



## 12. Electric Current and Circuits

### Technical Words:

1. **Conductor** - material that allows electric current to flow through.
2. **Electric circuit** - the path through which electricity flows.
3. **Electric current** - the flow of electricity through certain materials.
4. **Electricity** - a specific type of energy that we use to power home appliances, vehicles and industrial machines
5. **Insulator** - material that does not allow electric current to flow through
6. **Primary cell** - an electric cell that can be used once.

### A. Short answer question.

1. Make a list of three electrical appliances that you use every day. Mention the source of electricity for each of them.

*[Answer] Mobile phone: Lithium-ion cell; small mixer grinder: battery/mains electricity; laptop: Lithium-ion; washing machine: mains electricity (Answers vary)*

2. What is the difference between a primary cell and a secondary cell?

*[Answer] An electric cell can be used once is called a primary cell. It produces electric current through an irreversible reaction between the chemicals stored in it into electrical energy. While a secondary cell can be recharged after it has stopped supplying electric current by passing electricity through it. The chemical reactions that produce electricity are reversible and thus these cells can be used again and again.*

3. What kind of energy is converted to electricity in a dry cell?

*[Answer] Chemical energy is converted to electrical energy in a dry cell.*

4. Why will the torch bulb not glow if it has a broken filament?

*[Answer] If the filament is broken, it will stop producing light because the ends of the filament are attached to two thick wires—one to the base of the bulb and the other to the metal case at the bottom. If the filament is broken, the circuit will be open and no current will flow through the bulb, and hence, it will stop producing light.*

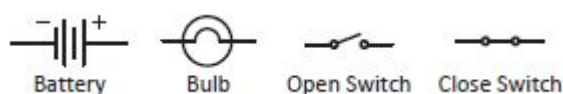
5. What is an electric circuit? Distinguish between open and closed circuits.

*[Answer] An electric circuit is the path through which electric current flows. If the path is broken or interrupted, the flow of electricity stops and this path is called an open circuit. A complete, uninterrupted path through which electric current flows is called a closed circuit.*

6. What is the direction of current in an electric circuit?

*[Answer] The direction of the flow of current in an electric circuit is from the positive terminal to the negative terminal.*

7. Draw the symbols used in a circuit diagram to show a battery, bulb and switch.



*[Answer]*

8. What is the difference between a conductor and an insulator?

*[Answer] Materials which allow electricity to pass through them are called electrical conductors. Metals, such as aluminium and copper are good conductors of electricity. Materials which do not allow electricity to pass through them are called insulators. Wood, plastic and glass are examples of insulators.*

**B. Long answer question.**

**(6 marks)**

1. Draw the cross-section of a dry cell and explain the functions of different parts.

*[Answer] The metal cap is the raised part of the dry cell that is represented by the positive (+) symbol. The carbon rod is connected to the positive terminal at the top and the flat, negative terminal at the bottom. The outer layer of the cell is made of zinc, and the cell is filled with ammonium chloride paste and powdered magnesium dioxide. When the positive and negative terminals of a cell are connected through a wire, the chemicals inside the cell react with each other and produce electricity. Thus, the dry cells convert stored chemical energy to electrical energy.  
(Diagram: Refer to the textbook)*

2. Differentiate between a dry cell and a car battery.

*[Answer] A dry cell is small and easy to handle. It can be button-shaped. Electric cells can also be connected end-to-end to make a battery. A dry cell cannot be recharged and has to be discarded after use.*

*A car battery is made up of six cells which provide power to the electric components of a car. It is a type of secondary cell that can be recharged when necessary.*

3. Explain how the electric bulb works with a diagram.

*[Answer] An electric bulb is a device that uses electricity to produce light. It is made of a glass case and a filament. The ends of the filament are attached to two thick wires—one to the base of the bulb and the other to the metal case at the bottom—inside the bulb forming the two terminals.*

*When current passes through the filament, it glows and produces light. The filament is made of tungsten in order to withstand the high temperatures generated in the bulb. If the filament is broken, the circuit will be open and no current will flow through the bulb, and hence, it will stop producing light.*

*(Diagram: Refer to the textbook)*

4. You have created a circuit. But when you turn the switch on, the bulb does not glow. List the possible reasons for this malfunction.

*[Answer] Following are the possible reasons for a bulb to not glow in a circuit:*

- (i) The circuit is open.*
- (ii) The filament of the bulb is open.*
- (iii) The switch in the circuit is turned 'off'.*
- (iv) The electric cell could be discharged.*
- (v) The wires may be loosely connected.*

5. You have been given a material. Write down the steps of an experiment that can be conducted to check whether it is a conductor or an insulator.

*[Answer] Steps to identify if the given material is a conductor or an insulator of electricity.*

**Aim:** *To identify if the given material is a conductor or an insulator*

**Materials required:** *one electric cell, insulated wires, a small bulb, two electric clips, the given material*

**Method:**

- (i) Connect the cell to the bulb using insulated wires and two electric clips.*
- (ii) Fix the given material between the clips and note your observation.*

**Observation and conclusion:** *If the bulb begins to glow, the given material is a conductor. If the bulb does not glow, the given material is an insulator.*

6. List a few safety rules one should follow while handling electrical devices.

*[Answer] Safety rules that should be followed while handling electrical devices are as follows:*

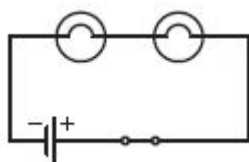
- (i) We should not touch any electrical appliance, switches or wires with wet hands as they are a good conductor of electricity and may give a shock.
- (ii) Electrical appliances such as a hair dryer or an electric shaver should not be used near a bathtub or sink.
- (iii) We should not play with wires, switches or plugs.
- (iv) We should not put our fingers into the plug point or touch the holes of the plug point.
- (v) It is important to switch off all electrical appliances before unplugging them.
- (vi) We must learn how to help someone who has received an electric shock.

**C. Image-based question.**

Convert the following picture into circuit diagram.

(3 marks)

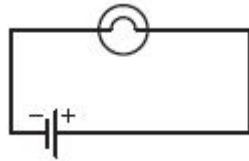
1.



[Answer]

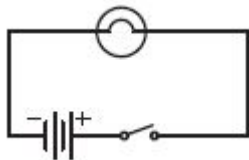
2.





[Answer]

3.



[Answer]

1.Assertion - In a closed electric circuit, the electric current pauses for one terminal of the electric cell to the other terminal

Reason - Switch is a simple device that is used to either break the electric circuit or to complete it.

Ans:Option B

2.Assertion - Rubber and plastics are used for covering electrical wires plug, tops switches and other parts of electrical appliances.

Reason - The substance which not allow electric current to pass through them are called insulator.

Ans: option A