

Max. Marks : 80

P.T.O

- b) Describe the first and second order phase transition and lambda line observed in liquid Helium system. 8

OR

- c) Draw and describe phase diagram of carbon system. 4
- d) Give thermodynamic derivation of phase rule. 4
- e) Determine the number of degree of freedom in each of the following. 4
- i) $\text{CaCO}_3 \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$
- ii) $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$
- iii) $\text{Fe}_{(s)} + \text{H}_2\text{O}_{(g)} \rightleftharpoons \text{FeO}_{(s)} + \text{H}_{2(g)}$
- iv) An aqueous solution of acetic Acid.

- f) Discuss first & second order transition. 4

4. a) Derive Michaelis-Menten equation for enzyme catalyst & explain the effect of pH & temperature on catalysis. 8
- b) Derive an expression for the rate constant on the basis of collision theory for bimolecular reaction. 8

OR

- c) Discuss the Kinetics of the $\text{H}_2 - \text{I}_2$ reactions. 4
- d) Derive the expression for RRKM theory. 4
- e) Write short note on acid-base enzyme catalyzed reaction. 4
- f) Explain: 4
- i) Quantum yield ii) Quenching.

5. a) What is meant by Hermitian operator? 2
- b) Write the equation of energy of simple harmonic oscillator. 2
- c) What are partial molar quantities? 2
- d) Define intensive and extensive properties with examples. 2
- e) Explain reduced phase rule. 2
- f) What are congruent and incongruent melting point. 2
- g) Explain photosensitizer. 2
- h) What is activation energy. 2
