

PH 690 - NANOPHOTONICS

Unit.1: Light interaction with matter: Electromagnetic aspects

Maxwell's equations- plane wave- wave propagation in free space- di-electric and conducting dielectric.

Unit 2: Basics of Nanomaterials optics

Electrons in one dimensional quantum wells, two dimensional thinfilms and graphene .
Spherically symmetric potential-Local field effects-Classical aspect-First principles

Unit 3: Nanoscale optics

Plasma excitations in optics-Plasmon resonance in spherical, rod shaped metallic nanoparticles.
Electromagnetic field enhancement in metallic nanostructures-Plasmons in hollow nanoparticles
Light absorption and emission from nanoparticles- Metallic and Semiconductor nanoparticles

Unit 4: Near field optics and nanoscopy

Near field optics-confinement of Photons and electrons – Tunneling –Band gap- Nanoscale optical interaction- Near field microscopy- Scanning confocal microscopy- Scanning probe microscopy.

Unit 5: Optics of photonic crystals and carbon based nanostructures

Basic concepts-Photonic crystals- Methods of fabrication-Photonic crystal optical circuitry-
Photonic crystal fibres-Optical communication- optical properties carbon based nanostructures-
CNT,DWNT, MWNT, C₆₀, Grapheme.

References

1. Introduction to Electrodynamics –D.J. Griffiths
2. Optics of Nanomaterials by Vladimir I. Gavrilenko
3. Near-field optics: principles and applications by Xing Zhu, Motoichi Ohtsu

Sub. to Director;
For Senate consideration
N.A.
29/3