

Chapter 5: Magnetism and Matter

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

Core ideas

- A bar magnet behaves qualitatively like a current loop/solenoid. Magnetic field lines form closed loops.
- Magnetic dipole moment of a current loop: $m = IA$ (NIA for N turns).
- Magnetisation M is magnetic dipole moment per unit volume.

Key relations & facts

- Magnetic field due to a dipole on axial/equatorial positions follows inverse-cube dependence in the far-field approximation.
- Torque on a magnetic dipole in uniform B : $\tau = mB \sin\theta$; potential energy $U = -mB \cos\theta$.
- Magnetic susceptibility: $\chi_m = M/H$; relative permeability $\mu_r = 1 + \chi_m$ (in simple linear media).
- Diamagnetic: weakly repelled; $\chi_m < 0$. Paramagnetic: weakly attracted; $\chi_m > 0$. Ferromagnetic: strongly attracted; large positive susceptibility.

Temperature

- Paramagnetic susceptibility generally decreases with increasing temperature (Curie behaviour).
- Ferromagnetism is strongly temperature-dependent and disappears above the Curie temperature.

Exam focus

- Compare dia/para/ferromagnetic materials; field-line direction; dipole torque; magnetisation and susceptibility.

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