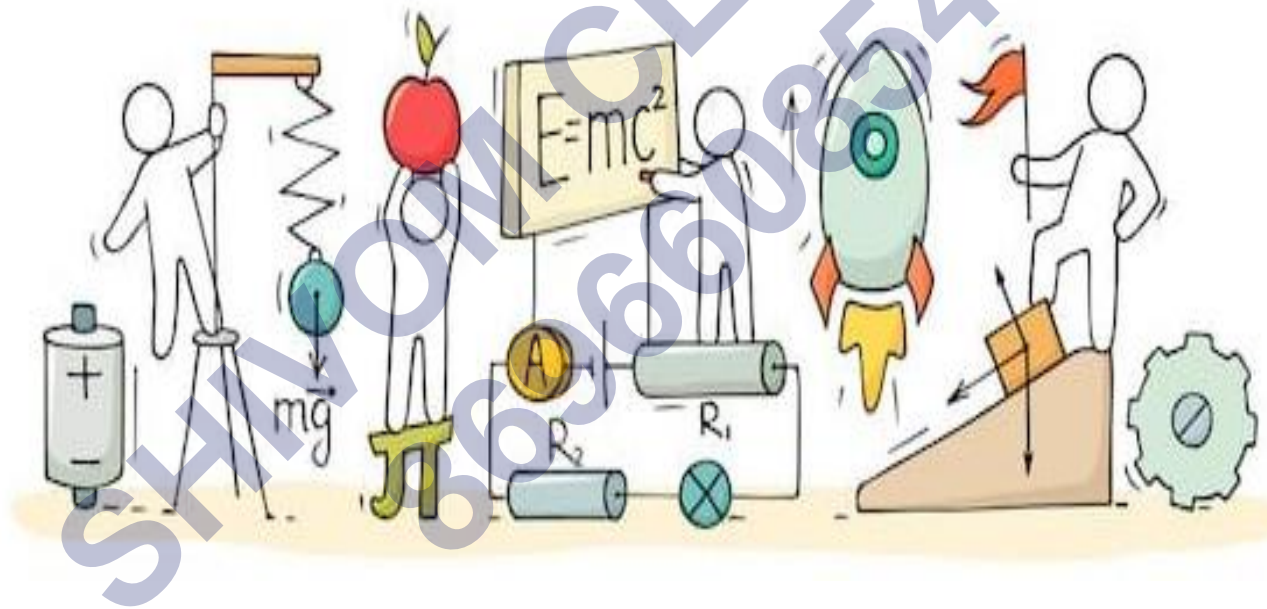


# SCIENCE

## Chapter-14: Electric Current and its Effects



## Electric Current and its Effects

### Electric Current





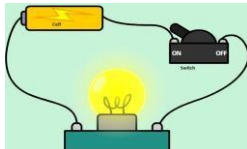

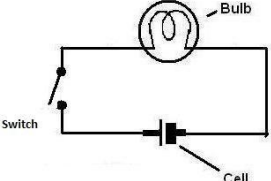



The flow of charges through a circuit is called electric current. The SI unit of electric current is ampere and denoted by A. The direction of the electric current is conventionally from the positive terminal to the negative terminal of a cell.


#### Electric Current and Its Effects:

Electrical energy is the most useful form of energy as it can easily be converted into various other forms of energy such as heat energy, light energy, mechanical energy and chemical energy.

#### Symbols of Electric Current

- Electric components are represented by symbols.
- Symbols are used in circuit diagrams to show how a circuit is connected.

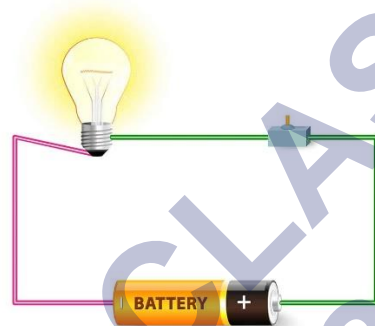
Sr. No.	Electric Component	Image	Symbol
1.	Electric Cell		
2.	Electric Bulb		
3.	Switch in 'ON' Position		
4.	Switch in 'OFF' Position		
5.	Battery		

6.	Wire		
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## Electric Circuit

- Electric current that flows through wires, cells, a key, a bulb etc. in a closed path is called an electric circuit.
- It is also known as a closed circuit.

