

Physics — Electricity

Chapter: Electricity

Key Definitions

- **Electric Current (I):** The flow of electric charge in a conductor. It is measured in Amperes (A).
- **Voltage (V):** The electric potential difference between two points. It is measured in Volts (V).
- **Resistance (R):** 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, given by the formula:

$$V = I \times R$$

- **Power (P):** 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:

$$P = V \times I$$

3. Resistance in Series:

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

4. Resistance in Parallel:

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

5. Energy Consumption:

$$E = P \times t$$

where (E) is energy in Joules, (P) is power in Watts, and (t) is time in seconds.

Diagrams

1. **Circuit Diagram:** A simple circuit can be represented as follows: - A battery connected to a resistor and a switch. - The flow of current is indicated by arrows.
2. **Series Circuit:** - Components are connected end-to-end. - Total resistance increases with each added resistor.
3. **Parallel Circuit:** - Components are connected across the same voltage source. - Total resistance decreases with each added resistor.

Summary Table

Parameter	Unit	Formula
Current (I)	Amperes (A)	-
Voltage (V)	Volts (V)	-
Resistance (R)	Ohms (Ω)	-
Power (P)	Watts (W)	$P = V \times I$
Energy (E)	Joules (J)	$E = P \times t$

Key Takeaways

- Electric current is the flow of charge and is measured in Amperes.
- Voltage is the potential difference that drives the current through a circuit.
- Resistance opposes the flow of current and can be calculated for series and parallel circuits.
- Ohm's Law is fundamental in understanding the relationship between voltage, current, and resistance.
- Power and energy consumption can be calculated using the respective formulas, which are essential for understanding electrical devices.