# 8 CURRENT ELECTRICITY

In this chapter you will learn:

- Concept of Electric Current
- Conventional Current
- Potential Difference
- Ohm's Law
- Resistance
- Components of a Circuit
- Direct and Alternating Current
- Use of A.C. and D.C.
- Domestic Electric Supply
- Hazards of Electricity and Precautionary Measures
- Electrical Measuring Instruments
- Analogue and Digital Meters

Electricity is very common form of energy, which we use in our homes and work places everyday. It has facilitated the availability of our needs of life. Just turn on the switch and the electricity starts its work.

Electricity is used in four important ways. It causes fans, electric motors and machines to move. It provides light through bulbs, tubes and television. In a loud speaker it is converted into sound and in electric iron, heater and toaster it assumes the form of heat.

## 8.1 Electric Current

You know that electric current is the flow of charges. The charges are the free electrons, which are available in conductors. In some conductors like liquids and gases, the current also flows due to the motion of positive and negative ions. But a source of energy is required to force the charges into motion. The source pushes the charges through the circuit.

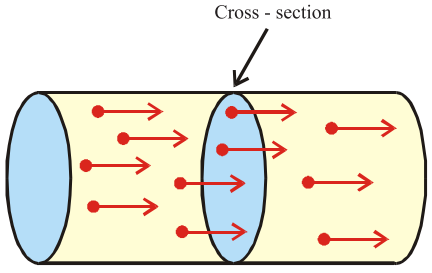



Fig: 8.1

**The amount of charge that passes through any cross-section in one second is called current.**

If charge Q passes through any cross-section in time t seconds then the current I can be written mathematically as

$$I = \frac{Q}{t} \qquad \ldots\ldots\ldots \qquad (8.1)$$

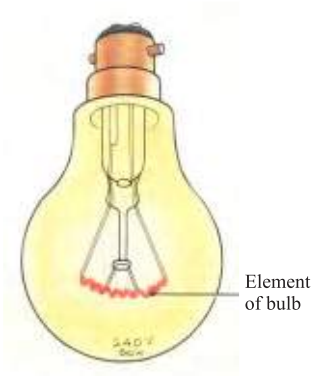
The unit of current in system International (SI) is ampere. It is denoted by A. Current can be measured by connecting an ammeter in series with the circuit.

**For your information**

$1\,mA = 10^{-3}\,A$

$1\,\mu A = 10^{-6}\,A$

**For your information**




The element of bulb is wound tightly like a spring so that heat may not be wasted due to convection of air.

## 8.2 Conventional Current

From the very beginning after the discovery of electricity, it was assumed that the electric current is due to flow of positive charges, which move from positive terminal of the battery towards the negative terminal. This is called the conventional current. But, now, we know this fact very well that the charge carrying particles in metal conductors are the electrons having negative charge on them. Electrons move from negative terminal of the battery towards positive terminal. Thus in fact, the current is due to the flow of negative charges.

Keep in mind that electrons do not flow through a conductor like a stream but their motion is different. A number of free electrons are always bumping among the atoms of the conductor, which is called random motion (Fig: 8.2). In the absence of a battery, the number of electrons passing towards left is the same as through the right side. Thus net rate of electrons passing through any cross-section in one direction is zero.

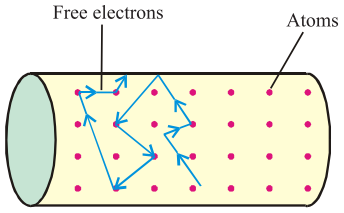



Fig. 8.2

When one end of a conductor is connected to the positive terminal of the battery and the other end connected to the negative terminal, the electrons experience force. Due to this force electrons start drifting towards the positive terminal of the battery in addition to their random

motion. As the electrons have negative charge, so they carry negative charge while moving through the circuit. However we can assume that

**The amount of positive charge flowing in one direction is equivalent to the same amount of charge flowing in opposite direction.**

Let us consider the following example to understand this.

Suppose that the body A carries +10C charge and the body B carries –10C charge. Let both of them are connected with each other through a wire for a small duration and then put them apart. If –4C charge is transferred from body B to A during this interval, then what should be the charge on bodies A and B after they are separated again.

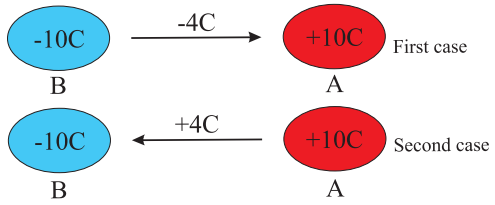



Fig. 8.3

In this case:

Charge on body A = + 10C + (–4C) = + 6C

Charge on body B = – 10C – (–4C) = – 6C

If we assume that +4C charge is transferred from body A to B, then

Charge on body A = + 10C – (+4C) = + 6C

Charge on body B = – 10C + (+4C) = – 6C

We see that in the both cases result remains the same.

