Department of Physics

Indian Institute of Technology Kanpur

PHY602 : Review of Quantum Mechanics

Course content:

S. No.	Topics	No. of Lecture and Tutorial Hours
1	Problem oriented review of Quantum Mechanics. Historical development of quantum mechanics, wavepackets, Schrodinger's equation, two-level systems.	4
2	Solution (analytical and numerical) of time-independent Schrodinger equation for various physically relevant potentials; angular momentum algebra, spherical harmonics. Numerical solution of the radial Schrodinger equation for arbitrary spherically symmetric potential.	12
3	Equivalence of Heisenberg approach and Schrodinger approach; matrix mechanics. Quantization of electromagnetic field in a cavity and in free space. Approximation methods: perturbation theory and variation principle for time-independent problems, WKB approximation. Time-dependent Schrodinger equation. Time-dependent perturbation theory and matter radiation interaction. Selection rules for dipole radiation. Adiabatic and sudden approximations.	16
4	Topics in (i) scattering theory, (ii) relativistic quantum mechanics, (ii) introduction to path integral formulation, (iv) identical particles. Problems of current interest, many body physics.	8

Reference books:

1. J. J. Sakurai, Modern Quantum Mechanics.

2. L.I. Schiff, Quantum Mechanics

3. E. Merzbacher, Quantum Mechanics

4. R. Shankar, Principles of Quantum Mechanics

5. Loudon, Quantum theory of light