### SIMPLE ELECTRIC CIRCUIT



- The bulb glows only when the switch is in the 'ON' position.
- A cell has two terminals:
  - a. Positive terminal (+)
  - b. Negative terminal (-)



- A key or a switch used in the circuit usually breaks the circuit when it is in the 'OFF' position and allows the electric current to flow when it is in the 'ON' position.

## Components of an electric circuit

### Cell or battery:

- A cell is a source of current.
- It has a positive and a negative terminal.
- When two or more cells are connected such that the positive terminal of one cell touches the negative terminal of the other, it forms a battery, but they have to be connected in a proper manner for electricity to flow through the circuit. They can be connected in series or in parallel.



**Battery**



**Cell**

**Switch:**

- A switch is used to close or open a circuit.
- When the switch is off, the circuit is open and no current flows through it.
- When the switch is on the circuit is closed allowing current to flow.



**Electrical appliance:**

- An electrical appliance is a device that uses the current flowing through it to function.
- Electric bulbs, electric iron, fans, electric motors are some commonly used electrical appliances in our daily life.



### Wires:

Wires connect the element of the electric circuit. They are made up of materials that are good conductors of electricity such as copper.



### Heating Effect of Electric Circuit

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- When an electric current is passed through a metallic wire, it gets heated up. This is known as the heating effect of current.
- Electric room heater or an electric heater works on the heating effect of electric current.
- It contains a coil of a wire called an element.
- This element becomes red hot and produces heat. The amount of heat produced in the wire depends on its material, length and thickness.

### Electric Fuse

- An electric fuse is an important application of the heating effect of electric current.
- The wires of an electric fuse are made of materials which melt quickly and break when large electric current is passed through them.



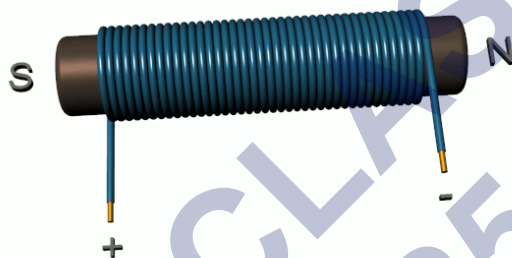
- There is a maximum limit on the current which can safely flow through a circuit.
- If the current exceeds this safe limit, then the wires may become overheated and cause

fire. Hence, a fuse is used to prevent such a dangerous occurrence.

## Magnetic Effect of Electric Current

- When an electric current passes through a wire, it behaves like a magnet. This is known as the magnetic effect of the electric current.
- When a compass is brought near such a current-carrying conductor/wire, the needle of the compass gets deflected because of the flow of electricity. This shows that electric current produces a magnetic effect.

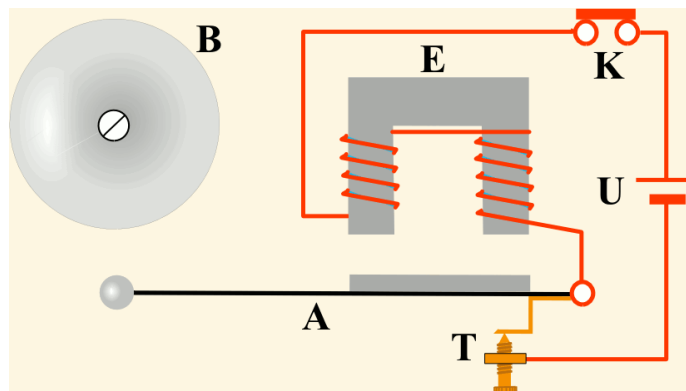
## Electromagnets



- An electromagnet can be defined as a soft-iron core which is magnetized temporarily by passing a current through a coil of wire wound on the core.
- When the electric current is switched off, the coil generally loses its magnetism. Such coils are called electromagnets.
- Electromagnets are widely used in motors, electric bells, generators, relays, loudspeakers, hard disks, MRI machines as well as in industrial lifting electromagnets for picking up and moving heavy iron objects such as scrap iron.

## Electric Bell

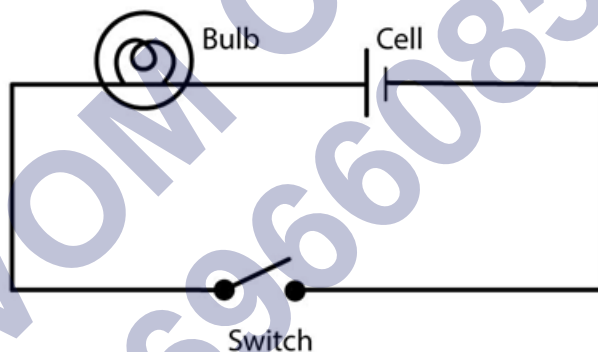
- An electric bell is a device which produces sound at the push of a button.