In future, we will use the word "current" for "conventional current". The words "electronic current" is used to indicate the direction of flow of electrons.

## 8.3 Potential Difference

When an electric circuit is completed by closing the switch, the negative terminal of the battery pushes the free electrons in the circuit towards positive terminal. This causes the flow of current.

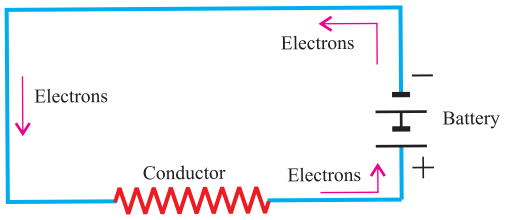



Fig. 8.4

The current flowing through a conductor can be considered analogous to the flow of water through the pipe. In Fig: (8.5), the water level is higher at position A and it is lower at position B. In this case the water will flow from position A to B. The water will stop flowing when level on both sides will be the same. Now, a pump has to be used to maintain the flow of water.

The pump will lift the water from B and will put it into the pipe at A. In this way the flow of water will continue . The water flows from A to B because the level of water at A is higher than that at B. A battery also acts like a pump. The chemical reaction in the battery transfers electrons from positive terminal to negative terminal. In this way the potential energy of the electrons, reaching the negative terminal, increases. This is the energy due to which electrons move towards the positive terminal in the outer circuit. The potential energy of the electrons decreases as they reach the positive terminal. The battery pushes them again towards the negative terminal. The energy required is provided by the chemical reaction in the battery.

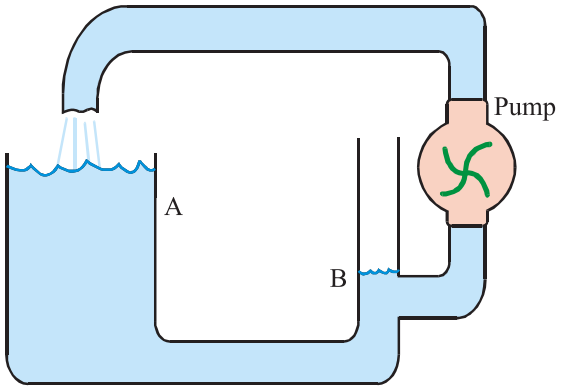


Fig. 8.5

If we refer to the conventional current, the current flows from positive to negative terminal. Therefore, like water the level of potential energy of the charge at positive terminal should be higher than that of potential energy at negative terminal. The level of potential energy is also called simply potential. Hence

**Current flows from higher potential towards lower potential.**

In order to maintain the current, charges gain energy from the battery and expend it while passing through the circuit. The capacity of supplying energy for different batteries is different. It depends upon the potential difference of the battery.

**The amount of energy supplied to one coulomb charge by a battery is called its potential difference.**

Potential difference is also called as voltage. The SI unit of potential difference is volt(V). The potential difference (V) between two points in a circuit can be measured by connecting a voltmeter parallel to the points.

## 8.4 Ohm's Law

Is there any relation between current and potential difference? Let us perform an experiment for this.

**Activity**

Connect one metre long nichrome wire to a variable power supply as shown in Fig.(8.6). Also connect an ammeter in series with the circuit. Connect a voltmeter parallel to the nichrome wire. Increase the voltage step by step from the power supply. Keep on noting the

reading V of voltmeter and the reading I of ammeter. You will observe that the value $\frac{V}{I}$ remains constant i.e., V is proportional to I. The relation between potential difference and current, first discovered by George Simon Ohm in 1826 is that

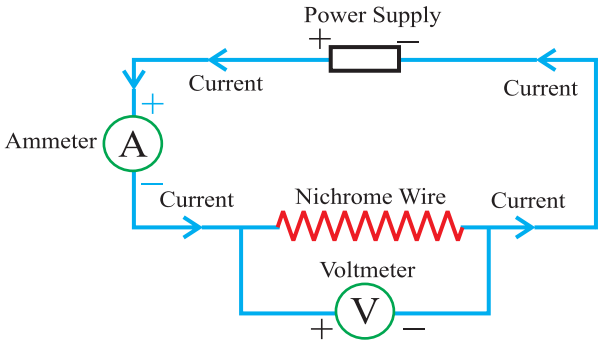


Fig. 8.6

**The current flowing through a conductor is directly proportional to the potential difference provided that the temperature and the physical state of the conductor does not change.**

This is called Ohm's law. Mathematically, we can write it as:

$$V \propto I$$
$$V = RI \quad \ldots\ldots\ldots\ldots\ldots \quad (8.2)$$

where R is a constant called the resistance of the conductor. From Ohm's law, we can determine the value of any unknown quantity by knowing the other two quantities.

