This course is for 3rd year B.Tech students. For students who wish to understand the basic foundations of Quantum Mechanics and the mathematical machinery used in developing the theory and its applications. It is also for more practical oriented students who wish to catch up with the understanding of semiconductor devices based on Quantum Mechanics.

Prerequisite: Linear Algebra, Modern Physics.

1. Motivation for quantum mechanics
   - Black body radiation
   - Photoelectric Effect
   - Wave-particle duality
   - Particle properties of waves
   - Wave properties of particles
   - De-Broigle wavelength
   - The uncertainty principle

2. Quantum Theory
   - Bohr model of the atom
   - Probability waves
   - Wave functions
   - Schrodinger’s equation
   - Operators, Eigenvalues and Expectation values

3. Applications
   - Particle in a box
   - Harmonic Oscillator
   - Hydrogen Atom

4. Angular Momentum
   - L and \( L_z \) Quantization
   - Spin, Stern Gerlach Experiment
   - Spin Quantization (\( S \) and \( S_z \))

5. Approximate Methods
   - Perturbation Theory

6. Two level Systems
   - Time evolution of spin in magnetic field
   - Addition of Spin Angular momentum
   - Symmetric and antisymmetric states.
• Density Operators and Ensembles.

7. • Bohm Aharanov Effect
• Quantum Cryptography
• Quantum Computers.

Books:

1. Quantum mechanics
   L.I. Schiff

2. Quantum Mechanics
   Eugene Mezbacher

3. Quantum mechanics
   John L. Powell and Bernd Crasemann

4. Quantum Mechanics
   Ghatak and Lokananthan

5. Modern Quantum Mechanics
   J. J. Sakurai

6. Feynmann Lectures in Physics Vol. 3
   Richard Feynmann