M.Sc. Examination, 2017

Semester-II

Chemistry

Course: CH-810

(Physical Chemistry)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.

Answer ***any four*** questions.

1. a) How is the charge density on the electrode is measured from electrocapillary curve? 2
   b) Show that the slope of the surface tension vs $\log a_{\pm}$ curve at constant potential yields the surface excess. 3
   c) Write down two characteristic of the Stern Model. 2
   d) Explain the constant capacity region and hump region in the experimental capacity - potential curve. 3

2. a) Write down the relation between electrophoretic mobility and zeta potential. 2
   b) Evaluate the charge enclosed by the surface of shear from electrokinetic measurements. 3
   c) Write down two difference between electroosmosis and streaming potential. 2
   d) Positive values of ΔS^{o}_{mic} primarily responsible for the spontaneous formation of micelles. Justify the statement. 3

3. a) Describe the three extreme situations that can be defined for the interaction of a protein with polar head group of lipids. 3
   b) Write a difference between gated ion channels and voltage gated ion channels. 2
   c) Write down the structure and function of the K^{+} channel of streptomyces lividans. 5

4. a) Show how the electrostatic potential (ψ) varies with distance (r) from reference ion. 2.5
   b) What is significance of activity coefficients? 2.5
   c) At high electrolytic concentrations how water removal theory of activity coefficient satisfy the experimental results? 2.5
   d) How triple ions forms from ion pairs? 2.5

5. a) The experimental heats of ion-solvent interactions of individual ionic species are neither meaningful non significant. – Explain the statement. 2.5
   b) Calculate the work term $W = W_D + W_C + W_{CF} + W_{SB}$ for tetrahedrally co-ordinated positive ion and negative ion. 2.5
   c) Do oppositely charged ions of equal radii have equal heats of solvation? 2.5
   d) Write the two significance of ion-quadrupole theory of solvation? 2.5

6. a) What are the factors which increase the degree of ion pair formation? 2
   b) What is primary solvation number? 2
   c) Write down the two differences between integral membrane proteins - lipid interaction with peripheral membrane proteins - lipid interaction. 2
   d) Show that critical coagulation concentration value varies inversely with the sixth power of the valence of the ions in solution. 4

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