

CHAPTER 12

MAGNETIC EFFECTS OF ELECTRIC CURRENT

VEDA
ACADEMY

CLASS 10TH

NCERT EXERCISE AND SOLUTIONS - SCIENCE



Q. 1. Which of the following correctly describes the magnetic field near a long straight wire?

- (a) The field consists of straight lines perpendicular to the wire.
- (b) The field consists of straight lines parallel to the wire.
- (c) The field consists of radial lines originating from the wire.
- (d) The field consists of concentric circles centred on the wire.

ANSWER:-

- (d) The field consists of concentric circles centred on the wire.

Solution: The magnetic field forms concentric circles centered around the wire. Using the right-hand thumb rule, we can determine the direction of the magnetic field. According to this rule, the magnetic field flows in the form of concentric circles around the wire carrying current.

Q. 2. At the time of short circuit, the current in the circuit

- (a) Reduces substantially
- (b) Does not change
- (c) Increases heavily
- (d) Vary continuously

ANSWER:-

- (c) Increases heavily

Solution: During a short circuit, the live wire and the neutral wire come into direct contact, creating a path with very low resistance. As a result, the current in the circuit increases suddenly and can become very large.

Q. 3. State whether the following statements are true or false.

- (a) The field at the centre of a long circular coil carrying current will be parallel straight lines.
- (b) A wire with a green insulation is usually the live wire of an electric supply.

ANSWER:-

- (a) True
- (b) False



Q. 4. List two methods of producing magnetic fields.

ANSWER:-

Two methods of producing a magnetic field are:

1. A magnetic field can be produced by placing a permanent bar magnet or a horseshoe magnet at the location where the magnetic field is needed.
2. A magnetic field is produced around a current-carrying straight conductor.

Q. 5. When is the force experienced by a current-carrying conductor placed in a magnetic field largest?

ANSWER:-

The force experienced by a current-carrying conductor placed in a magnetic field is greatest when the conductor is positioned perpendicular to the magnetic field. This is because the force is directly related to the angle between the magnetic field and the direction of the current, with the maximum force occurring at a 90-degree angle.

Q. 6. Imagine that you are sitting in a chamber with your back to one wall. An electron beam, moving horizontally from back wall towards the front wall, is deflected by a strong magnetic field to your right side. What is the direction of magnetic field?

ANSWER:-

An electron beam moving horizontally from the back wall towards the front wall is equivalent to a current flowing in the opposite direction, i.e., from the front wall towards the back wall. As the observer sees the deflection of the electron beam to his right side, it is indicated in the figure. By applying Fleming's left-hand rule, we can determine the direction of the magnetic force acting on the electron beam. The rule shows that the magnetic field is acting in a vertically downward direction.

Q. 7. State the rule to determine the direction of a

- (i) magnetic field produced around a straight conductor-carrying current,
- (ii) force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it, and
- (iii) current induced in a coil due to its rotation in a magnetic field.

ANSWER:-

- i. Maxwell's right hand thumb rule
- ii. Fleming's left hand rule
- iii. Fleming's right hand rule



Q. 8. When does an electric short circuit occur?

ANSWER:-

If the insulation of wires in an electrical circuit is damaged or there is a fault in an appliance, the live wire and neutral wire may come into direct contact. This creates a path with very low resistance, causing the current to increase suddenly. This leads to a short circuit, which can be dangerous and may damage the circuit or cause a fire.

Q. 9. What is the function of an earth wire? Why is it necessary to earth metallic appliances?

ANSWER:-

The metallic body of electrical appliances is connected to the earth using an earth wire. This allows any leakage of electric current to be safely transferred to the ground, preventing electric shocks to the user. This is why earthing electrical appliances is necessary for safety.

