

Third year of Five Years integrated M.Sc (Physics)  
M.Sc. III , Semester –V

	L	T	P	C
MP 305 : Quantum Mechanics	3	2	0	5

- **ORIGINS OF QUANTUM THEORY & APPLICATIONS** (06 Hours)  
The conceptual aspect, The state vectors, Bra and Ket notations, Eigenstates and eigenvalues, The postulates of quantum mechanics, Interpretation of the wave function, Operators, Commutation relations.
- **SCHRÖDINGER EQUATION AND RELATED PROBLEMS** (10 Hours)  
Equation of motion, Hamiltonian, Time dependent Schrodinger equation, Time independent Schrodinger equation, Schrodinger equation for particle in a potential well.
- **FOURIER TRANSFORM, DELTA FUNCTIONS** (06 Hours)  
Position representation of a state, momentum representation of a state, Plancherel's theorem, The Kronecker delta, Dirac delta function,
- **CENTRAL POTENTIALS; HYDROGEN ATOM** (05 Hours)  
spherically symmetric potentials, The two body problem, Bound states, Scattering states, Energy spectrum of Hydrogen atom
- **SYMMETRIES IN QUANTUM MECHANICS, GENERAL TREATMENT OF ANGULAR MOMENTUM; SPIN** (07 Hours)  
The invariance principles, Symmetry groups and their representation, Space-time symmetry, Rotation symmetry, Eigenvalues of angular momentum, Parity, Time reversal invariance.
- **IDENTICAL PARTICLES; PAULI EXCLUSION PRINCIPLE.** (04 Hours)  
The identity of particle, Quantum numbers, Spins and Statistics, Pauli's exclusion principle and the Slater determinant.
- **INTRODUCTION TO FIRST ORDER TIME-INDEPENDENT PERTURBATION THEORY** (04 Hours)  
The WKB approximation, Variational methods, Non-degenerate Perturbation Theory, Degenerate Perturbation Theory, Two-fold Degeneracy,

(Total Contact Time (Theory) : 42 Hours)

**BOOKS RECOMMENDED :**

1. Schiff L.I.	<i>Quantum Mechanics:</i>	McGraw Hill	1981
2. Ghatak A.K., & Loknathan S.	<i>Quantum Mechanics: Theory &amp; Applications</i>	Springer	2004
3. Shankar R.	<i>Principles of Quantum Mechanics:</i>	Springer	1994
4. Griffiths D.J.	<i>Intro to Quantum Mechanics:</i>	Benjamin Cummins	2004
5. Mathews P.M., and Venkateshan K.	<i>A Text book of Quantum Mechanics</i>	TMH	1979