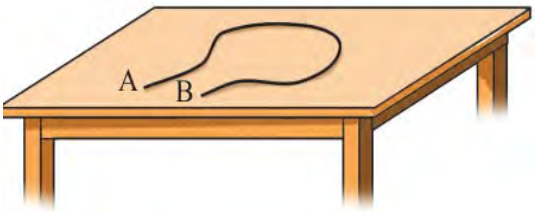
UNIT 2

Magnetic Effect of Electric Current

27/07/2020 – Class 12

Assignments Answer

1. The figure shows an insulated copper wire AB made into a coil. Suppose current flows from A to B through this.



a) What will be the direction of electron flow through it?

B to A

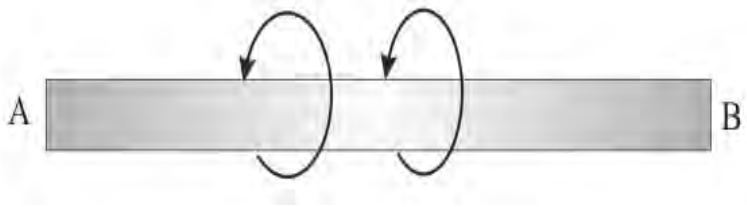
b) Can you find out the direction of the magnetic field around the conductor AB? State the rule that substantiates this.

Downwards through the table. Maxwell's Right Hand thumb rule.

c) Explain how you can find out the direction of the magnetic field inside the coil?

By using Maxwell's Right Hand Thumb rule we can identify the direction of magnetic field inside the conductor. If we hold the conductor in such a way that thumb of the right hand in the direction of the current, then the fingers downward direction of the current, gives the direction of magnetic field.

2.The magnetic field around the current carrying conductor AB is depicted.



Based on the Maxwell's Right Hand Cork Screw Rule find out the direction of current and record it.

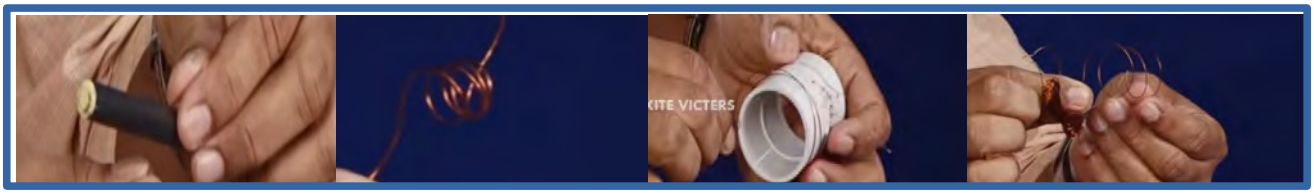
B to A

Activity 1

Different types of coils are used in many type of electrical devices.

Discussion

- Which type of conductor is used for making coils? **Insulated Copper wires.**
- How can we make coils having different area of cross sections? **Wound the insulated copper wire on cylindrical shaped objects having different area of cross sections.**



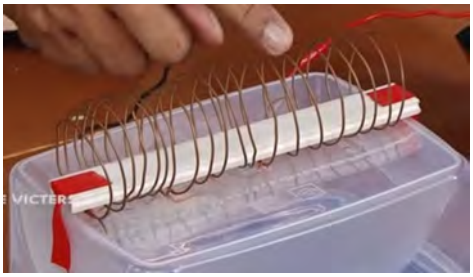
- Coils which is wound in the shape of a helix is.....? **Solenoid**
- Why insulated wires are used for making solenoid? **To avoid short circuit.**
- Which are the devices, we used solenoids? **Motors**
- When electricity is passed through the coils, what happened? **Magnetic field is produced around it.**

Inference

A solenoid is an insulated conducting wire wound in the shape of helix.

Activity 2.a

Observe a solenoid.



Discussion

- How many turns are there in this solenoid? **20**
- How to increase the number of turns in this solenoid? **By Decreasing the area of cross section.**

Activity 2.b

Observe the deflections of a magnetic needle, when electricity is passed through the solenoid.

