PH 502: APPLIED OPTICS (3-0-0: 3)

Review of Maxwell's Equations

Maxwell's equations and propagation of E. M. waves, reflection and refraction of E. M. waves, total internal reflection and evanescent waves; various states of polarization and their analysis.

Anisotropic Media

Plane waves in anisotropic media, Uniaxial crystals, some polarization devices.

Diffraction

The diffraction integral, Fresnel and Fraunhoffer diffraction through slits, Diffraction of a Gaussian beam, Diffraction grating.

Fourier Optics

Spatial frequency, Fourier transform property of lens, Spatial-frequency filtering, Phase-contrast microscope.

Coherence and Interferometry

Basics of coherence theory, spatial and temporal coherence, Michelson interferometer, Michelson stellar interferometer, Multiple beam interference, The Fabry-Perot interferometer, and its application to spectral analysis. Fourier transform spectroscopy, Laser speckles.

Guided Wave Optics

Modes of a planar waveguide, Optical fibers: Step-index and graded index fibers, Waveguide theory and Quantum Mechanics, Applications of optical fibers in Communication and Sensing.

Textbooks and References:

1. A. Ghatak, "Optics", McGraw Hill.
2. M. Bass, "Handbook of Optics: Volume- I", McGraw Hill.
3. R. S. Sirohi, "Wave Optics & its Applications", Orient Longman.
4. F. L. Pedrotti and L. S. Pedrotti, "Introduction to Optics", Prentice-Hall International.
5. J. W. Goodman, "Introduction to Fourier Optics", McGraw Hill.
6. G. R. Fowles, "Introduction to Modern Optics", Dover Publications.