Roll No. | | | | | | | | | | | | | **Total No. of Pages: 02**

Total No. of Questions: 11

Master of Science (Chemistry)(Sem. – 1)

PHYSICAL CHEMISTRY-I

Subject Code: CHL403-18

M Code: 75115

Date of Examination : 14-01-2023

Time: 3 Hrs. **Max. Marks: 70**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains EIGHT questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C is COMPULSORY consisting of TWO questions carrying TEN marks each.**

SECTION-A

1. Write briefly:

a) Define activity and mean activity of a strong electrolyte.

b) Mention the differences between Gouy-Chapman model and Stern-model.

c) Explain the term fugacity.

d) Write down Ilkovic equation with meaning of different parameters involved.

e) Draw conductometric titration graph of weak acid with strong base. Cite an example.

f) Write down two limitations of dropping mercury electrode (DME).

g) Find out the expression of activity and mean activity of 1:1 electrolyte of molarity c.

h) Mention the examples of unimolecular and chain reaction.

i) In a reaction, a certain reactant (A) gives two different products (B and C), how can you confirm the reaction is parallel or consecutive?

j) Calculate $f_{\pm}$ for $0.01(M)$ solution of KCl in water at $25°C$ according to Debye-Huckel limiting law. Given, $A = 0.51$ at $25°C$.

SECTION-B

2. Derive Gibbs-Duhem equation for chemical potential related with the composition of the system.

3. Write a short note on electrical double layer.

4. Differentiate between primary isotope effect and secondary isotope effect.

5. How the stopped flow method is used for studying kinetics of fast reaction?

6. The molar conductance of CH_3COONa, HCl and NaCl at infinite dilution are

   $91.0 \times 10^{-4}, 426.16 \times 10^{-4}$ and 126.45×10^{-4} Sm^2mol^{-1} respectively at $25°C$. Calculate the molar conductance at infinite dilution for CH_3COOH.

7. Write a short note on RRKM theory of unimolecular reaction.

8. Calculate mean activity coefficient for $0.01(M)$ solution of KCl in water at $25°C$ according to Debye-Huckel limiting law. Given, $A = 0.51$ at $25°C$.

9. Write a short note on chain reactions.

SECTION-C

10. Discuss in details the kinetics of consecutive reaction. How NMR method is used for study of the fast reactions?

OR

Write about the thermodynamics of electrified interface. Discuss the Lippmann equation and its significance.

11. Illustrate Debye-Huckel theory for activity coefficient of an electrolytic solution. Write a short note on concentration polarization.

OR

Discuss the kinetics of complex reactions. Differentiate between single sphere and double sphere models using suitable examples.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.