Exercise-10(B)

1. **What is an electromagnet?**
   Solution:
   An electromagnet is a temporary strong magnet made from a piece of soft iron when current flows in the coil wound around it. It is an artificial magnet.

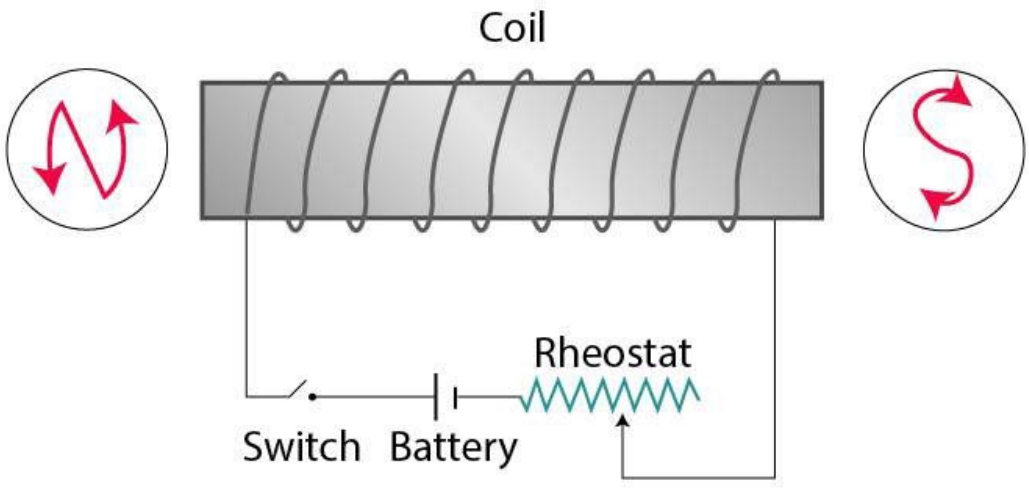
2. **Name the material used for preparing an electromagnet.**
   Solution:
   The material used for preparing an electromagnet is a piece of soft iron.

3. **How is an electromagnet made? Name two factors on which the strength of the magnetic field of an electromagnet depends.**
   Solution:
   An electromagnet can be made in the following two shapes:
   - I-shape or bar magnet
   - U-shape or horse-shoe magnet

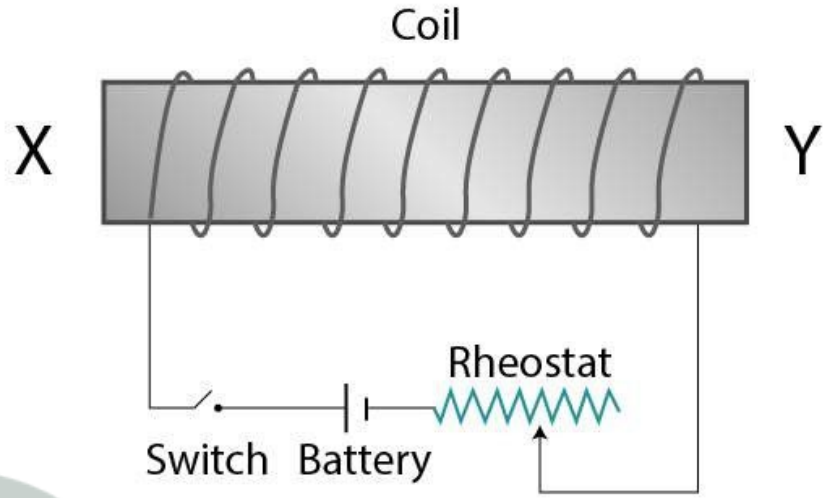
     The principle behind making both the magnets is the same. An electromagnet can be made by winding an insulated copper wire over a piece of soft iron in U-shape or a solenoid

   The two factors on which the strength of the magnetic field of an electromagnet depends are as follows:
   - It is dependent upon the number of turns of the wire wound over the coil
   - It is also dependent upon the current flowing through the wire

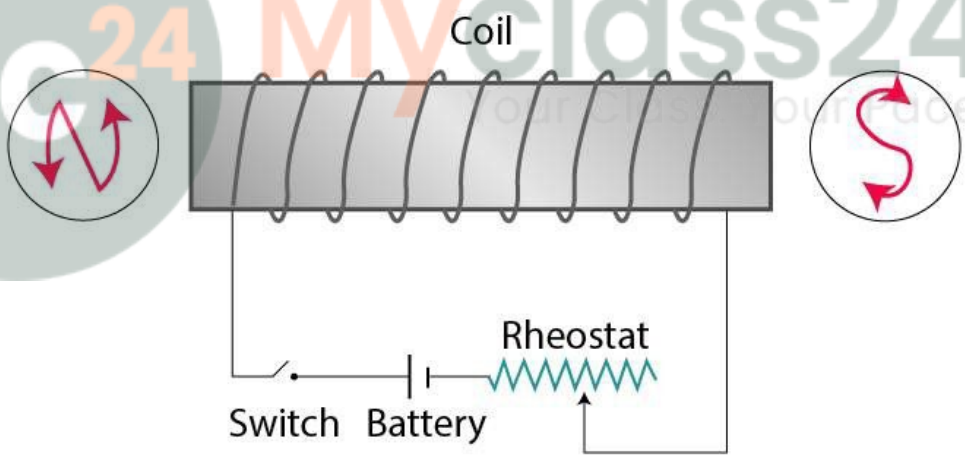
4. **You are required to make an electromagnet from a soft iron bar by using a cell, an insulated coil of copper wire and a switch. (a) Draw a circuit diagram to represent the process. (b) Label the poles of the electromagnet.**
   Solution:
   The labelled circuit is as follows:



