Optics & Lasers

PH201	Optics & Lasers	3-0-0-6	Pre-requisites:Nil

Review of basic optics: Polarization, Reflection and refraction of plane waves. Diffraction: diffraction by circular aperture, Gaussian beams. Interference: two beam interference-Mach-Zehnder interferometer and multiple beam interference-Fabry-Perot interferometer. Fourier optics, Holography.

The Einstein coefficients, Spontaneous and stimulated emission, Optical amplification and population inversion. Laser rate equations, three level and four level systems; Optical Resonators: resonator stability; modes of a spherical mirror resonator, mode selection; Q-switching and mode locking in lasers. Properties of laser radiation and some laser systems: Ruby, He-Ne, CO_2, Semiconductor lasers. Some important applications of lasers, Fiber optics communication, Lasers in Industry, Lasers in medicine, Lidar.

Texts:

- A. K. Ghatak, *Optics*, McGraw Hill, 2010.
- R. S. Longhurst, *Geometrical and Physical Optics*, 3rd ed., Orient Longman, 1986.
- E. Hecht, *Optics*, 4th ed., Pearson Education, 2004.
- M. Born and E. Wolf, *Principles of Optics*, 7th ed., Cambridge University Press, 1999.
- W. T. Silfvast, *Laser Fundamentals*, 2nd ed., Cambridge University Press, 2004.
- K. Thyagarajan and A. K. Ghatak, *Lasers: Theory and Applications*, Macmillan, 2008.