Sem.	Subject code	Course title	No. of hours	Credits	Paper type
III	17U3PMC3	Optics	4	4	Major Core

Objectives:

(i). To make the students understand the concepts of rectilinear propagation of light and the ideas of geometrical optics. (ii). To introduce the wave properties of light and the optical phenomena associated with them to the students.

Learning outcome:

(i). The students will be able to appreciate the dual nature of light. (ii). Students will be able to solve problems in geometrical and physical wave optics.

Geometrical optics

Unit I: Lens & Prism

Fermat's principle of least time-Rectilinear propagation of light-Reversibility of light rays–Lenses-Introduction-Terminology-Sign convention-Lens maker's formula-Deviation by thin lens-Power-Equivalent focal length of two thin lenses-Cardinal points-Dispersion-Angular dispersion-Dispersive power-Deviations without dispersion-Dispersion without deviation-Direct vision spectroscope.

Unit II: Aberrations & Eye pieces

Aberrations–Spherical & chromatic aberrations-Longitudinal chromatic aberration for an object at infinity-Achromatic lenses - Condition for achromatism of two lenses placed in contact and separated by a finite distance-Objective & eye pieces-Ramsden's eye piece-Huygens's eye piece.

Physical optics

Unit III: Interference

Introduction–Light waves-Superposition of waves-Interference-Coherence-Conditions for interference-Thin film-Plane parallel film-Interference due to reflected light and transmitted light-Variable thickness (Wedge shaped film)-Michelson's Interferometer–Applications of Michelson's Interferometer–Measurement of wavelength only.

Unit IV: Diffraction

Introduction-Huygens's-Fresnel theory-Fresnel's assumptions-Rectilinear propagation of light-Zone plate-Fresnel & Fraunhofer diffraction-Fraunhofer diffraction at a single slit-Plane diffraction grating-Determination of wavelength using grating-Resolving power-Rayleigh's criterion-Resolving power of prism.

Unit V: Polarization and LASER

Introduction-Polarization-Unpolarized light & Polarized light-Polarizer & analyzer-Anisotropic crystals-Double refraction in calcite crystal-Phase difference between extraordinary ray & ordinary ray-Superposition of waves linearly polarized at right angles-Retarders-Quarter wave plate (QWP)-Half wave plate (HWP)-Optical activity-Optical rotation-Specific rotation. Introduction to spectroscopy : Regions of spectra – Representation of spectra – Basic elements of practical spectroscopy.

Text book(s):

1. A Text book of Optics by Dr.N.Subrahmanyam, Brijlal, & Dr.M.N.Avadhanalu, 25th revised edition, S.Chand & company (Pvt) Ltd., Reprint, New Delhi, (2014).

Unit I: 2.2-2.4, 4.1-4.3, 4.7-4.10 (excluding 4.10.1), 4.15-4.17, 5.2 (upto 5.2.3), 8.1-8.4, 8.6-8.8.

Unit II: 9.2, 9.5, 9.10, 9.11.A, 9.13, 10.8, 10.10 (excluding 10.10.1), 10.11 (excluding 10.11.1), 10.12.

Unit III: 14.1-14.4, (excluding 14.4.1 - 14.4.4), 14.6, 14.7, 15.1-15.3, 15.5, 15.5.1, 15.5.2, 15.7, 15.8, 15.8.1 only.

Unit IV: 17.1-17.5.1, 17.7, 18.1, 18.2 (excluding 18.2.1-18.2.2), 18.7, 18.7.1, 18.7.2, 18.7.6, 19.1, 19.2, 19.11.

Unit V: 20.1-20.3, 20.8, 20.10, 20.11(excluding 20.11.1-20.11.3), 20.17-20.19, 20.27-20.29.

2. Fundamentals of molecular spectroscopy by Vth Edn., Mc Graw Hill Education India Pvt. Ltd., New Delhi, 2013.

Unit V: 1.3, 1.4, 1.5

Books for reference:

1. Optics & Spectroscopy by R.Murughesan 5th revised edition, S.Chand & Co Ltd., New Delhi, (2005).
2. Modern optics by A.B.Gupta, II nd edition, Books & Allied (p) Ltd., (2010).
3. Fundamentals of Optics by Jenkins & White, 4th edition, Mc Graw Hill International Edition, 5th reprint (2014).

Websites:

1. https://spie.org
2. https://aty.sdsu.edu>physics