



Syllabus

PANJAB UNIVERSITY, CHANDIGARH

B.Sc. Sem. III

QUANTUM PHYSICS-I

(30 Hrs.)

Paper - C :

Unit - I

Formalism of Wave Mechanics :

- (i) Brief introduction to need and development of quantum mechanics, wave-particle duality (photon as particle, de-Broglie hypothesis, particle diffraction, particle interference), wave packet, indeterminacy, complementarity.
- (ii) Schrödinger equation for a free particle, operator correspondence and equation for a particle subject to forces. Normalization and probability interpretation of wave function, superposition principle, expectation value, probability current and conservation of probability, admissibility conditions on the wave function, Ehrenfest theorem. ,
- (iii) Fundamental postulates of wave mechanics. Eigen functions and eigen values, operator formalism, orthogonal systems, expansion in eigen functions, Hermitian operators, simultaneous eigen functions, equation of motion.
- (iv) Uncertainty of position and momentum, monochromatic waves, Gaussian wave packet.

Unit - II

Problems in One and Three Dimensions:

- (i) Time dependent Schrödinger equation, Application to stationary states for one dimension, Potential step, potential barrier, rectangular potential well, degeneracy, orthogonality, linear harmonic oscillator.
- (ii) Schrödinger equation for spherically symmetric potential, spherical harmonics, hydrogen atom energy levels and eigen functions, degeneracy, angular momentum.