Observation

When electricity is passed through the solenoid, magnetic needle deflected slightly.

Discussion

What is inside the solenoid now? **Air**

When air is used as the core of the solenoid, strength of the magnetic field produced is low

Activity 2.c

Place a soft iron inside the solenoid and pass electricity through the solenoid.

Observation

Magnetic needle deflected more.

Activity 2.d

Place one more soft iron piece inside the solenoid and pass electricity through the solenoid.

Observation

Deflection is increased.

Discussion

- When soft iron is used as the core, what happened to the strength of the magnetic field produced around the solenoid? **Increased.**
- When electricity is passed through a solenoid wound on a soft iron, it becomes .....? **An electromagnet.**

Inference

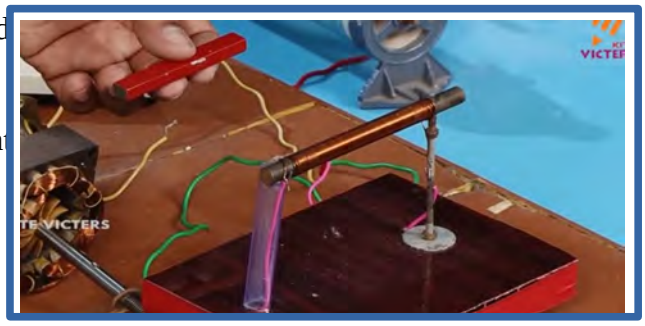
- When soft iron is used as the core of the solenoid, the strength of the magnetic field produced is increased.
- When the area of cross section of the soft iron core is increased the strength of the magnetic field produced is again increased.

How to increase the strength of the magnetic field produced on a solenoid?

- Increase the intensity of the electric current.
- Increase the no of turns in the solenoid.
- Use soft iron as the core of the solenoid.
- Increase the area of cross section of the soft iron core.

Activity 3.a

What are the differences between a bar magnet and an electromagnet.



Discussion

- Is the magnetic effect of a bar magnet is permanent or temporary? **Permanent**
- What about an electromagnet? **Temporary**
- White dot on the bar magnet indicates.....? **North pole**
- Can we change the poles of a bar magnet? **No**

Activity 3.b

Are the poles of an electromagnet permanent or temporary?

Pass electricity through a solenoid and bring a magnetic compass nearer to its ends.

Observation

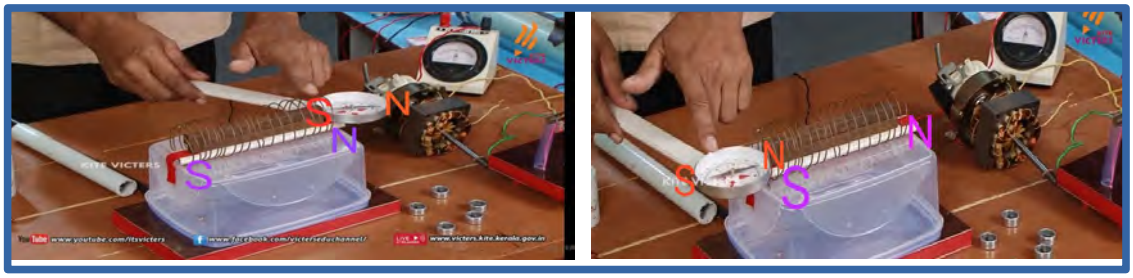
- When a magnetic compass is brought near the first end of the solenoid, north pole of the magnetic needle is attracted.
- When the magnetic compass is placed at the other end of the solenoid south pole of the magnetic needle is attracted.

Discussion

- If the north pole of the magnetic needle is attracted, which pole is formed there? **South**
- If the south pole of the magnetic needle is attracted, which pole is formed there? **North**

Activity 3.c

Repeat the experiment after reversing the current.



