

IMPORTANT DERIVATIONS! Practise and Revise

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- Coulomb's Law in the form of vectors –

$$\vec{F}_{12} = -\vec{F}_{21}$$

- Application of Gauss theorem in the calculation of electric field
- Electric field intensity due to a thin infinite plane sheet of charge
- Electric field intensity of an electric dipole on equatorial line –

$$E_R = \frac{1}{4\pi\epsilon_0} \frac{P}{r^3}$$

- Electric field intensity of an electric dipole on axial line –

$$E = \frac{1}{4\pi\epsilon_0} \frac{2P}{r^2}$$

- Electric field intensity due to a uniformly charged spherical shell at various points
- The capacitance of a parallel plate capacitor with a dielectric medium
- The capacitance of a parallel plate capacitor without dielectric medium
- Electric potential due to a point charge –

$$V(r) = \frac{Q}{4\pi\epsilon_0 r}$$

- Application of Gauss theorem in the calculation of electric field intensity due to thin infinite plane sheet of charge uniformly charged spherical sphere
- The relation between current and drift velocity
- An expression for drift velocity
- Series and parallel connection of resistors

- Torque experienced by a current loop in a uniform magnetic field
- Ampere's law and its application to an infinitely long straight wire. Straight and toroidal solenoids.
- The magnetic dipole moment of a revolving electron
- Apply Biot-Savart law to derive the expression for the magnetic field on the axis of a current-carrying circular loop.
- Cyclotrons
- The force between two parallel current-carrying conductors
- Torque on a magnetic dipole (bar magnet) in a uniform magnetic field.
- Current loop as a magnetic dipole and its magnetic dipole moment
- Force on a current-carrying conductor in a uniform magnetic field
- Force on a moving charge in uniform magnetic and electric field.

- Self and mutual induction
- Derivation of Emf induced in a rod moving in a uniform magnetic field.
- Impedance, reactance, and average power in series LCR, LR, LC, or CR circuit.
- The relation between peak and RMS value of the current
- Derivation for resonance in a series LCR Circuit

- Formula for Lens
- Refraction at convex surfaces
- The formula for Lens-Maker's
- Diffraction using a single slit
- Derivation of the refractive index of minimum deviation in the prism
- Young Double Slit Experiment
- Derivation of the formula for angle of minimum deviation for the prism
- Polarisation

- Derivation of the De-Broglie Relation
- The relation between threshold frequency, frequency of the incident photon and cut-off potential

- *Derive* $N = N_0 e^{-\lambda t}$
- Expression of the radius in hydrogen-like atoms

- Common emitter transistor amplifier
- Common base transistor amplifier