

Course Title	QUANTUM MECHANICS-I
Course Code	MPHY-332
Credit Hours	CH3
Pre- requisites	MPHY-231
Learning outcomes	This course offers a systematic introduction to fundamental non-relativistic quantum mechanics.
Contents	Introduction to Quantum Mechanics Wave-particle duality of matter and light, Heisenberg uncertainty principle, Probabilistic interpretation, Correspondence principle, Complementarity, Atomic spectra, Spontaneous and stimulated transitions, Lasers Introduction to wave mechanics: Schrödinger's equation, Linearity and superposition, Wave functions and wave packets, Probability amplitudes and expectation value, Operators and their algebra. Mathematical Tools of Quantum Mechanics Hilbert Space: Dimension, bases, orthonormal set, Dirac notation, Operators on Hilbert space, Hermitian and unitary operators, Eigenvalue equations, Matrix representation of various operators, Representation in discrete and continuous bases, Position and momentum representation, Postulates of quantum mechanics, Generalized uncertainty principle, Ehrenfest equations. Solutions to Schrödinger's Equation in One Dimension Transmission and reflection at a step, Potential Barrier, Barrier penetration, Potential wells, Quantum tunneling and its applications in technology, Quantum harmonic oscillator, Hermite Polynomials.
Teaching-learning Strategies	Classroom teaching / Lecturing
Assignments- Types and Number	Problem sheet: 3-4
Assessment and Examinations	Mid-Term Assessment: 35% Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc. Final Term Assessment: 40%
Text Books	1. Introduction to Quantum Mechanics by D. J. Griffiths and D. F. Schroeter (3rd Edition), Cambridge, (2018) 2. Introductory Quantum Mechanics by R. Liboff (4th Edition), Addison-Wesley (2002) 3. Quantum Mechanics: Concepts and Applications by N. Zettili (2nd Edition), Wiley (2009) 4. Modern Quantum Mechanics by J. Sakuri and Jim, Napolitano (2nd Edition), Pearson (2010) 5. An Introduction Quantum Mechanics by W. Greiner, Addison Wesley (1980)