2×10^{-5} T, acting upwards
(c) 4×10^{-5} T, acting downwards
(d) 4×10^{-5} T, acting upwards

10. A current I flows through a long straight conductor which is bent into a circular loop of radius R in the middle as shown in the figure.



The magnitude of the net magnetic field at point O will be **All India 2020**

(a) zero (b) $\frac{\mu_0 I}{2R}(1+\pi)$

(c) $\frac{\mu_0 I}{4\pi R}$ (d) $\frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right)$

11. 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 **Delhi 2020**

(a) $2r$ (b) $\sqrt{2}\,r$

(c) $4r$ (d) $\frac{r}{\sqrt{2}}$

Assertion-Reason Questions

Directions (Q. Nos. 12-19) *In the following questions, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below*

(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
(c) If Assertion is correct but Reason is incorrect.
(d) If both Assertion and Reason are incorrect.

12. **Assertion** When radius of a current carrying loop is doubled, its magnetic moment becomes four times.

Reason The magnetic moment of a current carrying loop is directly proportional to the area of the loop. **CBSE 2021 (Term-I)**

13. **Assertion** Higher the range, lower is the resistance of an ammeter.

Reason To increase the range of an ammeter, additional shunt is added in series to it. **CBSE 2021 (Term-I)**

14. **Assertion** Magnetic field at the centre of current carrying loop decreases with increase of radius of circular loop.

Reason Magnetic field at the centre of current carrying circular loop is $B=\frac{\mu_0 I}{2r}$.

15. **Assertion** A magnetic field interacts with a moving charge and not with a stationary charge.

Reason A moving charge produce a magnetic field.

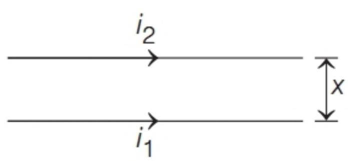
16. **Assertion** The magnetic field produced by a current carrying solenoid is independent of its length and cross-sectional area.

Reason The magnetic field inside the solenoid is uniform.

17. Assertion An α-particle and a deuteron having same kinetic energy enter in a uniform magnetic field perpendicular to the field, then radius of circular path of α-particle will be more.

Reason $\frac{q}{m}$ ratio of an α-particle is more than the $\frac{q}{m}$ ratio of a deuteron.

18. Assertion Upper wire shown in figure is fixed. At a certain distance x, lower wire can remain in equilibrium.



Reason The above equilibrium of lower wire is stable equilibrium.

19. Assertion Current sensitivity of a galvanometer is inversely proportional to the current through the coil.

Reason Voltage sensitivity is inversely proportional to voltage.

Case Based Questions

Directions (Q.Nos. 20-21) *These questions are case study based questions. Attempt any 4 sub-parts from each question. Each question carries 1 mark.*

20. Electron Moving in Magnetic Field

An electron with a speed $v_0 << c$ moves in a circle of radius r_0 in a uniform magnetic field. This electron is able to traverse a circular path as magnetic field is perpendicular to the velocity of the electron. The time required for one revolution of the electron is T_0. The speed of the electron is now inversely to $4\,v_0$.

(i) The radius of the circle will change to
(a) $4r_0$ (b) $2r_0$
(c) $\frac{r_0}{4}$ (d) $r_0/2$

(ii) The time required for one revolution of the electron will change to
(a) $4T_0$ (b) $2T_0$
(c) T_0 (d) $T_0/2$

(iii) A charged particle is projected in a magnetic field $\mathbf{B} = (2\hat{\mathbf{i}} + 4\hat{\mathbf{j}}) \times 10^2$ T. The acceleration of the particle is found to be $\mathbf{a} = (x\hat{\mathbf{i}} + 4\hat{\mathbf{j}})\text{ms}^{-2}$. Find the value of x.
(a) 8 ms^{-2} (b) -8 ms^{-2}
(c) -4 ms^{-2} (d) 4 ms^{-2}

(iv) If the given electron has a velocity not perpendicular to **B**, then the trajectory of the electron is
(a) straight line (b) circular
(c) helical (d) Both (a) and (c)

(v) If this electron of charge (e) is moving parallel to uniform magnetic field (B) with constant velocity v. The force acting on the electron is
(a) Bev (b) $2Bev$
(c) $\frac{Bev}{2}$ (d) zero

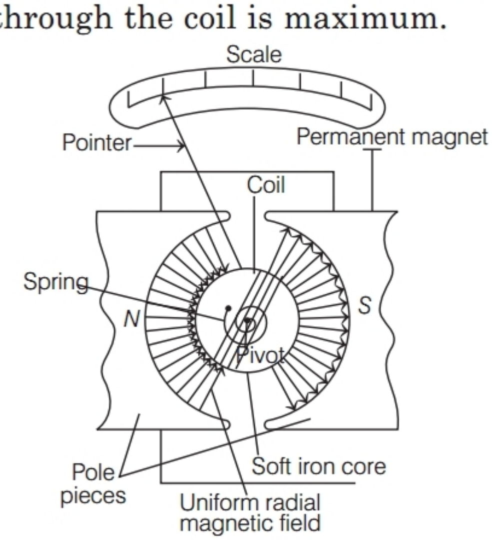
21. Moving Coil Galvanometer

Moving coil galvanometer operates on Permanent Magnet Moving Coil (PMMC) mechanism and was designed by the scientist D'arsonval.
Moving coil galvanometers are of two types

(i) Suspended coil

(ii) Pivoted coil type or tangent galvanometer.

Its working is based on the fact that when a current carrying coil is placed in a magnetic field, it experiences a torque.
This torque tends to rotate the coil about its axis of suspension in such a way that the magnetic flux passing through the coil is maximum.



(i) A moving coil galvanometer
(a) is used to measure emf
(b) is used to measure potential difference
(c) is used to measure power
(d) is a deflection instrument which gives a deflection when a current flows through its coil

(ii) The torque on moving coil is maximum in radial magnetic field. To make the field radial in a moving coil galvanometer,
(a) number of turns of coil is kept small
(b) magnet is taken in the form of horse-shoe
(c) poles are of very strong magnets
(d) poles are cylindrically cut

(iii) The deflection produced in the pointer of moving coil galvanometer is
(a) directly proportional to torsional constant of spring
(b) directly proportional to the number of turns in the coil
(c) directly proportional to the area of the coil
(d) inversely proportional to the current in the coil

(iv) In a moving coil galvanometer, having a coil of N-turns of area A and carrying current I is placed in a radial field of strength B.
The torque acting on the coil is
(a) $\frac{NAIB}{2}$ (b) $2NABI$
(c) zero (d) $NABI$

(v) To increase the current sensitivity of a moving coil galvanometer, we should decrease
(a) strength of magnet
(b) torsional constant of spring
(c) number of turns in coil
(d) area of coil

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