CLASS 12 PHYSICS REVISION NOTES

Revision Notes: Class 12 Physics Chapter 1 Electric Charges and Fields

NCERT Solutions | Extra Questions (HOTS) | Class 12 Physics Book

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Class 12 Physics Chapter 1 – Electric Charges and Fields: Quick Revision Notes

Coulomb's law: $F = kq_1q_2/r^2$, $k = 1/(4\pi\varepsilon_0) \approx 9\times10^9\ N\cdot m^2/C^2$

Principle of superposition: net force/field from multiple charges = vector sum of individual contributions

Electric field: $E = F/q_0$ (force per unit positive test charge); field of a point charge: $E = kq/r^2$

Field lines: start on + charge, end on − charge (or infinity); never cross; density indicates field strength; perpendicular to a conductor's surface

Electric dipole moment: $p = q\times2a$ (from −q to +q); field on axial line $\approx 2kp/r^3$; field on equatorial line $\approx kp/r^3$ (for $r \gg a$)

Torque on a dipole: $\tau = pE\sin\theta = p\times E$ (vector); potential energy $U = -pE\cos\theta = -p\cdot E$

Continuous charge distributions: linear density $\lambda = q/l$, surface density $\sigma = q/A$, volume density $\rho = q/V$

Electric flux: $\varphi = E\cdot A = EA\cos\theta$ (flat surface in uniform field)

Gauss's law: φ(closed surface) = Q_enclosed/ε_0 — depends only on enclosed charge, not surface shape or size

Field of an infinite line charge: $E = \lambda/(2\pi\varepsilon_0 r)$

Field of an infinite charged sheet: $E = \sigma/(2\varepsilon_0)$; between two oppositely charged parallel plates: $E = \sigma/\varepsilon_0$

Field due to a charged spherical shell: outside (r>R): $E = kQ/r^2$ (acts as if all charge at centre); inside (r<R): E = 0

Charge is quantised (q = ne) and **conserved** (never created/destroyed, only transferred)

Not currently CBSE-examinable: Q1.13 and Q1.25–Q1.34 of the textbook exercise (2023-24 rationalisation) — still useful for JEE/NEET