AAJ-7323 Seat No._____

M. Sc. (Sem. II) Examination

April/May – 2018

CHN-503 : Physical Chemistry : Paper - IX

Time : 3 Hours] [Total Marks : 70

Instructions :

(1) Each question carries 14 marks.

(2) Figures to the right indicate marks of the question.

1 (a) Answer the following : (any two) 10

(1) Write a short note : Primary salt effect.

(2) Write a short note : Flash photolysis.

(3) Explain the Hinshelwood theory of unimolecular reactions.

(b) Answer the following : (any one) 4

(1) The rate constant is found to be 6.3×10^{-5} at 30°C and 9.2×10^{-4} at 50°C. Calculate the Arrhenius frequency factor.

(2) The rate constant for the first order decomposition at alkylene oxide into CH_4 and CO_2 following equation : log

$$K = 14.34 - \left(\frac{1.25 \times 10^4}{T}\right)$$

Calculate :

(i) Activation energy

(ii) The frequency factor

2 (a) Answer the following : (any two) 10

(1) Write a short note : Micellization

(2) Explain the Gibbs Absorption isotherm.

(3) Discuss the determination of molecular mass of polymer by light scattering method.

(b) Answer the following : (any one) 4

(1) A polymer sample contains 40% : 60% weight ratio of particle with molecular weight 30000 and 50000 respectively. Calculate the PDI of polymer.

(2) The concentration of Myosin is 0.25 M in water at 27°C. Calculate the relative viscosity of this sample.

[Huggins constant $K^1 = 0.33$, constant $K = 1.3 \times 10^{-4}$ and a = 0.8 molecular weight = 10^5 gm/mole]

3 (a) Answer the following : (any two) 10

(1) Derive the Butler-Volmer equation.

(2) Write a short note : Gouy-Chappman Model

(3) Write a short note : D.H.O. theory

(b) Answer the following : (any one) 4

(1) The value of overvoltage is 0.35 V. Calculate the overvoltage under the condition, when the magnitude of electric current is increased by ten times and the value of b is 0.12.

(2) In an alkali chloride cell, a saturated solution of 6 N NaCl is electrolyte at 25°C. Using a steel cathode. Which of the two ions H^+ or Na^+ will be discharged first ?

[pH = 7.0 $E^{\circ}_{H/H^+} = 0.0\,V$, $E^{\circ}_{Na/Na^+} = 2.71\,V$

Hydrogen over voltage η = 0.2V]

4 (a) Answer the following : (any two) 10

(1) Derive the Half-wave potential equation.

(2) Explain : Donnan membrane equilibrium when

(a) The electrolytes on both the sides have no common ions.

(b) One of the solution is water alone.

(3) Describe the quantum aspects of charge transfer at electrode-solution interface.

(b) Answer the following : (any one) 4

(1) Write an explanatory note on bioelectro catalysis.

(2) Write a short note on : Electrocardiography.

5 Answer in one to four lines : (any seven) 14

(1) Give the relation of the Half Life time and initial concentration of n^{th} order reaction.

(2) Derive the unit of surface excess.

(3) Give the effect of pH on overvoltage.

(4) Write a lindmann equation on high and low pressure.

(5) Give the difference between Homo and co-polymers.

(6) A polymer sample is prepared by two components are equal weight. The ratio of molecular weight is 2.0. Prove the $\overline{Mn}$ is greater in molecular weight of the small component by 4/3.

(7) Slop and intershap of log $K \rightarrow \frac{1}{T}$ is respectively 3260 and 14.2596 respectively. Calculate energy of activation and Arrhenius constant. [R = 1.987 cal/mole K]

(8) Give the difference between LDP and HDP.

(9) Give the elcovic equation and explain its terms.

(10) What is n-P junction ?
