Chapter – 9

Electricity and Circuits

2marks:

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

Answer:

The purpose of an electric switch is to complete or break the circuit. Electrical gadgets that have switches built into them are fans, refrigerators, television, microwave ovens, and electric cookers.

2.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.

Answer:

The object is a conductor because the bulb glows only when the conductor is used but not when the insulator is used.

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

Answer:

An electrician uses rubber gloves while repairing an electric switch at

your home because rubber gloves are insulators. This protects him from avoiding electric shocks.

4.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?

Answer:

Tools like screwdrivers and pliers are used by electricians for repair work because plastic is an insulator, and plastic handles protect the electrician from electric shocks.

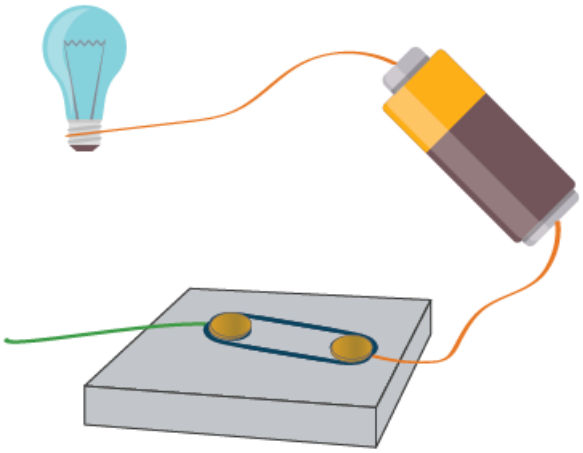
5. Explain why the bulb would not glow in the arrangement shown in Fig. 12.13.

Fig. 12.13

Answer:

The bulb would not glow in the arrangement because the circuit is not complete due to the presence of an insulator in the centre.

6. Complete the drawing shown in Fig 12.14 to indicate where the free ends of the two wires should be joined to make the bulb glow.



Answer:

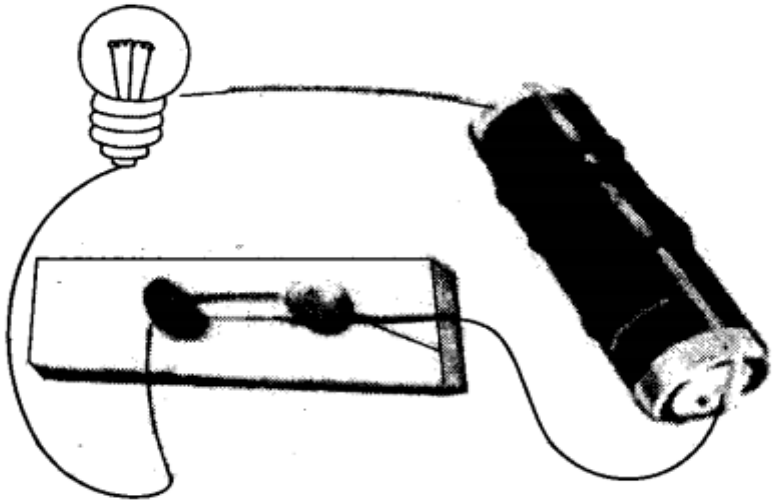
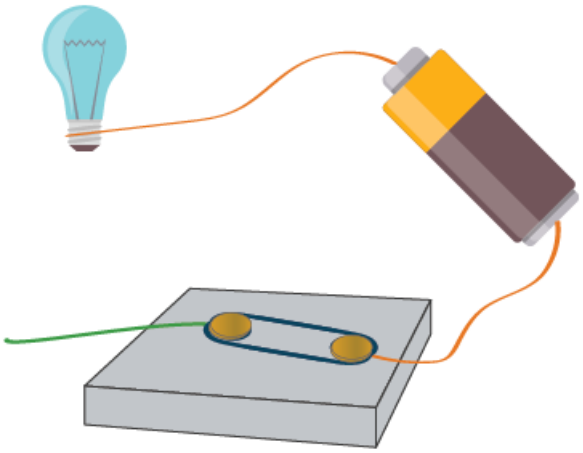


Fig. 12.10

7. Would the bulb glow after completing the circuit shown in Fig. 12.14 if instead of a safety pin we use an eraser?



Answer:

No, the bulb will not glow as the eraser is an insulator.

