

Current Electricity

Chapter 8: Current Electricity · Topic 1

Key Concept

Ohm's law states that current through a conductor is directly proportional to voltage, provided temperature remains constant: $V = IR$.

Resistance depends on the resistor's length, cross-sectional area, and material, calculated as $R = \rho L/A$, where ρ is resistivity.

In series combination, resistances add directly ($R = R_1 + R_2 + \dots$), while in parallel combination, reciprocals add ($1/R = 1/R_1 + 1/R_2 + \dots$).

Electrical power is calculated as $P = VI = I^2R = V^2/R$, and electrical energy consumed is power multiplied by time, important for calculating electricity bills.

Quick Revision Notes

- Ohm's law: $V = IR$ (constant temperature).
- Resistance: $R = \rho L/A$.
- ρ is resistivity; L is length; A is area.
- Series resistances add directly.
- Parallel: reciprocals add ($1/R = 1/R_1 + 1/R_2$).
- Power: $P = VI = I^2R = V^2/R$.
- Energy = power $\times$ time.
- This is used for electricity bill calculations.

Practice Questions

- 1 Calculate current using Ohm's law given $V=12V$, $R=4\Omega$.
- 2 Calculate the equivalent resistance of two 4Ω resistors in series.
- 3 Calculate the equivalent resistance of two 4Ω resistors in parallel.
- 4 Calculate power given $V=10V$ and $I=2A$.
- 5 Calculate energy consumed by a $100W$ bulb in 5 hours.
- 6 Explain Ohm's law in your own words.