Course Title	**QUANTUM MECHANICS-II**
Course Code	**MPHY-433**
Credit Hours	**CH3**
Pre- requisites	**MPHY-332**
Learning outcomes	The second course provides a basis for further concepts of quantum mechanics
Contents	**Angular Momentum:** Angular momentum and spherical harmonics, Space quantization, Quantization of angular momentum and energy, Schrödinger's equation in three dimensions, Central potentials and hydrogenic systems, Solution of Schrodinger wave equation for Hydrogen atom, quantum numbers, Electron probability density, Radiative transitions and selection rules, Zeeman effect, **Spin:** Spin angular momentum and Pauli matrices, Stern-Gerlach experiment, Precession in a magnetic field, Composite systems and tensor product of Hilbert spaces, Addition of angular momenta, Spin-orbit coupling. **Identical Particles:** Identical particles and second quantization, Indistinguishability, Quantum dynamics of identical particle systems, Exchange degeneracy, Symmetrization postulates, Constructing symmetric and anti-symmetric wavefunctions, Systems of identical non-interacting particles, Exchange symmetry and exclusion principle. **Approximation Methods for Stationary States:** Time-independent perturbation theory, non-degenerate and degenerate levels, Fine structure and anomalous Zeeman effect, Variational method, WKB approximation, Bound states for potential wells. **Time-Dependent Perturbation Theory:** Pictures of quantum mechanics, Schrödinger, Heisenberg, and interaction picture, Transition probability and Fermi Golden Rule, Interaction of atoms with radiation. **Scattering Theory:** Theory of scattering, scattering experiments and cross sections, scattering amplitudes, Potential scattering, Method of partial waves, Born approximation.
Teaching-learning Strategies	Classroom teaching / Lecturing, practical
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. J. Sakuri and Jim J. Napolitano (2nd Ed, Pearson (2010). 5. An Introduction Quantum Mechanics by W. Greiner, Addison Wesley (1980).