



Department of Physics
Indian Institute of Technology Kanpur

PHY 307A Modern Optics
2020-2021, Semester – I

Instructor: Prof. R. Vijaya

Office: SL 217, Tel: 7552

e-mail: rvijaya@iitk.ac.in

Discussion hour: as per DOAA website

Reference texts:

1. *Modern optics* by G.R.Fowles (Dover)
2. *Modern optics* by R.D.Guenther (Wiley)
3. *Optics* by Hecht (Pearson)
4. *Introduction to classical and modern optics* by Meyer-Arendt (Prentice-Hall)
5. *Modern optical engineering* by W.J.Smith (Tata-McGraw Hill)
6. *Optics* by K.K.Sharma (Academic Press)
7. *Optics* by A.Ghatak (Tata-McGraw Hill)
8. *Any e-book on Optics in the Central library*
9. *Any material suggested during the semester.*

Detailed course contents:

The purpose of this course is to acquire an understanding and appreciation of the relatively new topics in Optics that have gained importance in the last few decades. Some basics will be revised. Tentative plan is as follows:

- *Basics of Optics*
 - reflection, refraction, Maxwell's equations and wave equation, properties of waves
- *Optical sources and Processes of optical detection*
- *Diffraction and its importance*
- *Polarization*
- *Anisotropy*
- *Optical science and engineering (waveguides, Fourier optics, spatial filtering and image processing)*
- *Laser-matter interaction*

Lecture-wise plan (tentative) (equivalent of classroom teaching):

- 1-4: Review of basics
- 5-9: Sources and detectors
- 10-12: Anisotropic media
- 13-16: Polarized light
- 17-20: Diffraction and importance
- 21-24: Fourier transform and Fourier optics
- 25-26: Spatial filtering
- 27-30: Optical waveguides
- 31-34: Integrated optics
- 35-40: Laser-matter interaction

Evaluation (tentative):

Quizzes: 50%

Mid-semester examination: 25%

End-semester examination: 25%

Attendance: Essential in discussion hour.
