Chapter: Magnetic Field (Magnetic Effect of Current)

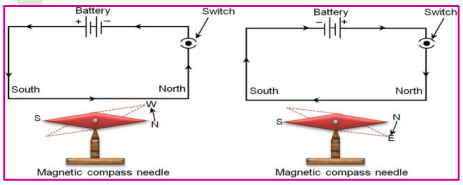
- Understanding of the concept of magnetic field lines and magnetic flux and **sketch magnetic field lines around a straight current carrying conductor and long solenoid**
- Explain **Orested's experiment, its outcome and limitations**
- Discuss force on moving charge and conductor in uniform magnetic field
- Describe force and **Torque on rectangular coil** placed in uniform magnetic field
- Describe moving coil galvanometer and know its applications
- Explain Hall effect and derive the expression $V_H = \frac{BI}{net}$,where $'t'$ is thickness
- Use **Hall probe to measure flux density** of a uniform magnetic field
- **State Biot and Savart law and know its application on (i) a circular coil (ii) a long straight conductor (iii) a long solenoid**
- State Ampere's law and know its applications to (i) a long straight conductor (ii) a straight solenoid (ii) a toroidal solenoid
- **Discuss force between two parallel conductors carrying current and definition of ampere**

- ***Fundamental Nature of magnetism is the interaction of Moving Charge.***
- ***Magnetic field exerts force on only moving charge. Similarly, only moving charge creates magnetic field.***
- ***When current flows through a conductor, magnetic field will be developed around it. This effect of current is known as magnetic effect of current.***
- ***The magnetic field exerts a force on any other charge or currents that is present in the field.***

Orested's Discovery:

The Relation Between electricity and magnetism was discovered by Orested's in 1820. He showed that the electric current through the conducting wire deflects the magnetic needle.

Suppose a magnetic needle is placed just below a conductor placed along north-south direction.



- When electric current is zero- no deflection is seen on the magnetic needle.
- When current is from south to north-the north pole of the needle gets deflected towards west.
- When the direction of current reversed then deflection of magnetic needle also reversed.
- On increasing current in the conductor, deflection in the magnetic needle also increases.

This shows that when an electric current is passed through a conductor, a magnetic field is produced around it, the direction of magnetic field so produced depends upon the direction of current through the conductor. This phenomenon was first discovered by Orested's and hence known as Orested's discovery.

Magnetic Field:

Magnetic Field is the region around a magnetic material or a moving electric charge within which the force of magnetism acts.

Some other facts:

- *A magnet at rest produces a magnetic field around it while an electric charge at rest produce an electric field around it.*
- *An electric field cannot be produced without a charge whereas magnetic field can be produced without a magnet.*
- *An accelerated charge produces electromagnetic wave also in addition to electric and magnetic field.*