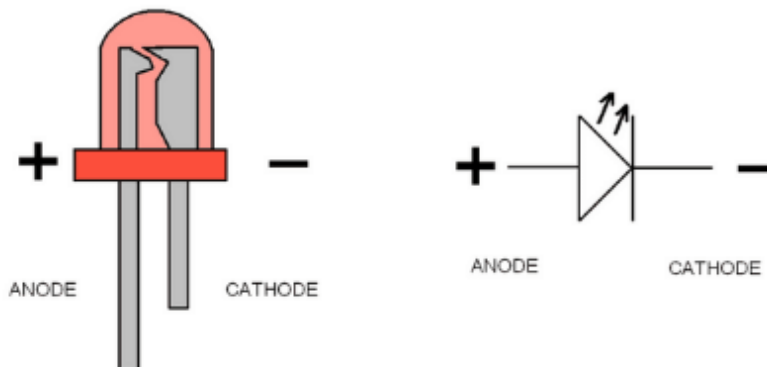
- It consists of a coil of wire wound on an iron piece. This coil acts as an electromagnet.
- An iron strip with a hammer at one end is kept close to the electromagnet.
- A contact screw is placed near the iron strip. When the iron strip is in contact with the screw, current flows through the coil. The coil thus, acts as an electromagnet. It then pulls the iron strip.
- In this process, the hammer at the end of the strip strikes the gong of the bell to produce a sound.
- When the electromagnet pulls the iron strip, it breaks the circuit, and the current through the coil stops flowing.
- The iron strip comes back to its original position and touches the contact screw again. This completes the circuit and the current flows in the coil and the hammer strikes the gong again.

### Circuit diagram

A schematic diagram that represents an electric circuit using the standard symbols of the components used in the circuit is called a circuit diagram.



### Light emitting diode (LED)

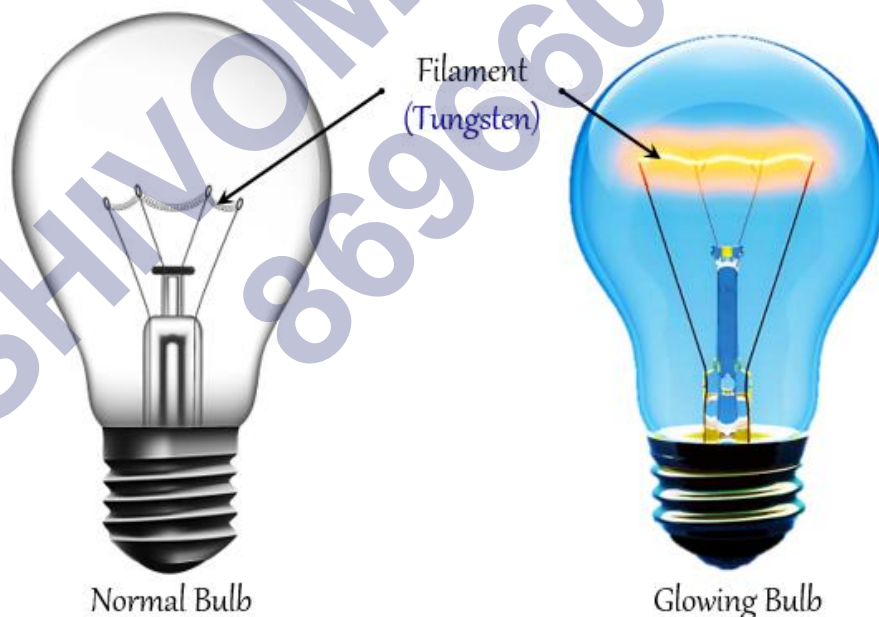




- Nowadays, Light emitting diodes (LEDs) are used instead of an electric bulb because they consume less electricity, do not produce heat, have very long life and are almost unbreakable.
- An LED allows electric current to follow in one direction only.
- LED cannot tolerate even a small change in electric current. A circuit with an LED therefore requires an appropriate resistor. The resistor regulates the flow of electric current and protects the LED.

