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 difference in electric potential between two points. It is measured in volts (V).
- **Resistance**: The opposition 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, stated as:

$$V = I \times R$$

- **Circuit**: A closed loop through which electric current can flow.
- **Conductor**: A material that allows the flow of electric current (e.g., copper).
- **Insulator**: A material that does not allow the flow of electric current (e.g., rubber).

Important Formulas

1. **Ohm's Law**:

$$V = I \times R$$

2. **Power in Electrical Circuits**:

$$P = V \times I$$

   Where (P) is power in watts (W), (V) is voltage in volts (V), and (I) is current in amperes (A).

3. **Resistance in Series**:

$$R_{total} = R_1 + R_2 + R_3 + ... + R_n$$

4. **Resistance in Parallel**:

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

Diagrams

- **Series Circuit**: A circuit where components are connected end-to-end, so the current flows through each component in turn.
- **Parallel Circuit**: A circuit where components are connected across common points or junctions, providing multiple paths for the current.

Summary Table

Quantity	Symbol	Unit
Current	I	Amperes (A)

Quantity	Symbol	Unit
Voltage	V	Volts (V)
Resistance	R	Ohms (Ω)
Power	P	Watts (W)

Key Takeaways

- Electric current is the flow of charge, and it requires a closed circuit to flow.
- Voltage is the driving force that pushes the current through the circuit.
- Resistance opposes the flow of current, and it can be calculated using Ohm's Law.
- Components in a circuit can be arranged in series or parallel, affecting the total resistance and current flow.
- Understanding these concepts is crucial for analyzing and designing electrical circuits.