

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 (Ω).
- **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:** For resistors in series:

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

4. **Resistance in Parallel:** For resistors 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 (Ω)
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.