5. Figure shows a coil wound around a soft iron bar XY. (a) State the polarity at the end X and Y as the switch is pressed. (b) Suggest one way of increasing the strength of the electromagnet so formed.



Solution:



(a) The polarity at the ends are as follows:
X – south pole
Y – north pole

(b) One way to increase the strength of the electromagnet is by increasing the flow of current in the coil.

6. A coil of insulated copper wire is wound around a piece of soft iron and current is passed in the coil from a battery. What name is given to the device so obtained? Give one use of the device mentioned by you.

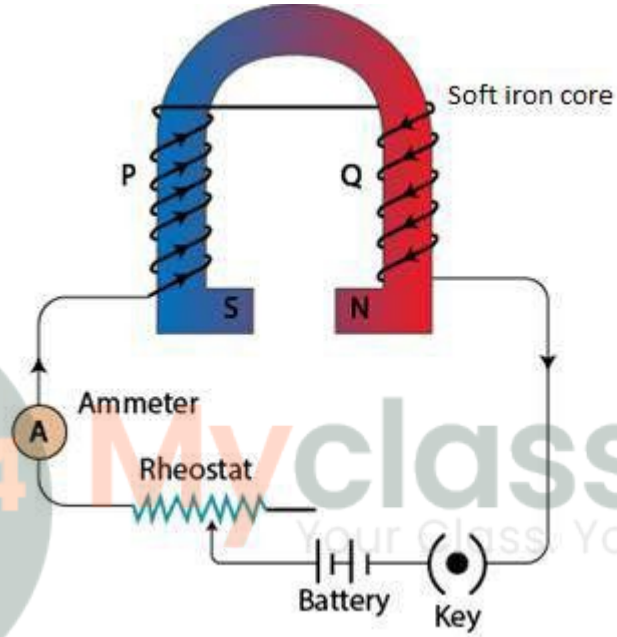
Solution:

The device so obtained can be named as an electromagnet.
One application of electromagnet is as follows:
Electromagnets are used in electrical devices such as telegraph, electric bell, microphone, loud speaker etc.

7. Show with the aid of a diagram how a wire is wound on a U-shaped piece of soft iron in order to make it an electromagnet. Complete the circuit diagram and label the poles of the electromagnet.

Solution:

The diagram is as follows:



8. State two ways through which the strength of an electromagnet can be increased.

Solution:

The strength of a magnet can be increased by the following two ways:

- Increase the number of turns of windings in the solenoid
- Increase the flow of current through the solenoid

9. Name one device that uses an electromagnet.

Solution:

A device that uses an electromagnet is a loud speaker.

10. State two advantages of an electromagnet over a permanent magnet.

Solution:

Two advantages of an electromagnet over a permanent magnet are listed below:

- In comparison with a permanent magnet, an electromagnet can produce a stronger magnetic field.
- Unlike a permanent magnet, the strength of the magnetic field of an electromagnet can easily be changed by altering the flow of current in its solenoid.

11. State two differences between an electromagnet and a permanent magnet.

Solution:

The two differences are as follows:

Electromagnet	Permanent magnet
Made using soft iron	Made using steel
Produces temporary magnetic field	Produces a permanent magnetic field

12. Why is soft iron used as the core of the electromagnet in an electric bell?

Solution:

Soft iron can obtain magnetic properties when an electric current flows through the solenoid and has a tendency to lose magnetic properties when it is devoid of any electric current. This is the reason why soft iron is used as the core of the electromagnet in an electric bell.

13. How is the working of an electric bell affected, if alternating current is used instead of direct current?

Solution:

If alternating current is used instead of direct current in an electric bell then the core of the electromagnet will get magnetized, the polarity at the ends will change. As polarity of the electromagnet and attraction of armature are not dependent on each other, upon pressing the switch, the bell will continue to ring.

14. Name the material used for making the armature of an electric bell. Give a reason for your answer.

Solution:

Soft iron is the material used for making the armature of an electric bell as soft iron has the property to induce magnetism quickly.

Multiple Choice Type

1. Electromagnets are made up of:

(a) Steel
(b) Copper
(c) Soft iron
(d) Aluminum

Solution:

(c) Soft iron

Soft iron can obtain magnetic properties when current flows through the solenoid.

2. The strength of an electromagnet can be increased by

(a) Reversing the directions of current
(b) Using alternating current of high frequency
(c) Increasing the current in the coil
(d) Decreasing the number of turns of coil

Solution:

(c) Increasing the current in the coil
The strength of electromagnet can also be increased by increasing the number of turns of winding in the solenoid.