

CH- 12 ELECTRICITY

1. What is Electric charge? What is the SI Unit of Electric charge?

It is an Inherent property of body due to which the body feels attractive or reflexive forces.

SI Unit of Charge is **COULOMB (C)**

1 coulomb = Charge carried by 6×10^{18} electrons

Charge on an electron = 1.6×10^{-19}

2. What is Electric current? What is the SI unit of Current?

It is defined as rate of flow of charge through any section of conductor

If a charge **Q** flow through a conductor in time (**T**)

$$I = \frac{Q}{T}$$

SI Unit of charge is **AMPERE (A)**

Other smaller units are Milli-Ampere (MA) Micro-Ampere

3. What is 1 Ampere?

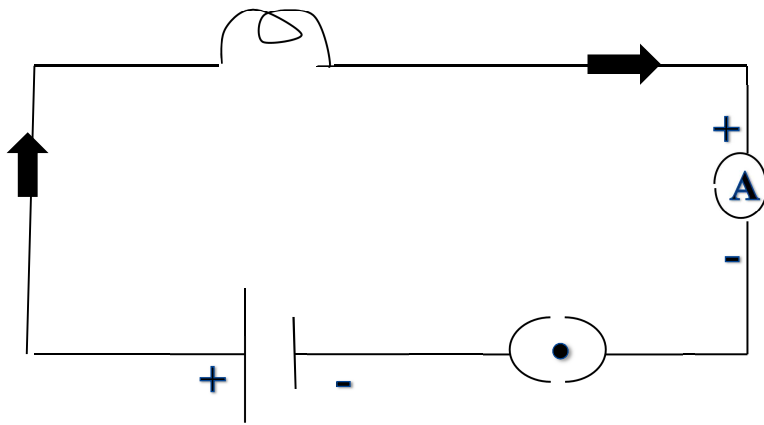
$$I = \frac{Q}{T} \qquad 1A = \frac{1 \text{ COULOMB}}{1 \text{ SECOND}}$$

Current through a conductor is said to be 1 Ampere. If 1 Coulomb of charge flows through it in 1 second.

4. What is Ammeter?

It is a device used to measure current in a circuit. It is always connected in series in a circuit through which current is to be measured.

5. Draw Neat diagram of Electric Circuit. And Define?



The Typical electric circuit consist of cell, electric bulb, an Ammeter and a Plug key

The electric current flows in a circuit from Positive Terminal of cell to the Negative Terminal through bulb & Ammeter. That is direction of electric current is from positive to negative.

6. What is Potential difference? What is the SI unit of Potential difference?

$$\text{Potential difference} = \frac{\text{Work done}}{\text{Charge}} \qquad V = \frac{W}{Q}$$

The electrical potential difference between two points in an electric circuit carrying some current as the work done to move a unit charge from one point to the other.

The SI unit of Potential difference is **VOLT**

7. Define 1 Volt:-

One volt is the potential difference between two points in a current carrying conductor when 1 joule of work is done to move a charge of 1 Coulomb from 1 point to the other

$$1 \text{ V} = \frac{1 \text{ J}}{1 \text{ C}}$$

8. What is Volt Metre?

The potential difference is measured by means of instrument called Volt Metre. The Volt Metre is always connected in parallel across the point between which the potential difference is to be measured.

9. Define Ohm's law:-

Ohm's law states that at constant temperature. Potential difference V across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it.


$V = \text{Proportional to } I$

$$V = IR$$

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

10. Define Resistance? What is the SI unit of Resistance?

It is the property of conductor to resist the flow of charges through it.

The SI unit of Resistance is Ohm 

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

11. What is VI Graph?

The VI Graph is a straight line passing through the origin . The slope of the graph gives the value of Resistance.

