

## **CH.1 – ORIGIN OF QUANTUM PHYSICS**

- **Historical Note.**
- **Classical Physics.**
  - **Newtonian Mechanics.**
  - **Electromagnetic Theory.**
- **Inadequacy of Classical Theory.**
  - **Blackbody Radiation.**
  - **Photoelectric Effect.**
  - **Compton Effect.**
  - **Atomic Line Spectra.**
- **Wave Aspect of Particles.**
  - **De Broglie's Hypothesis: Matter Waves.**
- **Particles Versus Waves.**
  - **Classical View of Particles and Waves.**
  - **Quantum View of Particles and Waves.**
- **Heisenberg's Uncertainty Principle.**
- **Wave Packets.**

## **CH. 2 OPERATORS AND WAVE FUNCTION**

- **Definition.**
- **Properties of Linear Operators.**
- **Eigen Value Equation.**
- **Commutation Relations.**
- **Properties of Commutators.**
- **Wave Function.**
- **Physical Significance of Wave Function.**
- **Expectation Values.**
- **Hermitian Operator.**
- **Normalized, Orthogonal and Orthonormal Functions.**

## **CH. 3 INTRODUCTION OF QUANTUM MECHANICS**

- **Operations of Observation.**

- **Operators and Observations: Interpretive Postulates.**
- **Physical Postulates.**
  - **Correspondence Principle.**
  - **Complementarity Principle.**
- **Schrödinger Equation: Time-Dependent Form.**
- **The Schrödinger Equation: Time-Independent Form.**
- **Principle of Linear Superposition.**
- **Parity.**
- **Probability Current Density.**

#### **Ch. 4 ONE-DIMENSIONAL MOTION**

- **Free Particle.**
- **Particle in a box.**
- **Wave Functions of a Particle in a Box.**
- **The Potential Step.**
- **Potential barrier.**

#### **CH. 5 HARMONIC OSCILLATOR**

- **Classical Theory.**
- **Quantum Theory.**
- **The raising and lowering ladder operator.**

#### **CH. 6 THREE DIMENSIONAL PROBLEMS**

- **Schrodinger Equation in Three Dimensions.**
- **Particle in Three Dimensional Box.**

#### **CH. 7 QUANTUM THEORY OF HYDROGEN ATOM**

- **Schrödinger's Equation for Hydrogen Atom.**
- **Angular Momentum.**
- **Separation of Variables.**
- **Magnetic Quantum Numbers.**
- **The Angular Equation (Zenith Equation).**
- **Orbital Quantum Number.**
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