

## 12

## Electricity and Circuits

## Lesson at a Glance

- **Electricity** is a form of energy which makes our task easier.
- **Power Stations:** The electricity used by us in our homes is supplied from *power stations*.
- **Types of Power Stations:** There are various types of power stations:
  - (i) Hydro power stations.
  - (ii) Thermal power stations.
  - (iii) Solar power stations.
  - (iv) Nuclear power stations.
- **Electric Cell:** An *electric cell* is a device which converts chemical energy stored in it into electric energy.
- All electric cells contain two terminals:
  - (i) **Positive terminal:** The metal cap is considered as positive terminal. It is indicated by sign (+).
  - (ii) **Negative terminal:** The metal disc or the container acts as negative terminal. It is indicated by sign (-).
- Electric cell converts chemical energy into electrical energy.
- **Uses of Electric Cells:**
  - (i) It is used in torch.
  - (ii) It is used in alarm clocks.
  - (iii) It is also used in wrist watches, transistors, cameras and other devices.
- **Uses of Electricity:**
  - (i) It is used to operate pumps to lift water.
  - (ii) It is used in the lighting of homes, roads and other places.
  - (iii) It is used in industries.
  - (iv) It helps us to work in night.
- **Battery:** The combination of two or more than two cells is called *battery*.

- **Electric Bulb** is the electrical device which converts electrical energy into light and heat energy.
- **Structure of Bulb:** It contains a thin tiny wire inside the glass cover. This tiny wire is called filament. It is supported by two thicker wires. One of these is connected to metal casing round the base of the bulb. The other is connected to metal tip of the base. The base of the bulb and the metal tip of the base are the two terminals of the bulb. These two terminals are fixed in such a way that they do not touch each other. An inert gas (argon) is filled inside the bulb.
- **Filament:** The thin wire in the bulb which emits light is called *filament* of the bulb. It is made up of tungsten metal.
- **Properties of Filament:**
  - (i) It has high resistance for current.
  - (ii) It has high melting point and do not get oxidised even at very high temperature.
- **Circuit:** The closed path from one terminal of the electric cell through the bulb and back to the other terminal of cell is called *circuit*. It provides complete path for electricity to pass between two terminals of the cell.
- **Types of Circuit:** There are following two types of circuit:
  - (i) **Open circuit:** When there is any gap in the circuit and bulb does not glow then it is called *open circuit*. The path for the flow of electricity to pass through is not complete.
  - (ii) **Closed circuit:** When there is no gap in the path of electricity and bulb starts to glow then it is called *closed circuit*.
- **The Direction of Flow of Current in a Circuit:** When the path of current in a circuit is completed, then electric current starts flowing through the circuit and the bulb glows. The *direction of flow of current will be from positive terminal to the negative terminal of the cell*.
- **Fused Bulb:** Bulb has a small filament inside it. If the filament of bulb is broken, then the bulb with broken filament is called *fused bulb*. The broken filament cannot complete the circuit. As a result, current cannot flow through the filament and fused bulb does not glow.



- **Electric Switch:** The simple device which is used to break or to complete the circuit is called *electric switch*. If it breaks the circuit then it is called switched off, when it completes the circuit then it is called switched on.
- **Conductors:** The materials which allow the electric current to pass through them are called *conductors*. Mostly metals are good conductors. Our body is also a good conductor of electricity.
- **Insulators:** The materials which do not allow the electric current to pass through them are called *insulators*, for example: rubber and wood are insulators.
- **Conduction Tester:** The device which is used to test whether a material is conductor or insulator is called *conduction tester*.

### TEXTBOOK QUESTIONS SOLVED

Q.1. Fill in the blanks:

- (a) A device that is used to break an electric circuit is called \_\_\_\_\_.
- (b) An electric cell has \_\_\_\_\_ terminals.

Ans. (a) switch (b) two

Q.2. Mark 'True' or 'False' for the following statements:

- (a) Electric current can flow through metals.
- (b) Instead of metal wires, a jute string can be used to make a circuit.
- (c) Electric current can pass through a sheet of thermocol.

Ans. (a) True (b) False (c) False.

