Chapter - 7
Electricity and Magnetism

A. Short Answer Questions.

1. It consists of two conducting rods called electrodes. These two electrodes are oppositely charged, i.e., one is positive and the other is negative. The positively-charged electrode is called anode and the negatively-charged electrode is called cathode. They are immersed in a solution called electrolyte.
2. A large number of solar cells forms a solar panel. A solar panel can produce enough electricity to heat water in a solar geyser. Solar cells can also be used to provide streetlight at night using stored electricity produced during the day. With the advancement in technology, solar cells are also used as a source of electricity in satellites.
3. Mains do not produce any electric current on their own. They consume electricity from the power plant. The electricity produced in power plants is carried to various sub-stations. From these sub-stations, it is transferred to electric poles through transformers. This electricity from the electric poles is transferred to the mains board in our houses through electric wires.

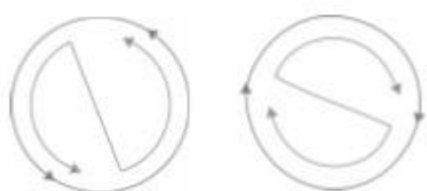
   From the mains board, electricity is distributed to different rooms by means of electric wires.
4. The two properties of a magnet are:
   (i) A magnet attract magnetic substances towards itself.
   (ii) A freely suspended magnet always rests in the north-south direction.

   To test whether a given rod is a magnet or not, take a magnet. Bring its north pole towards one end of the rod and observe what happens. Now, bring the south pole of the magnet near the same end of the rod. Again observe what happens.

   When you observe an attraction in both the cases, the given rod is not a magnet. When you observe an attraction in the first case and repulsion in the second case, the given rod is a magnet.
5. The polarity at the ends of an electromagnet depends on the direction of current in its coil. It can be determined by using the clock face rule.

   Clock face rule

   The end of the electromagnet where the direction of current flowing in the coil is anticlockwise becomes the north pole. The end where the direction of current flowing in the coil is clockwise becomes the south pole.



(a) north pole (anticlockwise)

(b) south pole (clockwise)

Polarity of an electromagnet

6. The strength of an electromagnet depends upon:
    (i) **Number of turns in its coil:** By increasing the number of turns, the strength of an electromagnet is increased.
    (ii) **The amount of current passing through the coil:** The larger the amount of current passing through the coil, the stronger will be the electromagnet.

    They are used:
    (i) by doctors to remove tiny iron particles from the eyes.
    (ii) to separate impurities of iron from other metals.

B. Long Answer Questions.

1. In a dry cell, a carbon rod (acting as a positive electrode) is enclosed in a mixture of manganese dioxide and charcoal (powdered carbon) filled in a muslin bag. A moist paste of ammonium chloride, Plaster of Paris (POP) and flour is used as electrolyte. A zinc container (acting as a negative electrode) is placed in a leakproof cover and the top is sealed with a brass cap.

Advantages of a dry cell
(i) It is lightweight and small in size.
(ii) It is cheaper.
(iii) The small size of a dry cell makes it suitable for powering small electronic devices.
(iv) It can easily be carried from one place to another.
(v) There is no fear of leakage.

2. The closed conducting path along which electric current flows is called an electric circuit. An electric circuit generally consists of the following components:
    - A source of electric current (cell or battery)
    - A conducting wire (say copper wire)
    - An electrical appliance (like bulb)
    - A switch (key)

    Types of circuits:
    (i) **Closed Circuit:** The circuit in which the switch is 'ON' and electric current flows from one terminal of the battery to the other, making the appliance work, is called a closed circuit.
    (ii) **Open Circuit:** The circuit in which the switch is 'OFF' and the electric current does not flow from one terminal of the battery to the other is called an open circuit. No appliance works when the circuit is open, as no current flows through the circuit.

3. **Aim:** To show that electricity flows in a closed circuit and stops in an open circuit

    Things needed: A cell, a switch, pieces of plastic coated copper wire, a bulb and a bulb holder

Method:

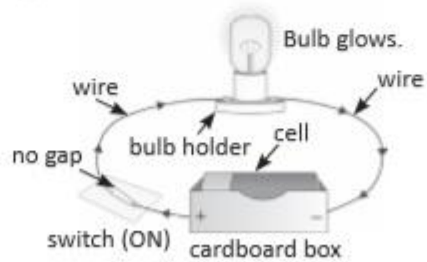
(i) Connect the positive terminal of a cell to one end of the switch with a piece of insulated copper wire.

(ii) Connect the other end of the switch to one end of the bulb holder with another piece of insulated copper wire.

(iii) Connect the negative terminal of the cell to the other end of the bulb holder with an insulated copper wire.

Observation and Discussion:

Case I: When the switch is in 'ON' position (or closed), the bulb glows brightly as shown in Fig. (a). In this case, a continuous path is provided to the electric current through the cell, the connecting wires and the bulb.

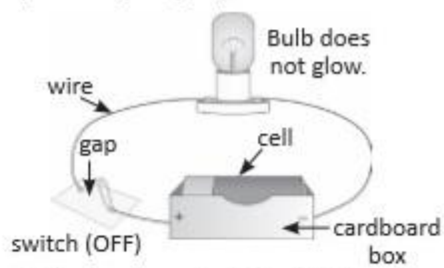


(a) when the switch is in 'NO' position

Due to this, the circuit gets completed. Hence, current flows in the circuit and the bulb glows. In other words, electric current flows in a closed circuit.