## 8.5 Resistance

The opposition to the flow of charges is called resistance. Resistance is equal to the ratio of potential difference and current. From equation 8.2

$$R = \frac{V}{I}$$

In a circuit diagram, resistance is shown by a zigzag line as shown in Fig. (8.7). The SI unit of resistance is ohm (Ω).

Fig. 8.7

**If one volt potential difference applied across the ends of a conductor gives rise to a current of one ampere, the resistance of the conductor is one ohm.**

The cause of resistance is that when a potential difference is provided across the ends of a conductor the free electrons in the conductor start moving from negative to positive end. In their way the free electrons collide with the atoms of the conductor due to which hindrance is produced in their motion. Because every conductor contains atoms in it, therefore every conductor does have resistance how so ever small it may be.

## 8.6 Components of a Circuit

Switches, resistors, capacitors etc. are inserted in a circuit in addition to the battery. These are

called the components of a circuit. Some important components are described below:

## Switches

A switch completes or breaks a circuit. When the switch is turned off, no current flows through the circuit. In the laboratory, the switch is replaced by a "key" which can be closed or opened. In the home, switches of different designs are used to turn electric appliances on or off. Some samples of switches and key are shown in Fig. (8.8).

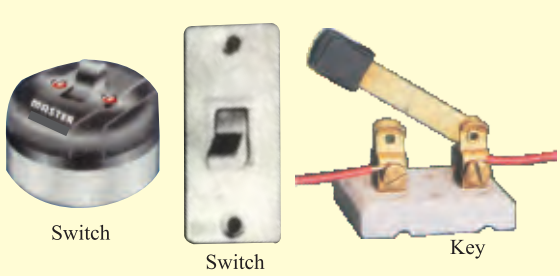



Fig. 8.8

## Resistors

The conductors having large resistance are called resistors. Bulb, heater, iron, fan and other electric appliances are all resistors. The charges flowing in a circuit carry energy from the battery and spend it while passing through the resistors. Here, the energy is converted into heat, light or motion.

When the electrons flowing though the circuit collide with the atoms, they transfer their energy to the atoms. With increased energy, the vibrations of the atoms become more vigorous and their temperature increases. That is why the resistors emit heat and light as we observe in case of lighted bulb or heater.

Resistors are also used to reduce or enhance the current in the circuits of appliances like radio, television etc. These are made from special materials. The values of resistance are indicated in the form of coloured bands on the resistors.

**For your information**

Different resistors-colour bands have drawn to indicate their values

## Capacitors

Capacitors store electric charge and are used for many other purposes in electric circuits. A simple capacitor consists of two parallel metal plates. There is some insulator placed between the plates that is called the dielectric.

When the capacitor is connected across a battery, positive charge is deposited on one plate and negative charge is deposited on the other plate. The charges remain there even if the battery is removed. This is called charging of capacitors.

When the capacitor is charged, potential difference is developed across the plates due to the opposite charges. The more the charge is stored, the greater is the potential difference produced.

The SI unit of capacitance is farad (F). Farad is a bigger unit. Usually micro-farad(μF) is used as a small unit.

$$1\mu F = 10^{-6} F$$

## Types of Capacitors and Uses

Two long metal foils are usually used to enhance the area of plate of the capacitor. A layer of paper or plastic sheet is placed in between the plates and rolled up. This becomes a fixed capacitor.

Fixed capacitors are used in electric fans and motors. When the switch is turned on, the capacitor is charged. The current in the circuit increases as it discharges, and fan or motors start easily. Different types of capacitors are shown in Fig. 8.10.

Two sets of plates are used in a variable capacitor. One set is fixed whereas the other one can be rotated to change the area between the plates. This changes its capacitance. This is also called the gang capacitor. Such capacitors are used for tuning radio, television etc.

Capacitors are also used to smooth the ripples while changing A.C. into D.C. When a sound signal from microphone or tape recorder is fed to the amplifier, a capacitor is introduced in the way, so that the D.C. voltage of amplifier may not damage the microphone.

