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

Total No. of Questions : 11

M.Sc.(Chemistry) (2018 Batch) (Sem.–1)

PHYSICAL CHEMISTRY-I

Subject Code : CHL-403-18

M.Code : 75115

Time : 3 Hrs. Max. Marks : 70

INSTRUCTION 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 will comprise of two compulsory questions. Each question carries TEN marks.**

SECTION-A

Q1 Answer briefly :

(a) Write down the expressions of partial molar internal energy and partial molar enthalpy with explaining different parameters involved.

(b) What is meant by activity and mean activity of a strong electrolyte?

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

(d) Mention the limitations of dropping mercury electrode (DME).

(e) Draw a plot of the conductometric titration curve of weak acid with strong base.

(f) What are the differences between Gouy-Chapman model and Stern-model?

(g) Why collision theory is applicable to simple gaseous molecular reaction?

(h) Give two examples of unimolecular reaction.

(i) A certain reactant A gives two products B and C how can you know that the path is parallel or consecutive?

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

SECTION-B

Q2 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.

Q3 Derive Gibbs-Duhem equation for chemical potential related with the composition of the system.

Q4 The molar conductances of CH_3COONa, HCl and NaCl at infinite dilution are 91×10^{-4}, 426×10^{-4} and 126×10^{-4} Sm^2mol^{-1} respectively at 25°C. Calculate the molar conductance at infinite dilution for CH_3COOH.

Q5 Write a short note on electrical double layer.

Q6 Describe briefly important applications of polarography.

Q7 Unimolecular reactions are not always first order kinetics. Justify the statement using Lindemann theory.

Q8 How the stopped flow method is used for studying kinetics of fast reaction?

Q9 Differentiate between primary isotope effect and secondary isotope effect.

SECTION-C

Q10 Deduce a relation between fugacity and pressure. Hence, proved that for an ideal gas fugacity is identical with pressure. What is dropping mercury electrode (DME)? Mention the advantages of DME.

OR

Q10. Discuss the Debye-Huckel theory of mean ionic activity coefficient. Derive the Debye- Huckel limiting law equation. How can these equations are verified?

Q11 Discuss in details the kinetics of chain reaction. How NMR method is used for study of the fast reactions?

OR

Q11 Derive the rate equation. Explain the primary and secondary isotopic effects on reaction rate.

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