SUMMARY

- An electric current produces a magnetic field.
- A magnetic field exists in the region surrounding a magnet, in which the force of the magnet can be detected.
- Field lines are used to represent a magnetic field.
- The magnetic field lines of a straight current are circular with centres on the wire carrying the current.
- The magnetic field inside a current carrying solenoid is uniform and parallel to the axis. It behaves like a bar magnet.
- An electromagnet consists of a soft iron core wrapped with an insulated copper wire.
- When a current carrying wire is placed in a magnetic field, a force acts on the wire. The direction of force is given by Fleming's left-hand rule. This is the basis of electric motor.
- An electric motor is a device that converts electrical energy into mechanical energy.
- The phenomenon by which an emf or current is induced in a conductor due to change in the magnetic field near the conductor is known as electromagnetic induction.
- The direction of the induced current is given by Fleming's right-hand rule. This forms the basis of the electric generator.
- An electric generator is a device that converts mechanical energy into electrical energy.
- In our houses we receive AC electric power of 220 V with a frequency of 50 Hz. There are two wires - the live wire and neutral wire. The potential difference between the two wires is 220 V.
- Earthing and electric fuse are the two commonly used safety measures in electrical circuits. It prevents electric shock.
- Electric fuse is a safety device used for protecting the circuits due to overloading and short-circuiting.

SUB TOPICS

- Rules for Determining the Direction of Magnetic Field
- Right Hand Thumb Rule
- Maxwell's Cork- Screw Rule
- Ampere's Swimming Rule
- Clock Rule
- Fleming's Rule
- Fleming's Left Hand Rule
- Fleming's Right Hand Rule

Rules for Determining the Direction of Magnetic Field

The direction of magnetic field around a current carrying conductor can be determined by using one of the laws given here.

Right Hand Thumb Rule

Imagine the conductor to be held in your right hand with the fingers curled around it. If the thumb points in the direction of the current, then the curled fingers show the direction of the magnetic field.

Maxwell's Cork- Screw Rule

Imagine a right-handed corkscrew being rotated along the wire in the direction of the current. The direction of rotation of the thumb gives the direction of the magnetic lines of force.

Ampere's Swimming Rule

Ampere's swimming rule states that "if a man swims along the wire carrying current such that his face is always towards the magnetic needle with current entering his feet and leaving his head then the North Pole of the magnetic needle is always deflected towards his left hand".

Clock Rule

According to the clock rule "When an observer, looking at the face of the coil, finds the current to be flowing in the anti-clockwise direction, then the face of the coil will behave like the North Pole. While if the current is in the clockwise direction, the face of the coil will behave like South Pole.

Fleming's Rule

Fleming's rules help us to predict the movement of a current carrying conductor placed in a magnetic field and the direction of the induced current.

Fleming's Left Hand Rule

Extend the thumb, forefinger, and the middle finger of the left hand in such a way that all the three are mutually perpendicular to each another. If the forefinger points in the direction of the magnetic field and the middle finger in the direction of the current, then, the thumb points in the direction of the force exerted on the conductor.

Fleming's Right Hand Rule

Stretch the forefinger, the middle finger and the thumb of the right hand, such that they are mutually perpendicular to each other. If forefinger indicates the direction of the magnetic field, the thumb indicates the direction of motion of the conductor, then, middle finger indicates the direction of induced current in the conductor.