A–059

Total Pages : 4 **Roll No. .....**

MSCCH–503

M.Sc. CHEMISTRY (MSCCH)

(Physical Chemistry–I)

1st Semester Examination, 2024 (June)

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

(Long Answer Type Questions) 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. (a) What do you mean by Gibbs free energy ? How Gibbs free energy vary with temperature and pressure ?

   (b) Explain Maxwell- Boltzmann and Bose- Einstein statistics.

2. (a) Describe transition state theory of reaction rate. Derive an expression for the thermodynamic formulation of reaction rate.

   (b) Discuss the factors affecting the rate of reaction in solution.

3. Write notes on the following :

   (a) Potential energy surfaces

   (b) Primary salt effect

   (c) BET equation

4. (a) Discuss various methods to study the kinetics of fast reactions.

   (b) Explain Debye-Huckel theory of strong electrolytes in detail.

5. Explain the following :

   (a) Collision theory of reaction rate

   (b) Thickness of ionic atmosphere

   (c) Over voltage

Section–B

(Short Answer Type Questions) 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Describe various laws of thermodynamics.

2. Write notes on the following :

   (a) Partial molar quantities

   (b) Partition functions

3. What do you mean by thermodynamic probability ? How entropy is related with thermodynamic probability ?

4. Explain Lindemann mechanism of unimolecular reactions.

5. Discuss Michaelis- Menten mechanism of enzyme reactions.

6. Explain and illustrate Gibbs adsorption isotherm.

7. (a) What is ionic strength ? Calculate the ionic strength of 0.01 molal solution of NaCI.

   (b) Write short note on decomposition potential.

8. (a) Describe the concept of activity and activity coefficient of strong electrolytes.

   (b) Two moles of an ideal gas are allowed to expand isothermally and reversibly at 300 K from a pressure of 1 atm to a pressure of 0.1 atm. Calculate the change in Gibbs free energy.

****