

**Class X: Physics**  
**Chapter 3: Electricity**

**Chapter Notes**

**Key Learnings:**

1. Electric current is the rate of flow of charge.
2. Battery provides the driving force required to move the charges along the wire from one terminal to another.
3. The constant voltage difference between the two terminals of the wire maintains the constant electric current through the wire.
4. Electric current is measured in terms of amperes where  
1 ampere = 1 coulomb / second
5. Voltage is measured in terms of volt where  
1 volt = 1 joule /coulomb
6. Resistance is a property that resists the flow of electrons in a conductor. It controls the magnitude of the current. The SI unit of resistance is ohm ( $\Omega$ ).
7. Resistivity is defined as the resistance offered by a cube of the material of side 1 m when the current flows perpendicular to the opposite faces of the cube.
8. Ohm's law: The potential difference across the ends of a resistor is directly proportional to the current through it, provided its temperature remains the same.
9. The resistance of a conductor depends directly on its length, inversely on its area of cross – section, and also on the material of the conductor.
10. In Series combination of resistors:
  - The current flowing through each resistor is the same
  - The potential difference across the ends of the series combination is distributed across the resistors
  - The equivalent resistance is greater than the greatest resistance in the combination.
11. In Parallel combination of resistors:
  - The potential difference across each resistor is same and is equal to the potential difference across the combination.

- The main current divides itself and a different current flow through each resistor.
- The equivalent resistance is lesser than the least of all the resistances.

12. The effect of heating current due to which heat is produced in a wire when current is passed through it is called heating effect of current.

13. Electric power is the rate at which electrical energy is produced or consumed in an electric circuit.

14. The unit of power is watt (W). One watt of power is consumed when 1 A of current flows at a potential difference of 1 V.

15. The commercial unit of electric energy is kilowatt hour (kW h), commonly known a 'unit'.

### Top Formulae:

1. The current I through the cross – section of a conductor is

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

Where Q is net charge flowing across the cross – section of a conductor in time t.

2. Potential difference (V) between two points = work done (W)/ Charge (Q)

$$V = W/ Q$$

3. Ohm's law:  $V = I R$

4. The equivalent resistance in series circuit is the sum of the individual resistances -

$$R = R_1 + R_2 + R_3$$

5. The equivalent resistance of a parallel circuit containing resistances  $R_1, R_2, R_3$  is given as

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

6. The electric power  $P$  is given by

$$P = VI$$

Or

$$P = I^2R = V^2/R$$

7. The electrical energy dissipated in a resistor is given by  $W = V \times I \times t$

8. Joule's law of heating;  $H = I^2Rt$

9.  $1 \text{ kW h} = 3,600,000 \text{ J} = 3.6 \times 10^6 \text{ J}$