Q.3. Explain why the bulb would not glow in the arrangement shown in Fig. 12.1.

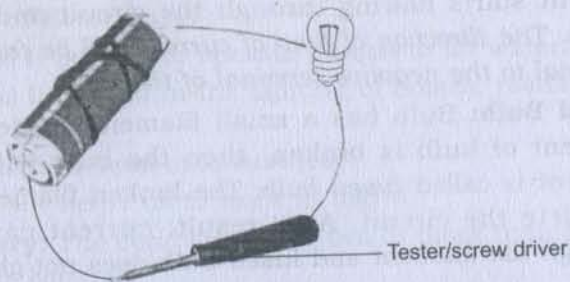


Fig. 12.1

Ans. The bulb would not glow in the arrangement shown in figure because the one end of tester/screw driver is made up of plastic which does not allow the electric current to flow through it.

Q.4. Complete the drawing shown in Fig. 12.2 to indicate where the free ends of the two wires should be joined to make the bulb glow.

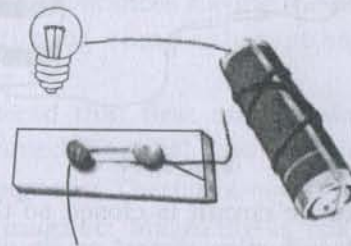


Fig. 12.2

Ans.

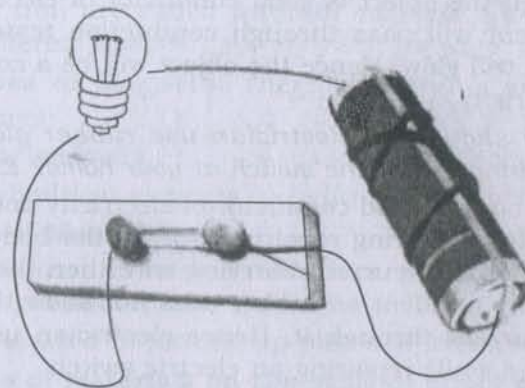


Fig. 12.3

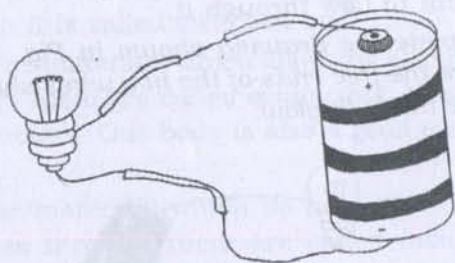
Q.5. What is the purpose of using an electric switch? Name some electrical gadgets that have switches built into them.

Ans. Electric switch is used to make electric circuit open or closed for a particular appliance and hence with the help of a switch we can use an appliance according to our desire. The electrical gadgets that have switches built in to them are Electric Iron, AC, Microwave.

Q.6. Would the bulb glow after completing the circuit shown in Fig. 12.2 if instead of safety pin we use an eraser?

**Ans.** No, since eraser is an insulator so it does not allow the current to pass. Hence the bulb will not glow.

**Q.7.** Would the bulb glow in the circuit shown in Fig. 12.4.



**Fig. 12.4**

**Ans.** Yes, the electric circuit is closed so the bulb will glow.

**Q.8.** Using the "conduction tester" on an object it was found that the bulb begins to glow. Is that object a conductor or an insulator? Explain.

**Ans.** Yes, if the object is good conductor of electricity then current will pass through conduction tester and the bulb will glow. Hence the object will be a conductor of electricity.

**Q.9.** Why should an electrician use rubber gloves while repairing an electric switch at your home? Explain.

**Ans.** Our body is good conductor of electricity and rubber is insulator. During repairing work if the body comes in contact with current carrying wire then there will not be any accident as rubber does not allow the passage of current through it. Hence electrician uses rubber gloves while repairing an electric switch.

**Q.10.** The handles of the tools like screwdrivers and pliers used by electricians for repair work usually have plastic or rubber covers on them. Can you explain why?

**Ans.** Plastic or rubber is an insulator which does not allow electric current to pass through it. The handles of the tools like screwdrivers and pliers used by electricians for repair have covering of plastic or rubber so that electric current may not pass through these tools to the body of the electrician to harm him.