

UNIT 2 - ELECTRICITY

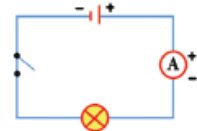
Class: VII

Subject: Science

I. Choose the correct answers

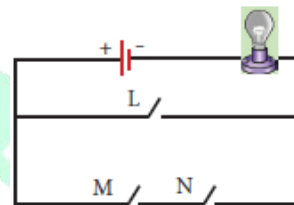
1. In the circuit diagram below, 10 units of electric charge move past point x every second. What is the current in the circuit -----

- a) 10 A b) 1 A c) 10 V d) 1 V



2. In the circuit shown, which switches (L, M or N) must be closed to light up the bulb?

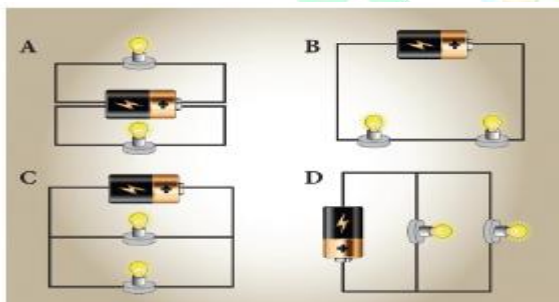
- a) switch L only
b) switch M only
c) Switch M and N only
d) either switch L or switches M and N



3. Small amounts of electrical current are measured in milliamperes (mA). How many milliamperes are there in 0.25 A ?

- a) 2.5 mA b) 25 mA c) 250 mA d) 2500 mA

4. In which of the following circuits are the bulbs connected in series?



Ans: B

II. Fill in the blanks.

- The direction of conventional current is Opposite to electron flow.
- One unit of coulomb is charge of approximately 6.242×10^{18} protons or electrons.
- Ammeter is used to measure the electric current.
- In conducting materials electrons are loosely bounded with atoms.
- S.I. unit of Electrical conductivity of a conductor is Siemens/meters

III. True or False - If False give the correct answer

1. Electron flow is in the same direction to conventional current flow. **False**
2. The fuse wire does not melts whenever there is overload in the wiring. **False**
3. In a parallel circuit, the electric components are divided into branches. **True**
4. The representation of the electric current is A. **False**
5. The electrical conductivity of the semiconductor is in between a conductor and an insulator. **True**

IV. Match the following

1. Cell - A device which converts chemical energy into electrical energy
2. Switch - used to open or close a circuit
3. Circuit - A complete path for the flow of an electric current
4. Miniature circuit Breaker - Reset by hand, circuit becomes complete once again
5. Fuse - safety device used in electric circuit

V. Analogy

1. Water : pipe :: Electric current : Wire
2. Copper : conductor :: Wood : insulator
3. Length : metre scale :: Current : ammeter
4. milli ampere: micro ampere :: 10^{-3} A : 10^{-6} A

VI. Assertion and Reason

1. Assertion (A) : Copper is used to make electric wires.
Reason (R) : Copper has very low electrical resistance.

Option:

- A. Both A and R are true and R is the correct explanation of A.
 - B. Both A and R are true but R is NOT the correct explanation of A.
 - C. A is true but R is false.
 - D. A is false but R is true.
 - E. Both A and R are false
2. Assertion (A): Insulators do not allow the flow of current through themselves.

Reason (R) : They have no free charge carriers.

A. If both A and R are true and the R is correct explanation of A.

B. If both A and R are true but R is not a correct explanation of A.

C. If A is true and R is false.

D. If both A and R are false.

VII. Very short answer

1. What is the speed of electric current?

Current travels at the speed of $\frac{1}{100}$ th times the speed of light 0.0002 m/s.

2. What is the S.I unit of electrical conductivity?

The S.I Unit of electrical conductivity is Siemens/meter(S/m)

3. Name the device used to generate electricity.

Electric cell.

4. Define fuse.

Electric fuse is a safety device which is used in household wiring and in many appliances.

5. Name some devices that run using heat effect of electric current.

Electric bulb, geyser, Iron box.

6. Name few insulators.

Rubber, wood, plastic, glass.

7. What is a battery?

Batteries are a collection of one or more cells whose chemical reactions create a flow of electrons in a circuit.

VIII. Short Answer

1. Define an electric current.

An electric current is measured by the amount of electric charge moving per unit time at any point in the circuit. The conventional symbol for current is I.

2. Differentiate parallel and serial circuits.

| Series Circuit | Parallel Circuit |
|------------------------|-----------------------|
| Single loop connection | Connected by branches |

| | |
|----------------------------------|------------------------------------|
| Bulbs dimmer | Bulbs brighter |
| Bulbs share power | Each bulb fully powered |
| All bulbs go out if one goes out | All bulbs stay lit if one goes out |

3. Define electrical conductivity.

Electrical conductivity or specific conductance is the measure of a material's ability to conduct an electric current.