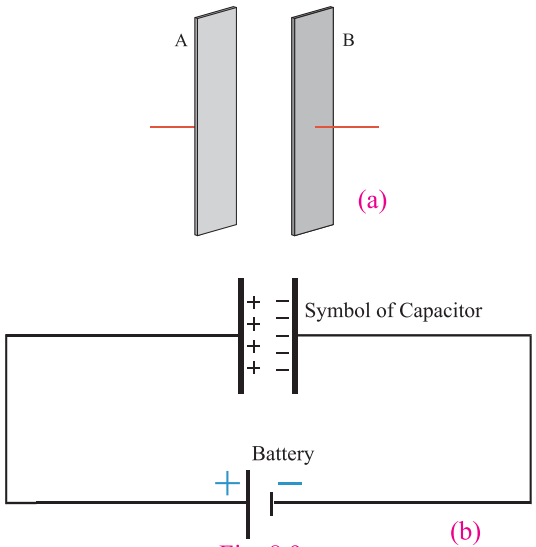
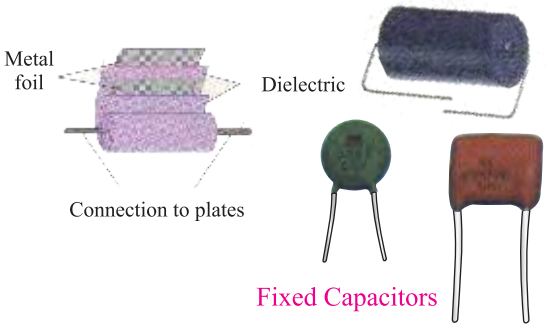
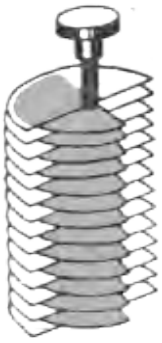


Fig: 8.9



Fixed Capacitors


Gang Capacitor
Fig. 8.10

## Transformer

Transformer is a device that decreases or increases the A.C. voltage. In A.C., current does not flow in one direction but it changes direction alternatively.

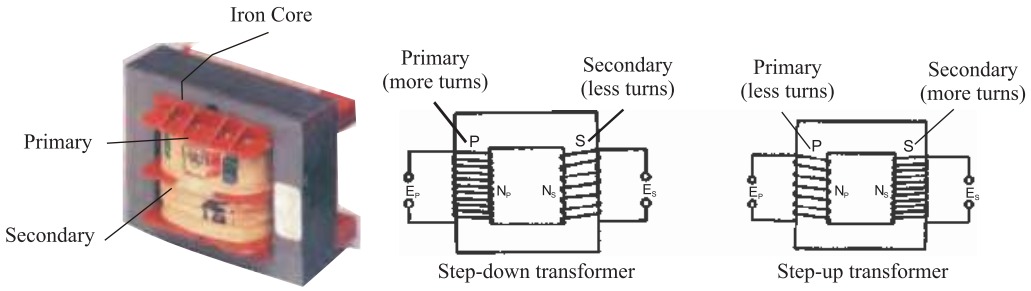



Fig. 8.11: Transformer

A transformer consists of two coils wound over an iron core. One coil is called the "primary" and the other one is called the "secondary". When a current passes through the primary, a current is also produced in the secondary due to induction. The voltages in the primary and the secondary are proportional to their number of turns i.e.,

$$\frac{\text{Secondary voltage}}{\text{Primary voltage}} = \frac{\text{No. of turns in the secondary}}{\text{No. of turns in the primary}}$$

or
$$\frac{V_s}{V_p} = \frac{N_s}{N_p} \quad \text{.....} \quad (8.3)$$

If the number of turns in the secondary are more than those of primary, it is called a step-up transformer. If the number of turns in the secondary are less than those of primary, it is called a step-down transformer. A step-up transformer increases the voltage whereas a step-down transformer decreases the voltage.

In a tape recorder, radio, computer etc. 220 volts are decreased to 6,9, or12 volts with the help of a transformer and then provided to the appliances. In a televison, the voltage is increased up to many thousands volts by using a step-up transformer.

Electricity is transmitted from power station to the cities at a very high voltage. This voltage is reduced to 220 volts with the help of transformers and then supplied to the consumers. If the electricity is transmitted from power station to cities at 220 volts, a large amount of energy would be lost.

## 8.7 Direct and Alternating Current

When both ends of a conductor are connected to the battery, current starts flowing through it. The current is directed from positive to negative terminal (Fig. 8.12).

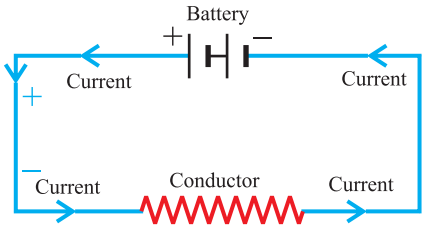



Fig. 8.12

**That current which always flows in one direction is called the direct current.**

Commonly, the direct current is termed as D.C. There is another type of current, which changes its direction again and again.

**The current which changes its direction again and again is known as alternating current.**

The alternating current is abbreviated as A.C. The electricity supplied to our homes is also A.C.

## 8.8 Uses of D.C. and A.C.

Cells are used in torches, watches and toys. These are the sources of direct current. A car battery also provides D.C. Actually radio, tape recorder, television and computer etc. all work with D.C. These appliances use A.C. supply after converting it into D.C. Electric fans, motors, bulbs and heaters etc. work with A.C.

