

**PHYSICS**  
**PY 102**

**Unit I: Wave Optics**

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Ramsden and Huygens eyepieces, coherent sources, Fresnel's biprism, thin film interference, Newton's ring, Fraunhofer's diffraction at single slit, Fraunhofer's diffraction at N-Slits (grating), Rayleigh's criterion of resolution, resolving power of microscope.

**Unit II: Polarization and LASER**

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Types of Polarised light, Double refraction, Nicol prism, Optical activity, polarimeter (Laurentz and Biquartz).

Characteristics of laser beam, Main components of laser, optical gain, Einstein's coefficients, He-Ne laser, Nd-YAG laser

**Unit III: Instrumentation and Elementary Molecular Spectroscopy**

**8**

Electron microscope: Principle and its working, Region of electromagnetic spectrum, Diatomic molecule as a rigid rotator and its spectrum, Non-rigid rotator, Vibrational spectra of diatomic molecule (simple harmonic oscillator and anharmonic oscillator, Qualitative discussions only), Raman Scattering ( Quantum and classical theory of Raman effect)

**Unit IV: Crystal Physics**

**8**

Introduction to crystal structure (Lattice, basis, unit cell, lattice parameters) Seven crystal systems and fourteen Bravais lattices, Coordination number, nearest neighbor distance, atomic radius and atomic packing fraction for SC, BCC and FCC, Simple crystal structures of NaCl and diamond cubic, Miller indices, Origin of X-rays ( Continuous and characteristic ), Bragg's law, Moseley's law.

**Unit V: Quantum Physics and Nanotechnology**

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Wave function and its physical admissibility, orthogonality of wavefunctions, normalization of wave functions, Schrodinger wave equation, A particle in a 1-D box, Identical particles, symmetric and anti symmetric wave functions.

Introduction to nanotechnology and its applications, Nanostructure formation techniques (CVD, sputtering).

**Books recommended:**

1. Fundamentals of Molecular Spectroscopy by C.N. Banwell, TMH Pub.
2. Molecular Structures and Spectroscopy by G.Herzberg.
3. Introduction to Solid State Physics by Charles Kittel. John Willey Pub.