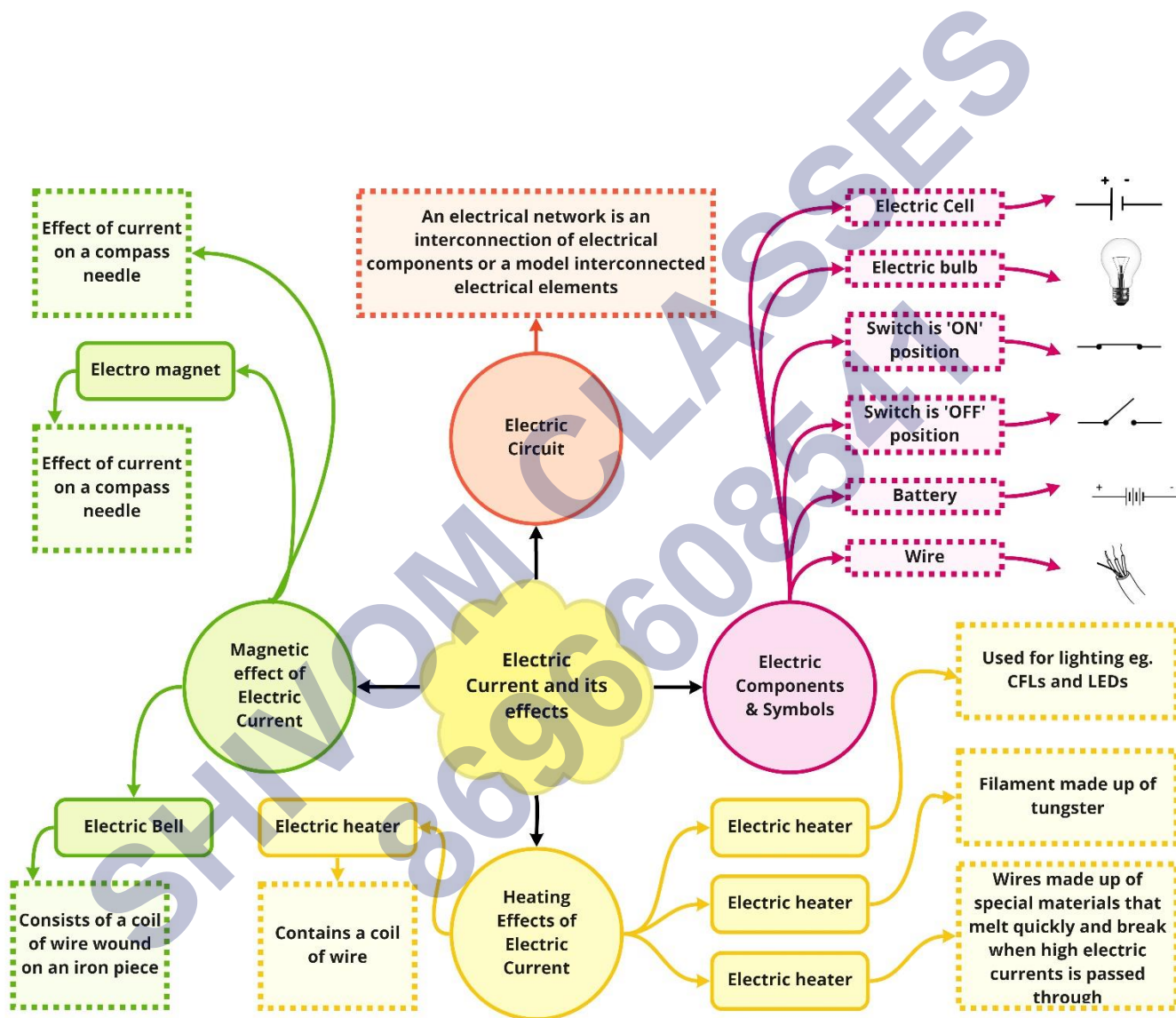
### What makes a bulb glow

- A bulb glows due to the heating effect of electric current.
- A bulb has a partial vacuum, argon gas and a thin filament of tungsten.
- Tungsten metal has a very high resistance and very high melting point.
- When an electric current pass through the filament, due to its high resistance, its heat up quickly to about 2500 degree Celsius.
- At this temperature, the tungsten filament begins to glow and emits light.





Class : 7th Science  
Chapter-14: Electric Current and its effects



## Important Questions

### ➤ Multiple Choice Questions:

Question 1. Which of the devices use a battery?

