Chapter 1

Suggestion

1.1 Electromagnetism and Modern Physics

Electromagnetism:

- Coulombs Law.
- Define point Charge, Conservation of Charge, Quantization of Charge [Proton and neutron are made of fractional electric charges, how charges remain quantized?]
- Electric field and a dipole in an electric field

$$E = \frac{1}{4\pi\epsilon_0}\frac{p}{x^3}; \quad \vec{\tau} = -\vec{p} \times \vec{E}; \quad U = -\vec{p} \cdot \vec{E}$$

- Gauss's Law and its applications; Gauss's Law $\leftrightarrow$ Coulomb's Law
- Define Electric potential and Electric Potential energy, Potential due to point charge and dipole.
- Capacitance of different types of Capacitor. Energy $U = 1/2CV^2$ or $U = 1/2\epsilon_0 E^2$
- Effect of dielectric in capacitor
- Difference between electric field and magnetic field, Magnetic Force $F = ILB$, $F = qvB$
- Torque on a current loop, HALL effect and voltage
- Biot-Savart Law and applications
- Define Ampere and Ampere's Law, magnetic Flux
- Magnetic field for solenoid and toroid
- Brief idea on Faraday's Law, Lenz Law, Self and mutual inductance
- r.m.s value of I and E, RLC circuit in AC circuit.

Modern Physics:

- Photoelectric effect, Compton effect, de-Broglie wave, Find the expression of Phase velocity and group velocity
- Brief idea about Uncertainty principle, different types of atomic model, nuclear size, binding energy.
- Properties of α, β, γ; Radioactive decay law, decay constant, mean life, half-life, Application of Radioactivity, Radioactive dating - the age of earth calculation.

Content related all mathematical problems