8. Would the bulb glow in the circuit shown in Fig. 12.15?

Fig. 12.15

Answer:

No, the bulb will not glow.

5marks:

1.Explain the concept of electric current and its significance in electrical circuits. How does the flow of electric current contribute to the functioning of devices?

Answer:

Electric current is the flow of electric charge, specifically electrons, in a conductor. In electrical circuits, it plays a fundamental role in powering devices. When a circuit is closed, electrons flow from the positive terminal of the battery through the conducting wires, components (such as bulbs or fans), and return to the negative terminal. This flow of electrons constitutes electric current, providing the necessary energy for devices to function. The magnitude of current is measured in amperes (A), and it is crucial for the proper operation of electrical appliances.

2.Differentiate between conductors and insulators, providing examples of each. Discuss the role of these materials in electrical circuits.

Answer:

Conductors are materials that allow the easy flow of electric current, while insulators impede the flow of current. Examples of conductors include metals like copper and aluminium, known for their ability to

conduct electricity efficiently. Insulators, such as rubber and plastic, prevent the leakage of current and ensure the safety of electrical circuits. Conductors are typically used for wiring, connecting components, and facilitating the flow of current, while insulators are employed to isolate conductors and prevent accidental contact.

3.Explore the importance of switches in electrical circuits. How do switches control the flow of current, and what role do they play in the functionality of devices?

Answer:

Switches are pivotal components in electrical circuits, serving as control devices for the flow of electric current. When a switch is closed or turned on, it completes the circuit, allowing current to flow and activating connected devices. Conversely, when the switch is open or turned off, the circuit is broken, interrupting the flow of current and turning off the devices. This functionality provides a convenient way to control the operation of electrical appliances, ensuring they are only active when needed, contributing to energy efficiency and device management.

4.Discuss the structure and working principle of a bulb in an electric circuit. How does a bulb produce light when connected to a power source?

Answer:

A bulb consists of a tungsten filament enclosed in a glass bulb filled with inert gas. When an electric current passes through the filament, it heats up due to its resistance, reaching a high temperature. This high temperature causes the filament to glow, emitting light. The inert gas inside the bulb prevents the filament from burning out quickly. The conversion of electrical energy into light energy in a bulb is a crucial aspect of lighting technology and finds widespread use in various applications.

5.Investigate the series and parallel arrangements of bulbs in an electric circuit. Compare their characteristics, applications, and advantages or disadvantages.

Answer:

In a series circuit, bulbs are connected in a single path, sharing the same current. If one bulb fails, the entire circuit is broken, and all bulbs go out. This arrangement is commonly used in decorative lighting. In contrast, a parallel circuit involves bulbs connected in separate paths, allowing independent current flow to each bulb. If one bulb fails in a parallel circuit, the others remain lit. Parallel circuits

are typical in household wiring, providing reliability and continuity even if one device fails. Each arrangement has its advantages and disadvantages, making them suitable for specific applications.

6.Elaborate on the concepts of a closed and open circuit. Discuss the impact of these circuit states on the flow of electric current and the functioning of devices.

Answer:

A closed circuit allows electric current to flow continuously, enabling devices to function. When the circuit is complete, the flow of electrons moves seamlessly through the conductor, powering connected devices like bulbs or fans. On the other hand, an open circuit interrupts the flow of current, causing devices to turn off. The switch is a key component for controlling the state of the circuit, opening and closing it as needed. Understanding the states of closed and open circuits is essential for managing electricity and ensuring devices operate effectively.

7.Provide safety measures and precautions when working with electricity and circuits. How can individuals protect themselves and avoid potential hazards?

Answer:

Safety is paramount when working with electricity. Precautions

include turning off the power before making or repairing circuits, using insulated tools to prevent electrical shocks, and avoiding water near electrical appliances to minimize the risk of electric shock or short circuits. Individuals should also be aware of the color-coding of wires, use appropriate protective gear, and follow safety guidelines when handling electrical components. Understanding and implementing these safety measures are crucial for preventing accidents and ensuring the well-being of individuals working with electricity.

8.Discuss the historical development of electrical circuits and their transformative impact on technology and daily life. How have advancements in electrical circuits shaped the modern world?

