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NY—210—2023

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(New/CBCS Pattern)

CHEMISTRY

Paper-II (CH-423)

(Physical Chemistry)

(Monday, 11-12-2023)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 Hours   *Maximum Marks—75*

N.B. :— (1) Attempt all questions.

(2) Use of calculator and log-table is allowed.

1. Solve any *three* :   15

(*a*) (*i*) What is enzyme catalysis ? Explain with examples.

(*ii*) State Michaelis-Menten equation and explain its significance.

(*b*) Write an account on 'Flash Photolysis' to study fast reactions.

(*c*) From the following data for a polydisperse polymer :

Mixture :   Mass (%)   25.0 | 50.0 | 75.0

Mi (kg/mole) 1.0 | 1.20 | 1.40

Calculate $M\bar{u}$ and $M\bar{w}$

(*d*) Explain the kinetics of the decomposition of Ethane.

(*e*) What is Staudinges equation ? Explain.

The intrinsic viscosity of myosin is 217 cm^3 gm^{-1}. Calculate the approximate concentration of myosin in water which would have a relative viscosity of 1.5.

P.T.O.

2. Solve any *three* : 15

   (*a*) Describe how exchange current density, S_O is determined from 'Taxel plot'.

   (*b*) What is half-wave potential ? Explain the advantages of using DME in polarography.

   (*c*) Write in brief on :

      (*i*) Fire resistant, and

      (*ii*) Liquid-crystal polymers.

   (*d*) State the principle involved in polarography and explain its experimental set-up with any *one* application.

   (*e*) Explain effect of light at semiconductor solution interface.

3. Attempt the following :

   (*a*) Describe BET theory for multilayer adsorption. 8

Or

   What are salt effects ? Explain the influence of ionic strength on the rates of ionic reactions.

   (*b*) Explain Osmometry method used to determine molar masses of macromolecules. 7

Or

   Derive Bulter-Volmer equation in the kinetics of electrode reactions. Explain variation of current density with overpotential in accordance with Butler-Volmer equation in short.

4. Attempt the following :

   (*a*) What is meant by Half-life period of any chemical reaction ? Show that for a first-order reaction, time required for 99.9% completion of the reaction is ten-times that required for 50.0% completion. 8

Or

What is over-potential ? Explain Oxygen over-voltage and Hydrogen over-voltage in detail.

(*b*) What is role of CMC in Micelle formation ? Explain the effect of temperature and added electrolyte on CMC of ionics. 7

Or

Explain the dynamics of unimolecular reactions using K-R-R treatment.

5. Write short notes on (any *three*) : 15

(*i*) Thermodynamic formulation of transition-state theory.

(*ii*) Theory of double layer at semiconductor electrelyte solution interface.

(*iii*) Laplace equation.

(*iv*) Surface active agents.