

CS/2110

**Paper - III**  
**Physical Chemistry**

10392/NH

**Max. Marks : 26 Marks**

**Max. Time : 3 hrs**

**Min. Pass Marks : 35%**

Candidates are required to attempt two questions (4 marks each) selecting each from section A & B. Section C is compulsory (2 marks each question).

**SECTION - A**

1. Write down Hamiltonian operator for a linear harmonic oscillator?
2. Write expression for Schrodinger wave equation for hydrogen atom in both polar and Cartesian coordinates?
3. Discuss postulates of quantum mechanics?
4. Discuss quantum numbers and their importance?

**SECTION - B**

5. Discuss basic feature of different type of spectrometers?
6. Discuss rigid rotor molecule and derive relation for rigid rotor for rotational spectra?
7. Define force constant and describe methods for its determination?
8. Explain, how anharmonicity in the molecule affect the vibrational spectrum?

**SECTION - C**

9. (a) What is meant by normalized and orthogonal functions?  
(b) Differentiate between radial and angular wave functions?  
(c) Describe Born-Opprnheimer approximation with its importance?  
(d) Explain the use of spectral intensity for rotational spectra?  
(e) Derive selection rule for vibrational spectra?