IX. Long Answer

1. Explain the construction and working of an Telephone.

In telephones, a changing magnetic effect causes a thin sheet of metal (diaphragm) to vibrate. The diaphragm is made up a metal that can be attracted to magnets.

- The diaphragm is attached to spring that is fixed to the earpiece.
- When a current flows through the wires, the soft - iron bar becomes an electromagnet.
- The diaphragm becomes attracted to the electromagnet.
- As the person on the other end of the line speaks, his voice cause the current in the circuit to change. This causes the diaphragm in the earpiece to vibrate, producing sound.

2. Explain the heating effect of electric current.

- When an electric current passes through a wire, the electrical energy is converted to heat.
- In heating appliances, the heating element is made up of materials with high melting point. An example of such a material is nichrome (an alloy of nickel, iron and chromium).
- The heating effect of electric current has many practical applications.
- The electric bulb, geyser, iron box, immersible water heater are based on this effect.
- These appliances have heating coils of high resistance.
- Generation of heat due to electric current is known as the heating effect of electricity.

3. Explain the construction and working of a dry cell.

- A dry cell is a portable form of a leclanche cell.
- It consists of zinc vessel which acts as a negative electrode or anode.

- The vessel contains a moist paste of saw dust saturated with a solution of ammonium chloride and chloride.
- The ammonium chloride acts as an electrolyte.
- The purpose of zinc plate is to maintain the moistness of the paste being highly hygroscopic.
- The carbon rod covered with a brass cap is placed in the middle of the vessel. It acts as positive electrode or cathode.
- It is surrounded by a closely packed mixture of charcoal and manganese dioxide (MnO_2) in a muslin bag.
- Here MnO_2 acts as depolarizer. The zinc vessel is sealed at the top with pitch or shellac.
- A small hole is provided in it to allow the gases formed by the chemical action to escape.
- The chemical action inside the cell is the same as in a Leclanché cell.

X. Higher Order Question

1. A student made a circuit by using an electric cell, a switch, a torch bulb (fitted in the bulb holder) and copper connecting wires. When he turned on the switch, the torch bulb did not glow at all. The student checked the circuit and found that all the wire connections were tight.

□ What could be the possible reason for the torch bulb not glowing even when the circuit appears to be complete?

The possible reasons so that even at switch 'ON' position the bulb is not glowing are:

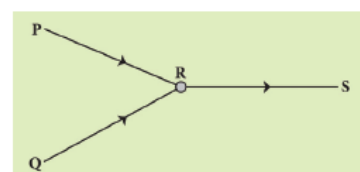
- The cell may be discharged
- The bulb may be fused.
- The wire may be broken from inside
- The connection may be loose.

XI Picture based Questions

1. Three conductors are joined as shown in the diagram

The current in conductor RS is 10 A. The current in conductor QR is 6 A. What will be the current in conductor PR

- a) 4 A b) 6 A c) 10 A d) 16 A



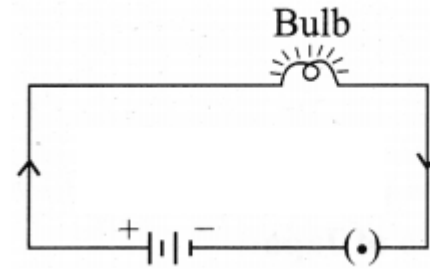
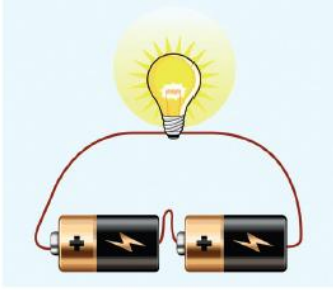
Solution:

$$PR + OR = RS$$

$$PR + 6A = 10A$$

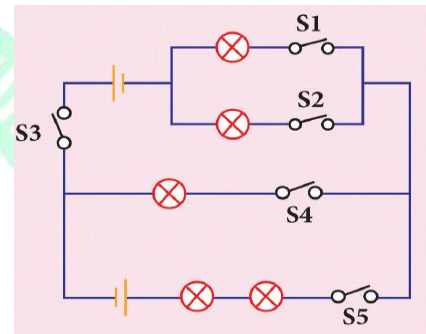
$$PR = 10A - 6A = 4A$$

2. Draw the circuit diagram for the following series connection



3. Study the electric circuit below. Which of the following switches should be closed so that only two bulbs will light up

- a) S1, S2 and S4 only
- b) S1, S3 and S5 only
- c) S2, S3 and S4 only**
- d) S2, S3 and S5 only



4. Study the three electric circuits below. Each of them has a glass rod (G), a steel rod (S), and a wooden rod (W). In which of the electric circuits would the bulb not light up .

- a) A only
- b) C only
- c) A and B only**
- d) A , B and C

