Paper–III
Physics

Internal Marks: 20	Theory Marks: 80	Total Marks: 100	Exam. Duration: 3 Hours

UNIT – I

MATHEMATICAL METHODS OF PHYSICS

Vector calculus; Vector Spaces, Linear transformations, Self-adjoint and unitary transformations, Inner Product, orthogonality and completeness, matrices, similarity transformations, Eigenvalues and Eigenvectors of Hermitian and Unitary transformations, diagonalization using analytical and numerical methods. Linear differential equations and introduction to special functions (Hermite, Bassel and Legendrre); Fourier series, Fourier and Laplace transforms;

UNIT – II

SOLID STATE PHYSICS

Brief review of crystal structure, X-ray diffraction methods, modern X-ray diffractometer, indexing of X-Ray diffractions peaks, data analysis and interpretation, crystallite size and strain measurement in nanomaterials, basic principle of scanning electron microscopy, energy dispersive X-ray, basic principle of transmission electron microscopy, brief idea of set up, sample preparation.

UNIT – III

LASER AND WAVE GUIDES

Applications of Lasers : Physics, Chemistry, Biology, Medicine, Material working, optical communication, Thermonuclear Fusion, Holography, Military etc. waveguides: rectangular waveguide, cylindrical waveguide, single mode fiber, multimode fiber, graded index fiber, dispersion, numerical aperture, mode of waveguide,

UNIT – IV

COMPUTATIOINAL PHYSICS

Matrix diagonalizatioin, numerical integratioin, solving differential equatioin, Euler, Runge – Kutta and Verlet schemes, monte-carlo and molecular dynamics methods and algorithms.

References:

1. Transmission Electron microscopy: Diffractiion, Imaging, and spectrometry by C. Barry Carter David B. Williams (Spinger).
2. Elements of X-ray Diffractiion by B.D Cullity (Pearson).
3. Scanning electron Microscopy and X-Ray Microanalysis by Joseph I. Goldstien (Kluwer Academic).
4. Solid State Physics by Charles Kittel,
5. Mathematical physics HK Dass
6. Mathematical Physics by waber & Arfkin
7. Mathematical Physics by B.S. Rajput
8. Optical wave guides by Ajoy Ghatak
9. Electrodynamics by David J. Griffith
10. Numerical Methods and Programming by B.S Grewal
11. Elements of X-Ray Diffraction by B.D Cullity
12. Transmission Electron Microscopy: - Diffraction, imaging and spectrometery by C.Barry. Carrter David B Williams.