- (a) Torch
- (b) Transistor
- (c) TV remote control
- (d) All of these

Question 2. Arrangement of cells in a device is

- (a) side by side
- (b) one after the other
- (c) (a) or (b)
- (d) none of these

Question 3. In an electric circuit, the bulb glows only when the switch is in the

- (a) 'ON' position
- (b) 'OFF' position
- (c) (a) or (b)
- (d) none of these

Question 4. When the switch is in the 'ON' position, the electric circuit is said to be

- (a) closed
- (b) open
- (c) complete
- (d) both (a) and (c)

Question 5. Which of the following precaution need not be taken while using electric appliances?

- (a) Never touch lighted electric bulb connected to mains.
- (b) Never experiment with the electric supply from mains.
- (c) Never use any wire to replace fuse wire.
- (d) Never turn switch in 'ON' position.

Question 6. In a bulb there is a thin wire called

- (a) filament

- (b) coil
- (c) element
- (d) fuse wire

Question 7. When the bulb gets fused, the electric current

- (a) flows in the circuit
- (b) does not flow in the circuit
- (c) sometimes flows and sometimes not
- (d) none of these

Question 8. A glowing bulb becomes warm due to the

- (a) heating effect of current
- (b) magnetic effect of current
- (c) chemical effect of current
- (d) physical effect of current

Question 9. An electric iron is an example of

- (a) heating effect of current
- (b) magnetic effect of current
- (c) chemical effect of current
- (d) physical effect of current

Question 10. The amount of heat produced in a wire depends on its

- (a) material
- (b) length
- (c) thickness
- (d) all of these

Question 11. The electric current has

- (a) magnetic effect
- (b) heating effect
- (c) chemical effect
- (d) all of these

Question 12. Which of the following is being used in place of fuses?

- (a) MCB

- (b) Nichrome
- (c) Filament
- (d) Switch

Question 13. Which of the following is not a reason for excessive currents in electrical circuits?

- (a) Direct touching of wires
- (b) Short circuiting
- (c) Switch in 'off position
- (d) Overloading

Question 14. When electric current passes through a wire, it behave like a

- (a) battery
- (b) magnet
- (c) fuse
- (d) compass needle

Question 15. Fuse wire is generally made of

- (a) tin and lead
- (b) nickel and chromium
- (c) nickel and copper
- (d) chromium and silver

➤ **Fill In the Blanks:**

1. A combination of two or more cells is called a .....
2. In a battery, the ..... terminal of one cell is connected to the ..... terminal of another cell.
3. An electric iron works on the principle of ..... effect of electric current.
4. The crane in a junkyard separate iron from the junk by using ..... effect of electric current.
5. The bulb glows as the switch is moved to the ..... position.
6. When the bulb gets fused, its ..... breaks.

➤ **True or False:**

1. A battery is a combination of cells in which positive terminals of both the cells are connected to one other.

2. The key or switch can be placed anywhere in an electrical circuit.
3. CFLs increase wastage of power.
4. The wires used for making electric circuits normally become hot.
5. A glowing electric bulb becomes warm.
6. When the circuit is closed, the electric current does not flow throughout the circuit.

### ➤ Very Short Question:

1. Define electric circuit.
2. For a bulb to glow, it must be connected to a battery. Why?
3. What is a cell holder?
4. What is a battery?
5. Which one of the two minimise wastage of electricity CFL's or an electric bulb?
6. State some factors that affect production of heat in a wire through which an electric current is passing.
7. Name the principle of working of electric fuse.
8. What is an electric fuse?
9. What is the full form of MCB?
10. What is the full form of CFL's?

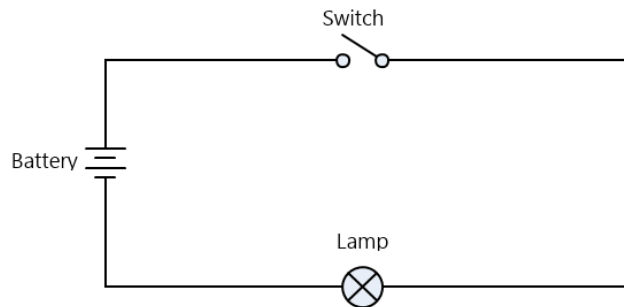
### ➤ Short Questions:

1. Differentiate between electric current and electric circuit.
2. Explain the function of cell in a circuit.
3. How fuses are useful?
4. Can we use an electromagnet separating plastic bags from a garbage heap? Explain.
5. Write short notes on heating effects of electric current.
6. Write short notes on magnetic effects of electric current
7. What are filaments of a bulb and a heater made up of?

