



Indian Institute of Information Technology, Allahabad

Department of Information Technology

Syllabus

Name of the Course: Engineering Physics (IT/ECE)

Component	Unit	Topics for Coverage
Component 1	1	Classical Mechanics: Calculus of Variations; Lagrange's Equations; Hamilton's principle, Hamilton's equations of motion, Applications.
	2	Heisenberg Uncertainty Principle, Wave Function, its Interpretation and Normalization; Superposition of Amplitudes, Dynamical Variables as Operators; Expectation Values, Schrodinger Equation and its Simple Applications like Particle in a Box, Quantum Well, Potential Barrier Problem, Electron in periodic potential and band structure of solid, k-space.
Component 2	3	Semiconductors: Introduction, Energy Bands in conductors, semiconductors, insulators, intrinsic and extrinsic semiconductor, and Carrier transport in semiconductor: diffusion current, drift current, mobility and resistivity. Generation and recombination of carriers in semiconductors. Thermal Noise, Shot Noise. Electrons and Holes in semiconductors: Silicon crystal structure, Donors and acceptors in the band model, electron effective mass, Density of states, Thermal equilibrium, and Fermi-Dirac distribution function for electrons and holes, Fermi energy. Equilibrium distribution of electrons & holes. The n-p product and the intrinsic carrier concentration at extremely high and low temperatures, Variation of Fermi energy with doping concentration and temperature
	4	Motion and Recombination of Electrons and Holes: Carrier drift: Electron and hole mobilities, Mechanism of carrier scattering, Drift current and conductivity. Carrier diffusion: diffusion current, Total current density, relation between the energy diagram and potential, electric field, Einstein relationship between diffusion coefficient and mobility

6. Text Book:

Classical Mechanics:

Classical Mechanics; H. Goldstein, C. Poole, J. Safko.

Quantum Mechanics:

Introduction to Quantum Mechanics by D . J. Griffiths

Modern Physics by A. Beiser.

Solid State Physics

Physics of semiconductor devices, S M Sze, John Wiley & Sons, 2006.;

7. References:

L.D. Landau and E.M. Lifshitz, Mechanics.

Theoretical Mechanics by M. Spiegel.

Feynman Lectures of Physics Vol-1 and Vol-3.

Quantum Physics for Atoms, Molecules, Solids, Nuclei and Particles by R Eisberg and R. Resnick.

Integrated Electronics: Analog and Digital Circuits and Systems by J. Millman and C.C. Halkias.