Observation

Magnetic poles formed on the solenoid is changed. North pole is formed on the first end and south pole is formed on the other end.

Inference

As the direction of current is reversed direction of magnetic filed is also reversed.

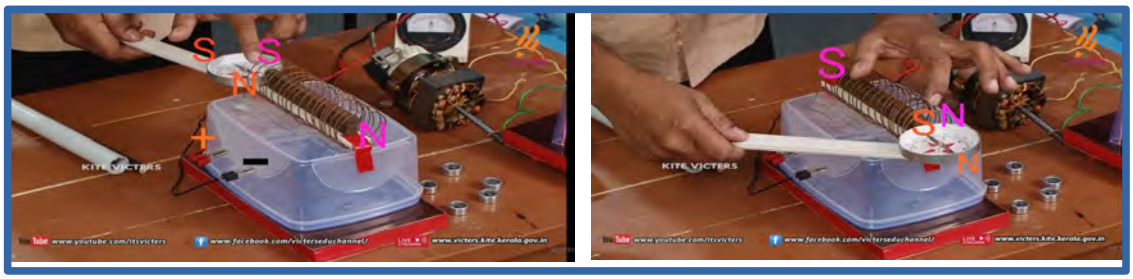
Differences between the magnetic field produced by a bar magnet and a solenoid.

Bar Magnet	Solenoid
The magnetism is permanent.	The magnetism is temporary.
Strength of the magnet cannot be altered	Strength of the magnet can be changed.
Polarity is permanent	Polarity can be chnaged

Activity 4 .a

How can identify the polarity formed on a current carrying solenoid?

Placed a current carrying solenoid with one end facing the teacher. Identify the poles formed on either sides of the solenoid by using a magnetic compass?



Discussion

- What is the direction of current through the solenoid at the end facing to the teacher? **Clockwise**
- Which end of the magnetic needle is attracted towards that end? **North**
- Which polarity is developed at that end of the solenoid? **South**
- What about the polarity formed at the other end of the solenoid? **North**

Inference

If current enters in to the solenoid in clockwise direction then south pole is formed at that end of the solenoid.

Activity 4.b

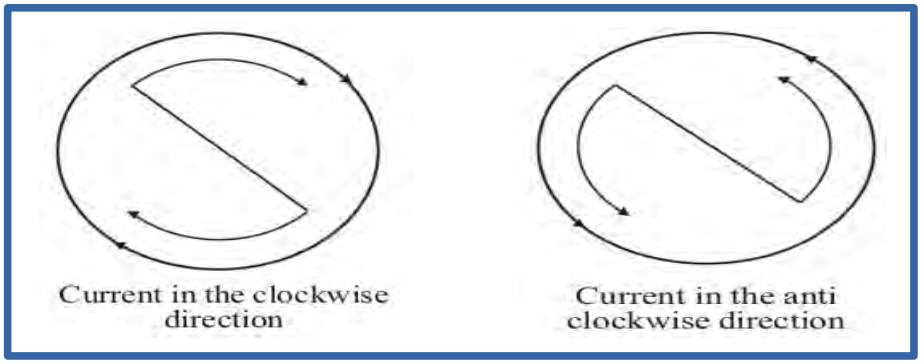
Repeat the experiment after reversing the current.

Discussion

- What is the direction of current at the end facing to the teacher? **Anticlockwise**
- Which end of the magnetic needle is attracted towards that end? **South**
- Which polarity is developed at that end of the solenoid? **North**
- What about the polarity formed at the other end of the solenoid? **South**

Inference

If current enters in to the solenoid in anticlockwise direction then north pole is formed at that end of the solenoid.



Conclusion

The end of the solenoid at which current flows in the clockwise direction will be the South Pole and the end at which current flows in the anticlockwise direction will be the North Pole.

Assignment

Complete the table?

Bar magnet	Solenoid
The magnetism is permanent …… ……	The magnetism is temporary …… ……

Table 2.3