

Chapter 3: Current Electricity

Short • Exam-ready • CBSE 2026–27 syllabus focused

Core ideas

- Current: $I = dq/dt$. Conventional current is opposite to electron drift direction.
- Drift relation: $I = neAv_d$; mobility $\mu = v_d/E$.
- Ohm's law: $V = IR$ for an ohmic conductor.

Key formulas

- Resistance: $R = \rho L/A$; conductivity $\sigma = 1/\rho$.
- Electrical power: $P = VI = I^2R = V^2/R$. Energy: $W = Pt$.
- Temperature dependence (small range): $R = R_0[1 + \alpha(T - T_0)]$.
- Cell: $V = E - Ir$ when delivering current; E is emf and r is internal resistance.
- Cells in series (identical): $E_{eq} = nE$, $r_{eq} = nr$. Parallel identical: $E_{eq} = E$, $r_{eq} = r/n$.
- Kirchhoff junction rule: $\sum I = 0$. Loop rule: $\sum \Delta V = 0$.
- Wheatstone bridge balance: $P/Q = R/S$.

Must know

- V-I graph: slope is R for V versus I ; for I versus V , slope is $1/R$.
- Terminal voltage becomes smaller than emf when a cell supplies current.
- Use Kirchhoff signs consistently around each loop.

Exam focus

- Internal resistance numericals; Kirchhoff loops; Wheatstone bridge; drift velocity; power and resistivity.

Revision tip: learn the formula, understand the symbols, then practise 2–3 application questions from NCERT/CBSE-style problems.