

## Physics for Computer Science and Engineering (CSS-112)

Topic	Detail description
Dielectric Solids	Polarization, Polarizability, Susceptibility, Polar and nonpolar dielectrics, dispersion and absorption, Electronic and Orientation Polarizabilities, Magnetism, para, dia and ferromagnetic solids, exchange interactions and anti-ferromagnetism, Magnetic ordering, spin waves, applications in computer science.
Semiconductor Device Physics	Energy bands in solids, E-k diagram, Density of states, Occupation probability, Fermi level and quasi Fermi levels, p-n junctions, Schottky junctions and Ohmic contacts, semiconductor optoelectronic materials, bandgap modification, heterostructures and quantum well.
Lasers	Basic concepts of lasers, Population inversion, spontaneous and stimulated emission, Einstein's coefficients, Basic Components of lasers, Type of Lasers, Ruby Laser Helium Neon laser, Energy level in molecules, CO <sub>2</sub> lasers, Semiconductor lasers, Application of lasers.
Fiber Optics	Total internal reflection, Critical incidence and propagation angles, Numerical aperture, Step index fibers, Modes in fibers, Intermodal dispersion and its effects and limitations on signal transmission, Solution of intermodal dispersion, Graded index fibers, Single mode fibers, Fiber materials and fabrications, Losses in optical fibers, application of optical fibers.
Electrostatics and Electrodynamics	Gauss's law in dielectric and its differential form, Equation of continuity and Displacement current, Maxwell's equation, derivation and significance, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem and Poynting Vector.
Superconductivity	Introduction and discovery of superconductivity, Superconducting materials, Isotopic effect, Meissner effect, critical magnetic field and critical current, Type-I and type-II superconductors, BCS theory of superconductivity, flux quantization, SQUIDS, application of superconductivity.

### Marks distribution

Activity/ Exam	Marks	Total Marks
Mid-semester exam	20	100
Class Test – I	10	
Class Test –II	10	
End Semester Exam	60	