# MALAPPURAM EDUCATIONAL DISTRICT

## FIRST BELL SUPPORTING MATERIALS

## PHYSICS

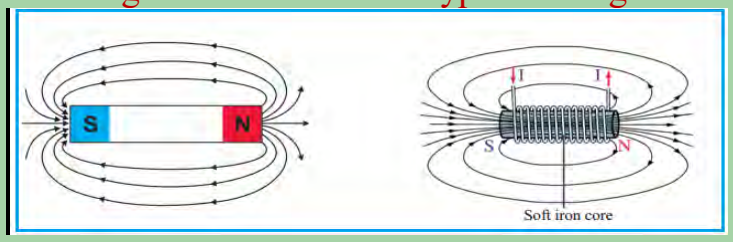
## CHAPTER – 2 MAGNETIC EFFECT OF ELECTRIC CURRENT

**CLASS 10** **Introduction**

**Answer the following**

1. This part in the picture belongs to which device?

2. The magnetic fields of two types of magnets are depicted. Which are they?




3. How can you identify the direction of magnetic fields?
4. How is the magnetic compass made?
5. When placed on a horizontal surface the magnetic needle align in which direction?
6. How can you find out the polarity of these magnets using a magnetic compass?

***ACTIVITY I***

a) Bring a magnetic compass near one end of a bar magnet and observe the magnetic needle.

b) Fix the bar magnet on a steel scale. Then move the magnetic compass around the magnet through different places and observe the deflection of magnetic needle.

## Answer the following

7) What happens to the needle in both cases?
8) Why the magnetic needle deflects?
9) Why the magnetic needle deflects when the magnetic compass placed anywhere around the bar magnet?

## ACTIVITY 2

a) A plastic sheet is placed above a bar magnet. Spread some iron filings on the plastic sheet and gently tap the sheet and observe.

b) Plastic sheet is placed above an electromagnet. After turning the electric supply on, spread some iron filings on the sheet. Gently tap the sheet and observe.


c) Repeat the above experiment after turning off the power supply.

## Answer the following

10) What happened to the iron filings on the sheet in the cases a and b?
11) Is there any pattern formed on the sheet when the power supply turned off? (Case C)
12) Why the iron filings are distributed in a pattern in the cases a and b?
13) Are the patterns formed by the bar magnet and electromagnet similar?
14) Compare the magnetic field of an electromagnet and a bar magnet? (Write the similarity and difference)

## ACTIVITY 3

a) Arrange a circuit above a pivoted magnetic needle in such a way that the part AB of the conductor is parallel and close to the magnetic needle. Switch on the circuit and observe the direction in which north pole of the needle deflects.

| No | Conductor above the magnetic needle | Direction of motion of north pole (N) of the magnetic needle (Clockwise/Anticlockwise) |
|---|---|---|
| 1 | Direction of current from A to B | ---------- |
| 2 | Direction of current from B to A | ---------- |

b) Repeat the experiment after reversing the current and record observations in the table.

c) Repeat the experiment keeping the conductor below the magnetic needle and record the observations in the table

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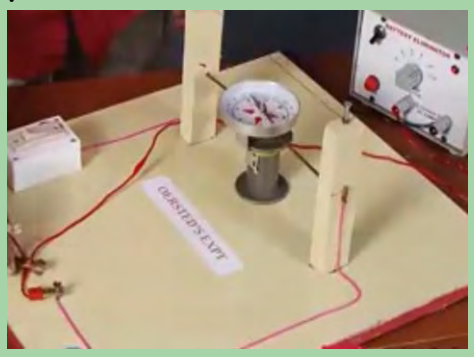

| No | Conductor below the magnetic needle | Direction of motion of north pole (N) of the magnetic needle (Clockwise/Anticlockwise) |
|---|---|---|
| 1 | Direction of current from A to B | ---------- |
| 2 | Direction of current from B to A | ---------- |

## Answer the following

15) What is the direction of current in the conductor?
16) In which direction electrons will flow?
17) When the direction of electric current is from Ato B then what will be the direction of electrons flow?
18) What might be the reason for the deflection of the magnetic needle when current passing through the conductor?
19) When the direction of current changes the magnetic needle deflects in opposite direction. Why?
20) When the magnetic compass is placed above the conductor the magnetic needle deflects in opposite direction. Why?
21) Who was the first to do the experiments in the field of magnetic effects of electric current?

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**CLASS 10** **Introduction**

### Answer key

1) An electric motor.

2) Magnetic field around a bar magnet.

Magnetic field around an electromagnet.

3) Using a magnetic compass.

4) A magnetic needle is arranged in such a way that it can rotate freely inside an aluminium case.

5) North south direction (North pole pointing to the geographic north of the earth).

6) If the north pole of the magnetic needle attracts at one end of the magnet, then south pole and if repels then north pole at that end.

### ACTIVITY 1

7) Magnetic needle deflects.

8) Due to the mutual action between the magnetic field of bar magnet and that of magnetic needle.

9) Magnetic field is formed in all directions (magnetic field is three-dimensional).

### ACTIVITY 2

10) Iron filings formed a pattern on the plastic sheet.

11) No. Pattern doesn't form on the plastic sheet.

12) Due to the magnetic field lines around the magnet.

13) Yes. They are similar.

14) The magnetic field formed around a bar magnet and an electromagnet are of the same type .But magnetic field around a bar magnet is permanent and magnetic field around an electromagnet is temporary.

## ACTIVITY 3 : OBSERVATIONS

| No | Conductor above the magnetic needle | Direction of motion of north pole (N) of the magnetic needle (Clockwise/Anticlockwise) |
|---|---|---|
| 1 | Direction of current from A to B | Anticlockwise |
| 2 | Direction of current from B to A | Clockwise |

| No | Conductor below the magnetic needle | Direction of motion of north pole (N) of the magnetic needle (Clockwise/Anticlockwise) |
|---|---|---|
| 1 | Direction of current from A to B | Clockwise |
| 2 | Direction of current from B to A | Anticlockwise |

15) Positive to negative

16) Negative to positive

17) B to A

18) Due to the mutual action of the magnetic field around the current carrying conductor and that around the magnetic needle.

19) When the direction of current changes, the direction of magnetic field also changes.

20) The direction of magnetic field formed above the conductor is opposite to the direction of magnetic field below the conductor.

21) Hans Christian Oersted.

## *INFERENCES*

- Magnetic compass is used to
  a. find the direction
  b. find the presence and the direction of a magnetic field
- There are magnetic field lines around a magnet
- Magnetic field formed around a magnet is three-dimensional
- Magnetic field around a bar magnet and an electromagnet are of the same type
- An electromagnet is a temporary magnet .It has magnetic property only when current passes through it.
- A magnetic field is developed around a current carrying conductor.
- If the direction of current is reversed then the direction of magnetic field also will be reversed.