Electricity supply is brought from far off places through cables. If it were transmitted at 220 volts, a major portion would have been wasted. Therefore, electricity is transmitted from the power stations at a very high voltage. Then voltage is reduced locally to 220 volts with the help of transformers and supplied to the consumers. As the transformer can change only the A.C. voltage and not the D.C. voltage, therefore A.C. is preferred to D.C. Besides this, A.C. can be converted into D.C. very easily whenever needed as in case of electroplating. Moreover, A.C. is used for carrying signals of microphone, tape recorder and for the radio, television transmissions.

## 8.9 Domestic Electric Supply

A.C. electric supply of 220 volts is provided at our homes. A domestic circuit is shown in (Fig. 8.13). Two wires enter our home from the meter. One wire is called live or hot and the other is called neutral or cold. Electric energy is supplied to our homes through live wire. Neutral wire is the return path for the current so that the circuit can be completed. The electric potential of neutral wire is zero. There is always a potential difference of 220 volts between the live and the neutral wire. A third earth wire is also shown in the circuit. This is used for protection. You have already studied the use of earth wire in the previous classes.

### Circuit Wiring

First of all a switch is introduced in the way of both live and neutral wires in the domestic circuit. This is called the main switch. It turns the whole circuit on or off. Following the main switch there is a fuse box where the main electric supply is divided into many parallel circuits. In this way all the electric appliances are provided with the same potential difference of 220 volts. These parallel circuits carry currents to the lights, heaters and other appliances. Every parallel circuit contains a live wire, a neutral wire and an earth wire.

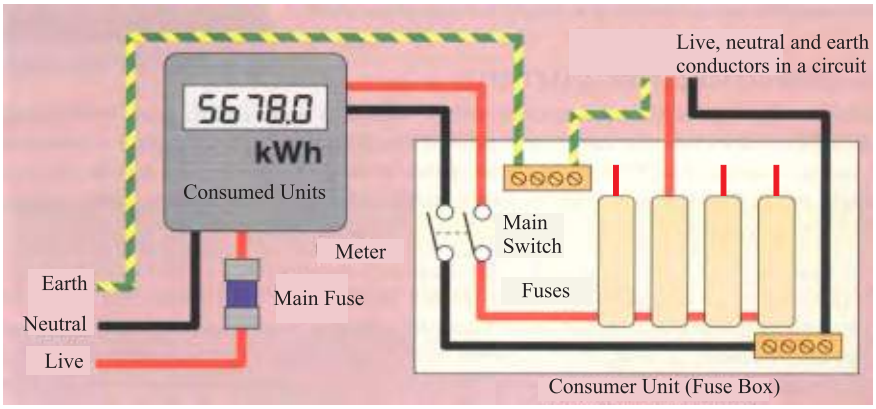


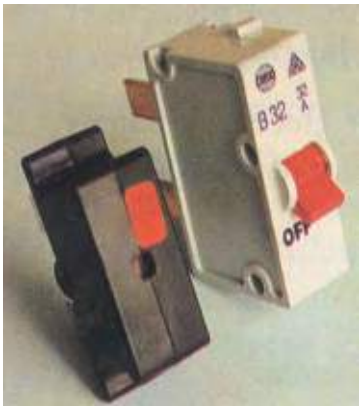

Fig. 8.13

## Fuses and Switches

Fuse is such a device which does not allow current to pass through it over a certain limit. If the current exceeds the limit, the fuse wire melts and we say that fuse has blown. Fuses are of different values. A fuse is introduced in the path of live wire in every parallel circuit. A fuse used in a circuit is of slightly higher value than the current required to be passed through the circuit. Usually a 13 ampere fuse is used for the power plug and a 5 ampere fuse is used for the lights. Now a days circuit breakers are replacing the fuses. These are turned off automatically on passing more or less current than its limit. In Fig. 8.14, fuses of different types are shown.


Fig. 8.14: Fuses of Different Types

All the electric appliances are connected in parallel with the main supply. A separate switch is used for each appliance to turn it ON or OFF. Switches are introduced in the ways of live wires only. If they are introduced in the way of neutral wires, the fan, heater etc. will remain "live" even if the switches are OFF. Thus danger of electric shock by touching the appliances will remain there.




Circuit Breaker

## 8.10 Measurement of Electricity Supply

You receive electricity bill at your home every month. The amount of electrical energy consumed during the month and its price is printed on the bill. The unit of electrical energy is kilowatt-hour. You have read about this unit in the previous chapter. The electricity meters installed in our homes measure the electricity in the same unit.

