

UNIT

5

MAGNETISM AND ELECTROMAGNETISM

Learning Objectives

After completing this lesson, students will be able to

- understand the concept of magnetic field.
- know the properties of magnetic field lines.
- calculate the force exerted on a current carrying conductor in a magnetic field.
- understand the force between two parallel current carrying conductors.
- know the concept of electromagnetic induction and apply it in the case of generators.
- appreciate how voltage can be increased or decreased using transformers.
- understand the applications of electromagnet and apply the knowledge in constructing devices using electromagnets.



Introduction

Have you ever played with magnets? Do you wonder why it attracts iron? Magnets are always attractive objects for the humans. In fact famous scientist Einstein has mentioned that he was always attracted by magnets in his childhood. In the olden days magnets were used in the ships. Captains of the ships effectively used the magnets to identify the direction of the ship in the sea.

There are two kinds of magnets that we can see around us: Natural magnet and Artificial magnet. Natural magnets exist in the nature. These kind of magnets can be found in rocks and sandy deposits in various parts of the world. The strongest natural magnet is lodestone magnetite.

The magnetic property in the natural magnets is permanent. It never gets destroyed. The lodestones were used to make compasses in the olden days. Artificial magnets are made

by us. The magnets available in the shops are basically artificial magnets. In this lesson we shall study about properties of magnets, magnetic effect of current, electromagnetic induction and applications of electromagnets.

5.1 Magnetic field (B)

Activity 1

Put a magnet on a table and place some paper clips nearby. If you push the magnet slowly towards the paper clips, there will be a point at which the paper clips jump across and stick to the magnet. What do you understand from this?

From the above activity we notice that magnets have an invisible field all around them which attracts magnetic materials. In this space we can feel the force of attraction or repulsion due to the magnet. Thus, magnetic