Answer:

The development of electrical circuits has played a pivotal role in shaping the modern world. From the early inventions of Alessandro Volta and Michael Faraday to the widespread use of electrical power in the late 19th and early 20th centuries, advancements in electrical circuits have revolutionized technology and daily life. The advent of the electric light bulb, telegraph, and later, the development of integrated circuits and microelectronics, marked significant milestones. Electrical circuits are the backbone of modern technologies, from household appliances to computers and

telecommunications. Understanding the historical evolution of electrical circuits provides insight into the transformative impact they have had on society, ushering in an era of unprecedented innovation and progress.

1. Fill in the blanks:

(a) A device that is used to break an electric circuit is called _____.

Answer:

switch**.**

(b) An electric cell has _____ terminals.

Answer:

Two

(c)_____ is the flow of electric charge in a conductor.

Answer:

Electric current

(d)Examples of conductors include metals like _____ and _____.

Answer:

Copper, Aluminium

(e)Switches control the flow of _____ in an electric circuit.

Answer:

Electric current

(f)A bulb emits light when an electric current passes through its _____ filament.

Answer:

Tungsten

(g)In a series circuit, bulbs are connected in a single _____, and if one fails, the circuit is broken.

Answer:

Path

(h)In a parallel circuit, bulbs are connected in separate paths, allowing independent _____ flow to each bulb.

Answer:

Current

(i)Safety measures when working with electricity include turning off the _____ before making or repairing circuits.

Answer:

Power

Multiple choice:

1.What is the flow of electric charge in a conductor known as?

a) Voltage

b) Electric flux

c) Electric current

d) Resistance

Answer:

c) Electric current

2.Which of the following is an example of a conductor?

a) Rubber

b) Glass

c) Copper

d) Plastic

Answer:

c) Copper

3.What role do switches play in an electric circuit?

a) Increase resistance

b) Control the flow of electric current

c) Emit light

d) Generate voltage

Answer:

b) Control the flow of electric current

4.In a bulb, what material is the filament typically made of?

a) Gold

b) Silver

c) Tungsten

d) Aluminium

Answer:

c) Tungsten

5.What happens to the brightness of bulbs in a series circuit if one bulb fails?

a) All bulbs become brighter

b) The remaining bulbs become dimmer

c) The remaining bulbs stay the same

d) All bulbs go out

Answer:

d) All bulbs go out

6.In a parallel circuit, how are bulbs connected?

a) In a single path

b) In series

c) In separate paths

d) Alternately

Answer:

c) In separate paths

7.What is the purpose of a closed circuit?

a) To interrupt the flow of electric current

b) To prevent devices from working

c) To allow continuous flow of electric current

d) To conserve energy

Answer:

c) To allow continuous flow of electric current

8.What is the main safety precaution when working with electricity?

a) Using metal tools

b) Working in water

c) Turning off the power before making or repairing circuits

d) Wearing wet clothing

Answer:

c) Turning off the power before making or repairing circuits

9.Which scientist is credited with the development of the first practical electric battery?

a) Thomas Edison

b) Michael Faraday

c) Alessandro Volta

d) Nikola Tesla

Answer:

c) Alessandro Volta

10.What is the purpose of an insulator in an electric circuit?

a) To increase the flow of electric current

b) To prevent the flow of electric current

c) To control voltage

d) To generate heat

Answer:

b) To prevent the flow of electric current

summary:

The chapter "Electricity and Circuits" provides a foundational understanding of essential electrical concepts. It explores the nature of electric current, emphasizing its flow through conductors and the significance of materials as conductors or insulators. The role of switches in controlling the flow of current is elucidated, demonstrating their pivotal function in electrical circuits. The chapter delves into the structure and functionality of bulbs, shedding light on the principles behind their illumination.

It introduces the arrangements of bulbs in series and parallel circuits, outlining their characteristics and applications. Furthermore, the distinction between closed and open circuits is explained, elucidating their impact on device functionality. The chapter concludes with a discussion on safety measures when working with electricity, promoting an awareness of precautions to ensure the secure handling of electrical components. Overall, the chapter equips students with fundamental knowledge about electricity, circuits, and safety, laying the groundwork for more advanced concepts in the field.