

PHY 3103: Quantum Mechanics I Academic Session: 2023-2024

3 Hours/week, 3 Credits Examination Duration: 3 Hours

- 1. **The Origin of Quantum Theory**: Shortcomings of Classical Theory: Photoelectric Effect; Compton Effect; Photon and Its Properties; Blackbody Radiation and Planck's Distribution.
- 2. **Quantization of Energy**: The Bohr Model of Atom; Energy Quantization; The Correspondence Principle; The Complementary Principle.
- 3. **Matter Wave and Uncertainty Principle**: Wave Particle Duality; Mathematical Description of Matter Waves; The Two-slit Experiment; Heisenberg Uncertainty Principle and Its Applications; Wave function and Its Physical Interpretation; Normalization; Probability Density; Wave Packet.
- 4. **Operator**: Introduction to Operator; Parity Operators; Observables; Hermitian Operator and Its Properties; Eigen value Equation; Eigen values and Eigen function; Eigen states; Commutation of Operators.
- 5. **Mathematical Structure of Quantum Mechanics**: Schrodinger Equation; Expectation Value of Position and Momentum; Wave function in Momentum Space; Conservation of Probability and Probability Current Density; Collapse of the Wave functions; Ehrenfest's Theorem; Evolution of an Observable with Time and Constant of Motion.

Books Recommended:

Griffiths, D	Introduction to Quantum Mechanics
Bransden BH, Joachain CJ	Quantum Mechanics
Zettili N	Quantum Mechanics: Concepts and
	Applications