

**B.A/B.Sc 6th Semester ( Old Syllb 2017-18)**

**(2720)**

**Paper: Chemistry (Physical Chemistry-IV)**

**Time Allowed: 2 hrs.**

**Max. Marks: 35**

**Note: Attempt any four questions. All questions are of equal marks.**

1. (a) Write five classical-mechanical observables and their corresponding quantum-mechanical operators along with their symbols. (b) Prove that the kinetic energy operator is Hermitian.
2. Show that energy of a particle in a box is quantized. Draw the energy levels, wave functions, and probability densities for the particle in a box.
3. Write the Schrödinger wave equation for a simple harmonic oscillator, discuss its solution, and the resulting wave functions.
4. Write the Schrodinger wave equation for a Hydrogen atom and discuss its solution (the radial and angular parts).
5. Discuss the determination of crystal structure of KCl by use of powder diffraction method.
6. Write a short note on (a) Law of constancy of interfacial angles, and (b) Symmetry elements in crystals.
7. Using Jablonski diagram, explain various radiative and non-radiative processes.
8. (a) Differentiate between thermal and radiative processes (b) What is quantum yield?

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