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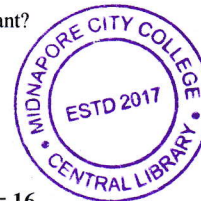
PG CBCS
M.Sc. Semester-IV Examination, 2022
CHEMISTRY
 PAPER: CEM 403 (SPL PAPER)
(ADVANCED PHYSICAL CHEMISTRY-IV)

Full Marks: 40

Time: 2 Hours

GROUP - A

1. Answer any four questions from the following questions: 2×4 = 8
- What are the advantages of Controlled-current coulometry over controlled-potential coulometry?
 - Write the difference between weight and number average molecular weight of macromolecule.
 - Define the intrinsic viscosity of a polymer. Why is intrinsic viscosity important?
 - What is the macroscopic diffusion-controlled reaction?
 - What is the synergic effect?
 - What is the transmission coefficient of a chemical reaction?

**GROUP - B**

2. Answer any four questions from the following questions: 4×4 = 16
- What are the secondary and tertiary structures of proteins? Give examples.
 - Discuss controlled-potential coulometry and controlled-current coulometry.
 - A sample weighing 0.1342 g is transferred to a 100 ml volumetric flask and diluted to volume with distilled water. A 10 ml portion is transferred to an electrochemical cell along with 25 ml, of 1 M KI, 75 ml of a pH 7.0 phosphate buffer, and several drops of a starch indicator solution. Electrolysis at a constant current of 36.45 mA required 221.8 s to reach the starch indicator end point. Determine the purity of the sample.
 - Equal numbers of molecules with $M_1 = 10000$ and $M_2 = 100000$ of polystyrene with a $\phi = 0.74$ are mixed. Calculate M_n , M_w , M_z , and M_{vis} , where the symbols are used for their usual meaning.
 - Describe the light scattering method for finding out the mass-average molecular mass of a polymer.
 - Show that the molecular Partition function is equal to the product of translational, rotational, vibrational, and electronic partition functions.

GROUP - C

3. Answer any two questions from the following questions: 8×2 = 16
- Using thermodynamic formulation, show that the expression of the rate constant of a bimolecular reaction is

$$K = \frac{K_B}{h} T e^{e^{\Delta S^\ddagger/R}} e^{-E_A/RT}$$

where the symbols are used for their usual meaning.

(P.T.O.)



- b) What is circular dichroism spectroscopy? Assign the characteristics band presents in circular dichroism (CD) spectra for the secondary and tertiary structure of a protein. 2+6
- c) Write the basic principle of cyclic voltammetry. What are the applications of cyclic voltammetry? 5+3
- d) Write the working principle of alkaline fuel cells and phosphoric acid fuel cells.
