

**CC-IV: Waves and Optics**  
**(32221202)**  
**Credit:6 (Theory-4, Practical-2)**  
**THEORY : 60 Hours**

**Guidelines for the Course**

**Course Objective**

This is one of the core course in Physics curriculum that begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

**Course Learning Outcomes**

On successfully completing the requirements of this course, the students will have the skill and knowledge to:

- Understand Simple harmonic oscillation and superposition principle.
- Understand superposition of a range of collinear and mutually perpendicular simple harmonic motions and their applications.
- Understand the importance of classical wave equation in transverse and longitudinal waves and solving a range of physical systems on its basis.
- Understand different types of waves and their velocities: Plane, Spherical, Transverse, Longitudinal.
- Understand Concept of normal modes in transverse and longitudinal waves: their frequencies and configurations.
- Understand the concept of temporal and spatial coherence.
- Understand Interference as superposition of waves from coherent sources derived from same parent source.
- Demonstrate understanding of Interference experiments: Young's Double Slit, Fresnel's biprism, Llyod's Mirror, Newton's Rings, Michelson Interferometer and Fabry-Perot Interferometer
- Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from apertures
- Understand Fraunhofer Diffraction from apertures: Rectangular, Slit, Double Slit, Grating, Circular apertures.
- Demonstrate fundamental understanding of Fresnel Diffraction: Half period zones, Zone Plate, Fresnel's Integrals, Cornu's Spiral and its applications.