FPYC502 FUNDAMENTALS OF QUANTUM MECHANICS – I

UNIT-I

Origins of Quantum Physics: Historical Perspective, Particle Aspect of Radiation, Wave Aspect of Particles, Heisenberg Uncertainty Principle, Probabilistic Interpretation, Atomic Transitions and Spectroscopy, Wave Packets

UNIT-II

Mathematical Tools of Quantum Mechanics: The Linear Vector Space, The Hilbert Space, Dimension and Basis of a Vector Space, Square-Integrable Functions, Dirac Notations, HermitianOperator, Projection Operator, Commutation Algebra, Uncertainty Relation between Two Operators,

UNIT-III

Functions of Operators, Inverse and Unitary Operators, Eigenvalues and Eigenvectors of an Operator, Infinitesimal and Finite Unitary Transformations, Representation in Discrete Bases: Matrix Representation of Kets, Bras and Operators, Unitary Transformation, Matrix Representation of Eigenvalue Problem, Representation in Continuous Bases: Position and Momentum Representation, Parity Operator, Matrix and Wave Mechanics;

UNIT-IV

Postulates of Quantum Mechanics: The Basic Postulates of Quantum Mechanics, The State of a System, Observables and Operators, Measurement in Quantum Mechanics, Time Evolution Operator, Stationary States, Schrödinger Equation, The Conservation of Probability, Time Evolution of Expectation Values, Symmetries and Conservation Laws, Connecting Quantum to Classical Mechanics

Books:

1. Quantum Mechanics S. Gasiorowicz
2. Quantum Mechanics J. Sukurai
3. Quantum Mechanics R. Shankar
4. Quantum Mechanics S.N. Biswas
5. Quantum Mechanics A. Das
6. Quantum Mechanics A. Ghatak and S. Lokanath
7. Quantum Mechanics (Non Relativistic theory) L.D. Landau and E.M. Lifshitz
8. Principles of Quantum Mechanics P.A.M. Dirac
9. Quantum Mechanics, concepts and application, N Zettili