12. What are the factors on which Resistance depends?

i) Resistance is directly proportional to length of the conductor.

ii) Inversely Proportional to area of cross section

iii) Nature of Material. The Resistance depends upon nature of material of conductor. Example the resistance of copper wire, is less than nichrome having same length and area of cross-section.

iv) Temperature. The Resistance of all pure metals increases with rise in temperature and decreases on lowering the temperature.

13. Define Restivity:-

$$R \text{ is Proportional } = \frac{L}{A} \quad R = \frac{\rho L}{A}$$

ρ is called resistivity. Restivity is Numerically equal to resistance of a conductor having a length of 1 Metre and area of cross-section 1 Metre square.

14. Alloys are commonly used in electrical heating devices like electric iron? Give Reason?

The Resistivity of an alloy is generally higher than that of its constituent metals. Alloys do not oxidize really at high temperature.

15. Will current flow easily through a thick wire or a thin wire of the same material. When connected to the same source? Why?

Thick wire, because for thick wire area of cross-section is more, so resistance is less, R is Proportional to L/A . Through resistance current flow more easily.

16. What are the advantages of connecting electric current in series?

- ❖ The current is constant throughout the electric circuit. So it is impracticable to connect an electric bulb and electric heater in series because they need currents of widely different values to operate properly.
- ❖ In series circuit when 1 compound stops working, the other compound will work
- ❖ In Series circuit, Potential difference is difference across each appliance.
- ❖ Each device will have only one switch so they cannot be operated independly.
- ❖ Total Resistance is maximum due to which current from the power supply is low.

17. What are the advantages of connecting electrical devices in parallel?

- ❖ Different devices can be connected because each device can draw different current as per requirement.
- ❖ In parallel circuit, if one component stops working the other component will work.
- ❖ In Parallel circuit, Potential difference is same across all appliances.
- ❖ Each device will have separate switches.
- ❖ Total resistance is produced due to which current from power supply is high.

18. Why Ammeter is connected in series? Give reason?

Ammeter is a low resistance device when it is connected in series. Total resistance in the circuit does not increase. Hence current in the circuit remains unaffected.

19. Why Volt metre is connected in parallel? Give Reason?

Volt Metre is a high resistance device. When it is connected in parallel. It draws very small current from the main circuit and most of the current passes through the component.

20. What are the heating effects of electric current?

When current is passed through the high resistance the wire becomes hot. This is called heating effects of current.

21. What is the expression for heat developed in a conductor?

Consider a current **I** flowing through a resistance **R**. The Potential difference across it is **V**. Let **T** be the time during which a charge **Q** flows.

21. Define Joule's law?

The law implies that heat produced in a resistor is –

- i) Directly proportional to the square of current for a given resistance.
- ii) Directly proportional to resistance for a given current
- iii) Directly proportional to time

22. What is the unit of electrical energy and SI unit of it?

The SI unit of electrical energy is Joule. And commercial unit of electrical energy is kilowatt hours.

23. Define 1 Kilowatt hours?

1 Kilowatt hours is defined as electrical energy consumed when an electric appliance having a power rating of 1Kwh is used for 1 hours.

1 Kwh is 3.6×10^6

24. What is electrical power? What is the SI unit of electrical power?

Power is the rate of doing work or it is a rate at which electrical energy is dissipated or consumed in electric circuit. The SI unit is V I

ALL IMPORTANT FORMULAS :-

1) $Q = Ne$ (Number of electrons)

2) $V = IR$

3) $1 \text{ Kwh} = 3.6 \times 10^6$

4) $I = \frac{Q}{T}$ (Ampere)

5) $V = \frac{W}{Q}$ (Volt)

6) $R = \frac{PI}{A}$

7) $R_s = R_1 + R_2$

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$$

8) $H = VQ$

$$H = I^2 RT$$

$$\frac{V^2}{R} T$$

9) $P = \frac{W}{T}$

$$T \quad \text{Energy} = \text{Power} \times \text{Time}$$

10. Power $P = VI$

$$\frac{V^2}{R}$$

$$= I^2 R$$