Case II: When the switch is in 'OFF' position (or open), the bulb does not glow as shown in Fig. (b). In this case, there is a gap or a break in the circuit. When the electric circuit breaks, no current flows in the circuit.

Hence, the bulb does not glow. In other words, no electric current flows in an open circuit.



(b) when the switch is in 'OFF' position

Conclusion: Thus, it proves that electricity flows in a closed circuit and stops in an open circuit.

Precautions to be taken before an electric circuit is switched ON

(i) Do not touch the switch or any component with wet hands.

(ii) Clean the ends of connecting wires by sandpaper.

(iii) The connections should be tight while connecting various components of the circuit.

(iv) Wires of small length should be used to make connections.

(v) Get your circuit connections checked by your teacher before passing current.

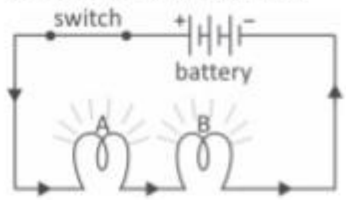
(vi) Close the key/switch when you are ready to record the readings.

4. (i) **Aim:** To study the properties when electric appliances are connected in series

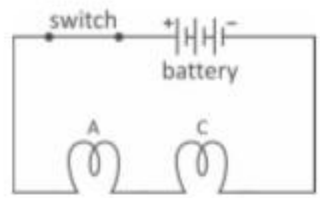
Things needed: A battery, two bulbs (A and B), one fused bulb (C), a switch, connecting wires and a cellotape.

Method:

Connect bulbs A and B in series using connecting wires. Now, connect the free ends of the wires to a battery through a switch [Fig. (a)]. Close the switch. After sometime, open the switch and remove bulb B and instead of it, connect a fused bulb C. Now, close the switch again [Fig. (b)].



(a) series circuit with bulbs A and B



(b) Series circuit with bulbs A and C

Observation:

- On closing the switch, it is observed that both the bulbs A and B glow. However, they do not glow very brightly.
- On opening the switch, it is observed that both the bulbs stop glowing.
- On connecting the fused bulb C instead of bulb B, it is observed that even when the switch is closed, the bulb A does not glow.

Conclusion: In a series circuit:

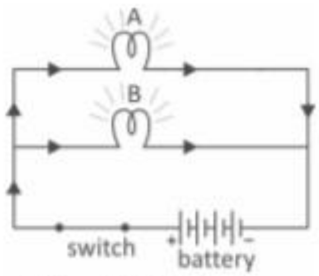
- All the electrical appliances work simultaneously when switch is closed. Similarly, all electrical appliances stop working when switch is open.
- When any of the electrical appliance goes out of order, the other appliances also stop working. This is because electricity supply to the circuit is cut off.
- The same voltage of the battery is not available to all the electrical appliances. They share the battery voltage. Therefore, they do not work at their full capacity.

(ii) **Aim:** To study the properties when electric appliances are connected in parallel

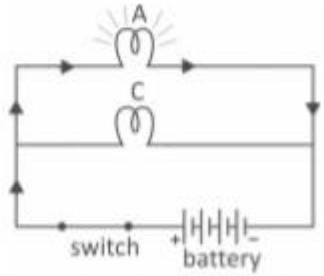
Things needed: A battery, two bulbs (A and B), one fused bulb (C), a switch, connecting wires and a cellotape.

Method: Now, repeat the Activity 3 by connecting the bulbs in parallel as shown in Fig. (a).

Observation: You observe that on closing the switch, both the bulb A and B glow brightly.After replacing the bulb B with a fused bulb C, the bulb A continues to glow brightly, whereas the bulb C does not glow Fig. (b).



(a) parallel circuit with bulbs A and B



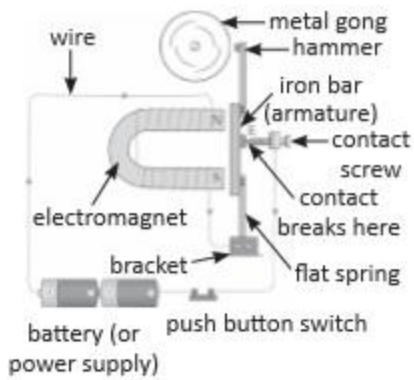
(b) Parallel circuit with bulbs A and C (fused)

Conclusion: In a parallel circuit:

- All electrical appliances work independently.
- When any one of the appliances goes out of order, the other appliance continues to work.
- The same voltage of the battery is available to all the appliances. Therefore, they work to their full capacity.

5. **Working of an electric bell:**

(i) When we press the switch, the electric circuit of the bell completes and the current passes through the coil of the electromagnet. As a result, it gets magnetised. The electromagnet attracts the armature towards itself and the hammer attached to the armature strikes the gong and produces a sound.



(ii) When the armature moves towards the magnet, its contact with the contact screw breaks at point E. Due to this, the electric circuit breaks and no current flows in the coil of the electromagnet. The electromagnet loses its magnetism and the armature is no longer attracted by it. The spring brings back the armature to its original position and the hammer moves away from the gong.

(iii) As soon as the armature comes back and touches the contact screw, the circuit completes. The current again starts flowing in the coil of the electromagnet. As a result, the electromagnet again attracts the armature and the hammer strikes the gong, producing the sound. This process of 'make and break' of the electric circuit continues as long as we are pressing the switch. Thus, the hammer strikes the gong rapidly producing almost continuous sound and we say that the bell is ringing.