Group: B.Sc   **Subject:** Electricity, Magnetism & Electronics   **Year:** III   **Sem:** V

Unit-I:

Electric field intensity and potential: Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii) charged spherical shell and uniformly charged sphere.

Dielectrics: Electric dipole moment and molecular polarizability- Electric displacement D, electric polarization P – relation between D, E and P- Dielectric constant and susceptibility. Boundary conditions at the dielectric surface.

Unit-II:

Electric and magnetic fields: Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid – Lorentz force – Hall effect – determination of Hall coefficient and applications.

Electromagnetic induction: Faraday's law-Lenz's law- Self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field. Transformer – energy losses - efficiency.

Unit-III:

Alternating currents and electromagnetic waves: Alternating current - Relation between current and voltage in LR and CR circuits, vector diagrams, LCR series and parallel resonant circuit, Q –factor, power in ac circuits.

Maxwell's equations: Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves. Poynting theorem.

Unit-IV:

Basic electronics: PN juction diode, Zener diode, Tunnel diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation between α, β and γ - transistor (CE) characteristics -Determination of hybrid parameters, Transistor as an amplifier.

Unit -V:

Digital electronics: Number systems - Conversion of binary to decimal system and vice versa. Binary addition and subtraction (1's and 2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive- OR gate, Half adder and Full adder, Parallel adder circuits.

Reference Books:

1. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
4. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
5. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill