

Course Title : **Waves and Optics (Moujaen aur Ilm-Manazir)**

Course Code : BSPH301CCT

Scheme of Instruction

Total Duration : 60 Hr

Periods /Week : 4

Credits : 4

Instruction Mode : Lecture

Scheme of Examination

Maximum Score : 100

Internal Evaluation : 30

End Semester : 70

Exam Duration : 3 Hrs

Course Objectives:

Course Outcomes:

Unit	Course Content	Instruction Hours
1	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 and unequal frequency and their uses. 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.	15
2	Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - 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. Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle.	15
3	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.	15
4	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.	15

Examination and Evaluation Pattern :		
Text Books and References :		
1.	Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill.	
2.	Principles of Optics, B.K. Mathur, 1995, Gopal Printing.	
3.	Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication.	
4.	University Physics. FW Sears, MW Zemansky and HD Young 13/e, 1986. Addison-Wesley.	