If you want to know how much electricity have you consumed in a certain period, follow the procedure given below.

i. Note the reading of your meter in the beginning of the said period.

ii. At the end of that period, note the reading again.

iii. The difference of both the readings is equal to the amount of electrical energy consumed.

iv. The total price can be calculated by multiplying the consumed energy with the rate of units of electricity.

## 8.11 Dangers of Electricity and Precautionary Measures

There are many advantages of electricity. But you cannot deny its danger as well. A few of them are described below.

### Electric Shock

Sometimes live wire may touch with the metallic body of electric appliance like fan or iron. If a person in this state happens to touch that appliance, a current starts flowing through him into the ground.

**When a current flows through a living body, it is called an electric shock.**

Some part of the body may burn with the electric shock or even death can be caused.

### Fire

Electric appliances are the resistors. The current flows through them up to a certain limit. If the insulation of wire is damaged due to some reason and the wires touch together, the current completes its circuit through wires only without passing through the resistor. As the wires have negligible resistance, so a large current starts flowing through them. The wires become so hot that these catch fire. This fire becomes more dangerous after it spreads away.

Fig. 8.15

Overloading

Damaged Insulation

Fig. 8.16

Besides damaged insulation, overloading or damp conditions could also be the cause of fire (Fig. 8.16).

## Explosion

At the places where petrol, diesel, fireworks or other inflammable chemicals are present, the short circuiting become extremely dangerous. These materials can explode after catching fire. The chances of explosion increase many times in a military ammunition depot.

## Precautionary Measures

Dangers of electricity can be controlled by making precautionary measures. Here below are given some precautionary measures. By taking these measures, dangers can be avoided to much extent.

1. Always insert switches in the way of live wire.
2. Do not plug in many electric appliances in the same socket. It will cause overloading.
3. Do not let electric appliances touch with water. As water is conductor of electricity, therefore, it may increase the chances of short circuiting.
4. The use of fuses and circuit breakers reduce the dangers of electricity.
5. Earth wire must be connected to the electric appliances. This can save from possible accidents.
6. Do not pull the wire removing out a plug from the socket. Always pull out the plug.
7. Fire extinguishers should be made available in offices and factories for the emergency use.

### First Aid Administration

1. If a person has received electric shock, watch before touching him whether he is not still in contact with the electric appliance. If so, turn off the main switch immediately. In case the main switch is out of reach, detach the affected person from the appliance with the help of a wooden rod or a plastic object.
2. The electric shock can stop respiration and it can also cause death of the victim. If breathing stops, try to restore respiration artificially by giving air through mouth.
3. In case the heart stops beating, press upon the chest repeatedly with both of your hands. It may restore heart beating.
4. Immediately call for the ambulance and carry the patient to the hospital.

## 8.12 Measuring Instruments

Different instruments are used for the measurement of current, voltage and resistance. Basically, galvanometer is an instrument which detects the current. Different measuring instruments are made by making modification in the galvanometer.


Fig. 8.17 (a)
Galvanometer

You have learnt about electric motor in the lower classes. The principle of the galvanometer is the same as that of an electric motor. A coil of wire is placed between the opposite magnetic poles. An axil passes through the centre of the coil. When current is passed through the coil, it turns about the axil. The springs at the ends of the axil are tightened as the coil rotates. They stop further rotation of the coil.

As the coil rotates, a pointer fixed on the coil also deflects along a circular scale (Fig. 8.17). The more the current the larger is the deflection. A galvanometer attains full scale deflection only with a few milliampere current. That is why a galvanometer is not used to measure the exact amount of current, but it is used only to detect the current.

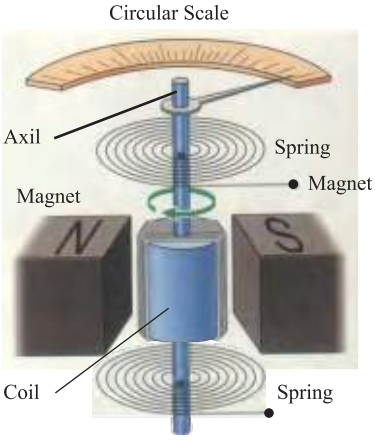



Fig: 8.17 (b)

## Ammeter

Ammeter is an instrument which measures the current. This is made by connecting a small resistance in parallel to the coil of the galvanometer. This resistance is called the "shunt". The major portion of the current passes through the shunt. Only a small portion passes through the galvanometer. The value of the shunt resistance is determined by the desired range of the ammeter (Fig. 8.18).

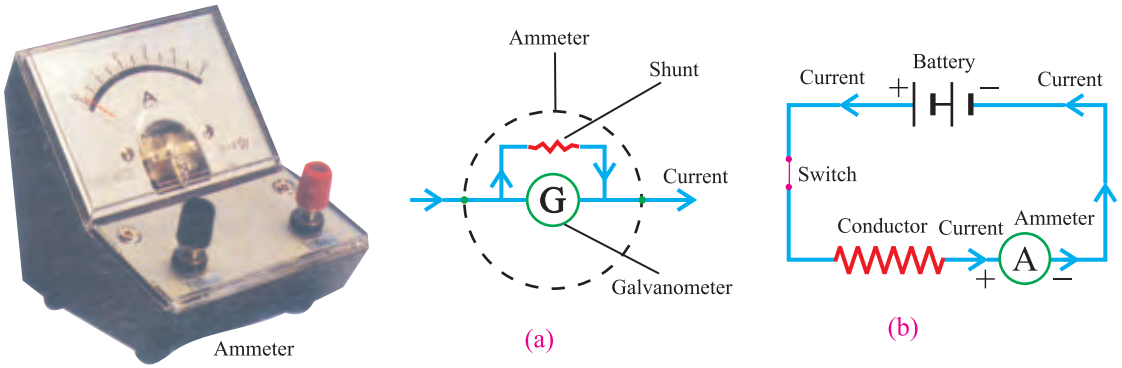



Fig. 8.18: Ammeter

Ammeter is always connected in series with a circuit. So that all the current to be measured should pass through the ammeter. Due to this reason the resistance of the ammeter is very low, so that it may not alter the current in the circuit. While connecting the ammeter in a circuit, care should be taken that the current may not exceed its range. Moreover the current should enter an ammeter from its positive terminal.

## Voltmeter

Voltmeter is an instrument which is used to measure potential difference. This can also made by modification in the galvanometer. A high resistance is connected in series with the coil of the galvanometer. This converts it into a voltmeter (Fig. 8.19). The value of high resistance depends upon the range of the voltmeter. Usually this resistance is of many thousands ohms.

A voltmeter is connected in parallel to the points across which the potential difference is to be measured. As the resistance of a voltmeter is very high, so it does not draw any current from the main circuit. By using the voltmeter in this way, the potential difference between the two points does not change and it is measured accurately. Like ammeter, care must be taken in the use of voltmeter. Its positive terminal should be connected to that point whose potential is higher than the other.

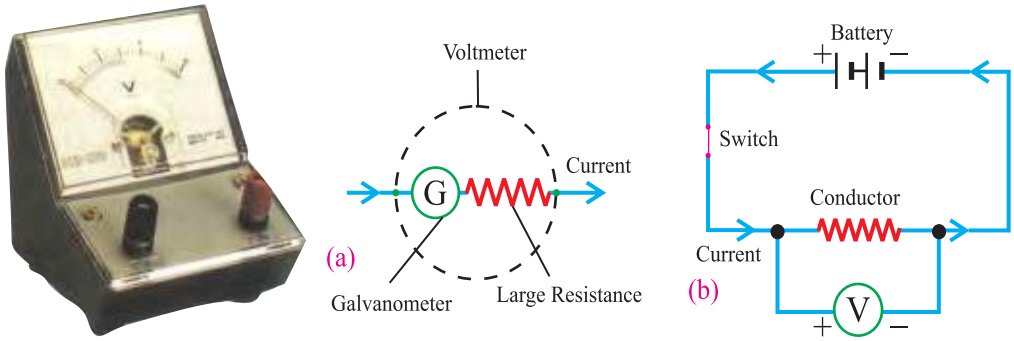



Fig. 8.19: Voltmeter

### Multi-meter

This is an instrument which can be used to measure current, potential difference and resistance. This is also called AVO meter. Here "A" stands for ampere, "V" for volt and "O" for ohm.

Multi-meter is also a galvanometer which is converted into ammeter, voltmeter and ohmmeter by necessary modifications. For any one measurement its function is selected with the help of a switch. Ranges can also be selected for every function. For use as voltmeter, it is provided with the facility to measure both D.C. and A.C. voltages (Fig. 8.20).

Fig: 8.20 Multimeter

## 8.13 Analogue and Digital Meters

The meters about which you have read so far are such that you have to note the position of a pointer on the circular scale to take the reading. As the scale is continuous, so every reading is possible in the scale. Such meters are called analogue meters. A meter shown in (Fig. 8.20) is an analogue meter.

There is also an electronic meter for measuring current potential difference and resistance. That is called the digital meter. It also performs all the functions of an AVO meter. But the difference is that in a digital multi-meter, the reading is displayed in the form of digits that can be read easily. Error is possible by the human eye while looking at the position of the pointer on the scale of an analogue meter. On the other hand, this error is not possible in the digital meter because of its display in digits.

