Approval : 2nd adhoc meeting

PH-301: Quantum mechanics and applications (2.5-0.5-0-3)

1. Review of postulates in quantum mechanics, observables and opertaors, theory of measurement in quantum mechanics, state of the system and expecation values, transition from quantum mechanics to classical mechanics-Ehrenfast theorem. [5 Lectures]

2. Application of Schrodinger equation in 1-D: rectangular barrier, tunneling, square potential well, delta-function potential [5 Lectures]

3. Basic mathematical formalism of quantum mechanics, Dirac notation, linear vector operators, matrix representation of states and operators, commutator relations in quantum mechanics, commutator and uncertainity relations, complete set of commuting observables [6 Lectures]

4. Quantum computation and information: Qubits and logic gates [4 Lectures]

5. Theory of angular momentum in quantum mechanics, commutator relations in angular momentum, eigen values and eigen states of angular momentum [5 Lectures]

6. Application of Schrodinger equation in 3-D models, central potentials, Schrodinger equation in spherical co-ordinates, solution to hydrogen atom problem [5 Lectures]

7. Time independent non-degenerate and degenerate perturbation theory, fine-structure of hydrogen, Zeeman effect and hyperfine splitting [5 Lectures]

8. Time dependent perturbation theory, two level systems, emission and absorption of radiation [5 Lectures]

References:

1. Introduction to quantum mechanics-D J Griffith
2. Introductory Quantum Mechanics – R Liboff
3. Quantum physics of atoms and molecules-R Eisberg & R Resnick.
4. Quantum Mechanics for Scientists and Engineers- D A B Miller
5. Applied quantuum mechanics – Levi
6. Quantum Mechanics B. H. Bransden & C. J. Joachain
7. Modern Quantum Mechanics - J J Sakurai
8. Principles of Quantum Mechanics - R Shankar
9. Quantum Mechanics -Vol.1– Cohen-Tannoudji, B Diu, F Laloe