### ➤ Long Questions:

1. Explain the formation and uses of battery.
2. An electrician is carrying out some repairs in a building. He wants to replace a fuse by a piece of wire. Would you agree with the electrician? Give reasons for your response.
3. Look at the figure given below and answer whether the compass needle will show

deflection or not when the switch in the circuit shown is closed?



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## ✓ Answer Key-

## ➤ Multiple Choice Answers:

1. (d) All of these
2. (c) (a) or (b)
3. (a) 'ON' position
4. (d) both (a) and (c)
5. (d) Never turn switch in 'ON' position.
6. (a) filament
7. (b) does not flow in the circuit
8. (a) heating effect of current
9. (a) heating effect of current
10. (d) all of these
11. (d) all of these
12. (a) MCB
13. (c) Switch in 'off position
14. (b) magnet
15. (a) tin and lead

## ➤ Fill In the Blanks:

1. battery
2. positive; negative
3. heating
4. magnetic
5. 'ON'
6. filament

## ➤ True or False:

1. False
2. True
3. False
4. False
5. True



6. False

### ➤ Very Short Answers:

1. Answer: A closed path formed by the interconnection of electrical components through which electric current flows is called an electrical circuit.
2. Answer: because a bulb will require more power
3. Answer: A compartment that holds two or more cells together to form a battery is called a cell holder.
4. Answer: A combination of two or more cells connected together is called a battery.
5. Answer: CFL's
6. Answer: Length and thickness of the wire, the duration of flow of current, and the material of the wire.
7. Answer: The electric fuse works on the principle of the heating effect of electric current.
8. Answer: An electric fuse is a safety device to prevent damage to an electrical circuit when excessive current flows through it.
9. Answer: Multiple Circuit Breakers
10. Answer: Compact Fluorescent Lamps

### ➤ Short Answers:

1. Answer: Electric Current is the flow of electrons. But an electric Circuit is the closed path in which electric current flows.
2. Answer: A cell supplies electric current. The positive terminal (+) of a cell is represented by a vertical long line, while the negative terminal (-) is shown as a parallel, shorter line.
3. Answer: A fuse is thus a safety device which prevents damages to electrical circuits and possible fires.
4. Answer: An electromagnet cannot be used for separating plastic bags from a garbage heap as it attracts only iron pieces and will not attract plastic bags.
5. Answer: When an electric current flows through a wire, the wire gets heated. It is the heating effect of current or When current flows through a metal wire it gets heated up, this is called heating effect of current. E.g., a glowing electric bulb becomes warm. This effect has many applications like Electric Heater, Light Bulb etc.
6. Answer: When an electric current flows through a wire, it produces magnetic effect around it. A current carrying coil of an insulated wire wrapped around a piece of iron is called an electromagnet. Magnetic Effect of electric current has many applications like Electric Bell, Motor, Fan etc.
7. Answer: In a bulb there is a thin wire called the filament made up of tungsten. When

current passes through it, it glows and gets heated up. In a heater there is a coil of wire called element which is made up of nichrome. When current passes through element it becomes red hot and give out heat

### ➤ Long Answers:

1. Answer: A combination of two or more cells connected together is called a battery. It supplies electric current. It is formed by connecting the positive terminal of one cell to the negative terminal of another. To identify the positive and negative terminals, they are denoted as + and -, respectively. These batteries are used in many devices, such as torch lights, mobile phones, calculators and even automobiles.
2. Answer: There is a maximum limit on the current which can safely flow through a circuit. If by accident the current exceeds this safe limit, the wires may become overheated and may cause fire. In order to prevent this, in all buildings fuses are inserted in all electrical circuits. If a proper fuse is there in the circuit, it will blow off and break the circuit. A fuse is thus a safety device which prevents damages to electrical circuits and possible fires. So we will not agree with an electrician, who is using a wire in place of fuse of proper rating as if by accident the current exceeds safe limit, the wires may become overheated and may cause fire.
3. Answer: The compass needle will not show any deflection when the switch in the circuit shown by above figure is closed, because there is no power source like cells in the circuit hence there will be no electric current flow in the circuit. In the absence of electric current there will be no magnetic effect to cause the deflection of compass needle.