**PH2501 Engineering Physics L-T-P- 3-0-0, Cr: 03**

**Unit I; Vector Calculus & Coordinate System**

Gradient Divergence, Curl and Laplacian Operator; Divergence Theorem and Stokes Theorem; important Vector identities; Cartesian, Cylindrical, and Spherical Coordinate Systems and Coordinate Transformation.

**Unit II: Electrostatics**

Coulomb's Law and Gauss's Law; Electric Scalar Potential; Recapitulation of Capacitance; Electricfield due to continuous charge distribution-line, surface volume charge, Energy Stored in Electric Field; Electric Field in Dielectric Material and Polarization; Electric Field at Material Boundary.

**Unit III: Magneto-statics**

Lorentz Force; Gauss's Law for Magnetism; Biot-Savart Law and Ampere's Law; Self and Mutual Inductance; Energy Stored in Magnetic Field; Magnetic Vector Potential and Coulomb's Gauge-Magnetization; Magnetic Field at Material Boundary.

**Unit IV: Lasers**

Einstein's A and B coefficients, spontaneous and stimulated emission, population-inversion. Light amplification, Optical resonators, Ruby laser, He-Ne Laser, YAG laser.

**Unit V: Quantum Physics**

Photoelectric effect, Compton effect, wave particle duality, deBroglie waves, phase velocity and group velocity, Davisson and Germer experiment, Heisenberg uncertainty principle and its applications, wave functions and wave equations, physical interpretation of wave function and their normalization, Expectation values, Schrodinger's equation, time independent form, particle in one dimensional box.

**Recommended Readings:**

1. D.J. Griffith, Introduction to electromagnetic Theory, TMH.

2. A Ghatak, Optics, TMH

3. A. Beiser, Perspectives of Modern Physics, TMH