

**Department of Physics**

**Telangana University**

**Generic Elective Paper for other departments/Disciplines: (Credits: 02)**

**Semester V**

**GE1-Optics**

**UNIT-I**

**Wave Optics:** Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle.

**Interference:** Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes.

**UNIT-II**

**Diffraction:** Fraunhofer diffraction- Single slit; Elementary idea of Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge using half-period zone analysis.

**Polarization:** Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization.

**Reference Books:**

- Fundamentals of Optics, F.A Jenkins and H.E White, 1976, McGraw-Hill
- Principles of Optics, B.K. Mathur, 1995, Gopal Printing
- Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publications
- University Physics. F.W. Sears, M.W. Zemansky and H.D. Young. 13/e, 1986. Addison Wesley

**PHYSICS LAB: GE- I LAB: OPTICS**

1. To determine the Refractive Index of the Material of a Prism using Sodium Light.
2. To determine wavelength of sodium light using Newton's Rings.
3. To determine the dispersive power of material of a given prism.
4. To determine wavelength of sodium light using diffraction grating.

**Reference Books:**

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Osborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, InduPrakash and Ramakrishna, 11th Edition, 2011, KitabMahal, New Delhi.

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**Semester VI**

**GE2- Electromagnetism**

**UNIT-I**

**Electrostatics:** Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential.

**Capacitance:** Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

**UNIT-II**

**Magnetism:** Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferromagnetic materials.

**Electromagnetic Induction:** Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance,  $L$  of single coil,  $M$  of two coils. Energy stored in magnetic field.

**Reference Books:**

- Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
- Electricity & Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press.
- Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.
- Electricity and Magnetism- K.K Tewari (S. Chand Higher Academics) 2013.

**GE II LAB: ELECTRICITY, MAGNETISM AND EMT**

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current and (d) checking electrical fuses.
2. Ballistic Galvanometer: (i) Measurement of charge and current sensitivity (ii) Measurement of CDR (iii) Determine a high resistance by Leakage Method (iv) To determine Self Inductance of a Coil by Rayleigh's Method.
3. To compare capacitances using De'Sauty's bridge.
4. Measurement of field strength  $B$  and its variation in a Solenoid (Determine  $dB/dx$ ).