PGC 4406   **PHYSICAL CHEMISTRY-II**   **Time: 3 Hours**

Max Marks: 75

Answer **ANY FIVE** Questions   **(5 X 15 = 75)**

1. a) Derive the expression for rotational spectra of a rigid diatomic molecule and draw the spectrum. (9) b) discuss the effect of isotopic substitution on rotational spectra. (6)

2. Using quantum mechanical formulation, deduce the eigen value, eigen function, transition frequencies and relative intensities of the lines in an AB NMR system.

3. a) Discuss Frank Condon principle and its applications. (9) b) Discuss overtone and combination bands. (6)

4. a) Give the pulse sequence and vector diagram of a DEPT experiment and explain the information obtained from this technique. (7) b) Illustrate the use of INDOR experiment to determine the relative signs of the coupling constant with the help of energy level diagram. (8)

5. a) Write a note on CARS and hyper Raman effects. (7) b) What is NOE? How does it arise? Explain its importance. (8)

6. Discus briefly transport properties and arrive at the expression for coefficient of thermal conductivity on the basis of transport property. (5+10)

7. Derive Maxwell's distribution of molecular kinetic energies and velocities explain the effect of temperature. (5+7+3)