Fig. 8.21: Digital-meter

# IMPORTANT POINTS

- Amount of charge that passes through any cross-section in one second is called the electric current.
- The unit of current in system international is ampere.
- Amount of negative charge flowing in one direction is equivalent to he same amount of positive charge flowing in opposite direction.
- Current flows from higher potential to lower potential.
- Amount of charge supplied to one coulomb by a battery is called its potential difference.

  Ohm's law is that the current flowing through a conductor is directly proportional to the potential difference, provided that the temperature and the physical state of the conductor does not change.
- The opposition to the flow of charge is called resistance.
- Transformer is a device that is used to decrease or increase the A.C. Voltage.
- If the number of turns in the secondary are more than those of primary, it is called a step up transformer.
- If the number of turns in the secondary are less than those of primary, it is called a step down transformer.
- The current which flows in one direction only is known as direct current.
- The current which changes its direction again and again is known as alternating current.
- All electric appliances are connected in parallel with the main electric supply.
- The unit of electrical energy is kilowatt-hour.
- When a current passes through a living body, it is an electric shock.
- Galvanometer is used only to detect the current.
- Ammeter is an instrument that measures the current. It is always connected in series with the circuit.
- Voltmeter is an instrument that measures the potential difference. Voltmeter is connected in parallel with those two points across which the potential difference is to be measured.
- Multimeter is an instrument that is used to measure current, potential difference and resistance.
- The instrument that shows continuously decreasing or increasing readings is known as analogue, and the instrument that shows only discrete readings in known as digital.

# GLOSSARY

**Electric Current:** Amount of charge passing through any cross-section in one second.

| | |
|---|---|
| Conventional Current: | Flow of positive charge. |
| Potential Difference: | Energy consumed by one coulomb charge. |
| Resistance: | Opposition of the flow of charges. |
| Resistors: | Conductors of large resistance. |
| Capacitors: | Device that stores charge. |
| Transformer: | Device that increases or decreases A.C. voltage. |
| Direct Current: | Current that flows in one direction only. |
| Alternating Current: | Current that changes direction again and again. |
| Switch: | Device that completes or breaks a circuit. |
| Kilowatt-hour: | Unit of electrical energy. |
| Electric Shock: | Flow of current through a living body. |
| Ammeter: | Instrument for measuring current. |
| Voltmeter: | Instrument for measuring voltage. |
| Multimeter: | Instrument for measuring current, voltage and resistance. |
| Analogue Meter: | Instrument showing continuous reading with the help of pointer. |
| Digital Meter: | Instrument displaying reading in digits. |
| Induction: | Appearance of current due to relative motion of magnet and coil. |

# QUESTIONS

Q.1 Put "✓" against true and "×" against false statement.

(i) Amount of charge passing through any cross-section in one second is called electric current.

(ii) The unit of electric current is volt.

(iii) Current flows from higher potential to lower potential.

(iv) Switches should always be placed in the way of live wire.

(v) D.C. voltage can be decreased or increased with the help of a transformer.

Q.2 Fill in the blanks.

(i) The current flowing through a conductor can be considered analogous to water flowing through a _____.

(ii) Potential difference is also called _____.

(iii) The _____ to the flow of charges is called resistance.

(iv) The charge on a capacitor is proportional to _____.

(v) Ammeter is always connected in _____ with the circuit.

Q. 3 Four possible answers are given for each statement. Select the correct answer.

(i) The instrument that measures current is called

(a) voltmeter (b) circuit breaker (c) ammeter (d) switch

(ii) The potential of the neutral wire is

(a) zero (b) +220Volts (c) 220Volts (d) changing

(iii) The SI unit of resistance is

(a) ampere (b) volt (c) hertz (d) ohm

(iv) The constant in Ohm's law is

(a) current (b) resistance (c) potential difference (d) charge

(v) The device used for turning a circuit ON or OFF is:

(a) switch (b) fuse (c) circuit breaker (d) earthwire

Q. 4 Write short answers of the following questions:

(i) What is an electric current?

(ii) Define potential difference.

(iii) Which quantities does Ohm's law relate?

(iv) Define resistance.

(v) What are resistors?

(vi) What is meant by charging of a capacitor?

(vii) Where are the gang capacitors used?

(viii) What does a step-up transformer do?

(ix) What does a step-down transformer do?

(x) Where is a shunt resistance connected to convert a galvanometer into ammeter?

Q.5 Define electric current. What is conventional current? Explain.

Q. 6 Explain potential difference with example. Define its unit.

Q. 7 What is resistance? Define the unit of resistance.

Q. 8 What is a capacitor? Give some uses of capacitors.

Q. 9 What is the difference between direct current and alternating current? explain.

Q. 10 How does structure of a voltmeter differ from that of an ammeter? Describe the use of both of them.

Q. 11 What is multi-meter? What is it used for? Describe the difference in analogue and digital meter.