

# Physics — Electricity

## Chapter: Electricity

### Key Definitions

- **Electric Current:** The flow of electric charge in a conductor. It is measured in Amperes (A).
- **Voltage (Potential Difference):** The work done to move a unit charge from one point to another. It is measured in Volts (V).
- **Resistance:** The opposition offered by a conductor to the flow of electric current. It is measured in Ohms ( $\Omega$ ).
- **Ohm's Law:** The relationship between voltage (V), current (I), and resistance (R) in a circuit, given by the formula:

$$V = I \times R$$

- **Power:** The rate at which electrical energy is consumed or converted. It is measured in Watts (W) and is given by:

$$P = V \times I$$

### Important Formulas

#### 1. Ohm's Law:

$$V = I \times R$$

#### 2. Power in Electrical Circuits:

$$P = V \times I$$

or

$$P = I^2 \times R$$

or

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

#### 3. Resistance in Series:

$$R_{total} = R_1 + R_2 + R_3 + \dots$$

#### 4. Resistance in Parallel:

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

### Diagrams

- **Circuit Diagram:** A simple circuit can be represented as follows:
  - A battery connected to a resistor with a switch.

- **Components:**

- Battery (Voltage source)
- Resistor (R)
- Switch (S)

- **Series Circuit:**

- Components connected end-to-end.
- Current ( $I$ ) is the same through all components.

- **Parallel Circuit:**

- Components connected across the same two points.
- Voltage ( $V$ ) is the same across all components.

### Summary Table

Quantity	Symbol	Unit
Current	I	Amperes (A)
Voltage	V	Volts (V)
Resistance	R	Ohms ( $\Omega$ )
Power	P	Watts (W)

### Key Takeaways

- Electric current is the flow of charge, measured in Amperes.
- Voltage is the potential difference that drives current through a circuit.
- Resistance opposes current flow and is calculated using Ohm's Law.
- Power can be calculated using different formulas depending on known quantities.
- Understanding series and parallel circuits is essential for analyzing complex circuits.