In.M.Sc. Applied Physics, 5 years
8<u>TH</u> <u>SEMESTER</u>

FPYC-801: QUANTUM MECHANICS-II

Marks-100

Unit-I

Approximation Method for stationary states:

Rayleigh-Schrodinger Method for Time-independent Non degenerate Perturbation theory, First and second order correction, perturbed harmonic oscillator, Anharmonic oscillator, The stark e ect, Quadratic Stark Effect and polarizability of hydrogen atom, Degenerate perturbation theory, Removal of Degerancy, parity selection rule, linear stark effect of hydrogen atom, Spin orbit Coupling, Relativistic correction, ne structure of Hydrogen like atom, normal and anomalous Zeeman effect, The strong- field Zeeman effect, The weak-field Zeeman effect and Landes g-factor. Elementary ideas about field quantizition and particle processes. (10)

Unit-II

Variational Methods:

General formalism, Validity of WKB approximation method, Connection Formulas, Bohrquantisation rule, Application to Harmonic oscillator , Bound states for potential well with one rigid wall and two rigid walls, Tunneling through potential Barrier, Cold emission, Alpha decay and Geiger-Nutal relation.

Time dependent perturbation Theory:

Transition probability, constant and harmonic perturbation, Fermi golden rule, and electric dipole Radiation and Selection Rule, Spontaneous emission EinsteinsA, B- coefficient, Basic principle of laser and Maser. (15)

Unit-III

Scattering Theory:

Scattering amplitude and Cross section. Bornapproximation, Application to Columb and Screened coulmbpotential, Partial wave analysis for elastic and inelastic Scattering. Effective range and Scattering length, Opticaltheorem, Black Disc Scattering, Hard-sphere Scattering, Resonance Scattering from square well potential. (15)

Books:

1.   Quantum Mechanics S. Gasiorowicz
2.   Quantum Mechanics J. Sukurai
3.   Quantum Mechanics R. Shankar
4.   Quantum Mechanics S. N. Biswas
5.   Quantum Mechanics A. Das

In.M.Sc. Applied Physics, 5 years

6. Quantum Mechanics A. Ghatak and S. Lokanathan
7. Advanced Quantum Mechanics P. Roman
8. Quantum Mechanics (Non Relativistic theory) L. D. Landau and E. M. Lifshitz
9. Elementary Theory of Angular Momentum M. E. Rose
10. Principles of Quantum Mechanics P. A. M. Dirac
11. Quantum Mechanics, Concept and Applications, N Zettili