Semester - IV (Core Course)	PHY420C: PHYSICS: WAVES AND OPTICS	Theory
04 Credits		60 Hours

Unit - I

Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses.

Unit - II

Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity.

Sound: Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria.

Unit - III

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. Lloyd's Mirror and Fresnel's Biprism. 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: Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index and Visibility of fringes.

Unit - IV

Diffraction: Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. Polarization: Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization.

Text Books:

1. *Fundamentals of Optics, F A Jenkins and H E White*
2. *Optics by Ajoy Ghatak*

Reference Books:

1. *Principles of optics by B K Mathur.*
2. *Fundamentals of optics by H R Gulati and D R Khanna*

Semester - IV (Core Course)	PHY420C: PHYSICS: WAVES AND OPTICS	Practical
04 Credits		60 Hours

1. To investigate the motion of coupled oscillators
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify λ^2 – T Law.
3. To study Lissajous Figures
4. Familiarisation with Schuster`s focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the Refractive Index of the Material of a given Prism using Sodium Light.
7. To determine Dispersive Power of the Material of a given Prism using Mercury Light
8. To determine the value of Cauchy Constants of a material of a prism.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism
11. To determine wavelength of sodium light using Newton's Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium & (2) spectrum of Mercury light using plane diffraction Grating
14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits.

Reference Books:

1. *Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop,*
2. *A Text Book of Practical Physics, Indu Prakash and Ramakrishna*
3. *A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal*
4. *Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn*