July 2012

M. Sc. (Previous) Third Semester Examination

CHEMISTRY

Paper XIII (B) : Physical Chemistry : II (CHH 409)

Time : 3 Hours

Max. Marks : 50

Note : **Attempt all questions. All questions carry equal marks. The blind candidates will be given 60 minutes extra time.**

1. (a) Discuss in detail the activation complex theory of the reaction rate. In what way is this theory superior to collision rate theory ? 8½
   (b) Illustrate general features of the fast reactions. Describe flow method to study the fast reactions. 8½

OR

   (a) Illustrate the mechanism and kinetics of pyrolysis of acetaldehyde. 8½
   (b) Illustrate kinetic salt effect with suitable examples. 8½
   (c) Describe the mechanism and kinetics of photochemical reaction between H_2 and Br_2.

2. (a) Describe the Gibbs adsorption isotherm. 8½
   (b) What is CMC ? Describe various factors affecting the CMC of surfactants. 8½

OR

   Write explanatory notes on any two of the following :
   (a) Effect of vapour pressure of droplets (Kelvin equation)
   (b) Estimation of surface area (BET equation)
   (c) Thermodynamics of micellization.
   (d) Anionic active agent and their classification. 8½ × 2

3. (a) Present an illustrative account of liquid crystal polymers and their applications. 8½
   (b) Describe kinetics and mechanism of radical chain polymerization. 8½

OR

   (a) Describe the method for the determination of molecular weight of polymers by viscometry. 8½
   (b) Equal numbers of molecules with $M_1 = 10,000$ and $M_2 = 100,000$, are mixed. Calculate number average molecular mass and mass average molecular mass. 8½

4. (a) Explain the Onsager's reciprocity relations. 8
   (b) Write short notes on electric conduction.
   (c) Explain the electro kinetic phenomena. 8

OR

   (a) Describe principle of minimum entropy production.
   (b) Discuss the non equilibrium stationary states of thermodynamics.
   (c) Describe Forces and Fluxes. 8½

5. (a) Describe the theory of Polarography. What is half wave potential ? Write its significance.
   (b) Write notes on the following :
   (i) Ilkovic equation
   (ii) Ilkovic equation in context of Polarography. 8½

OR

   (a) Derive Volmer equation and also explain the Tafel plot.
   (b) Discuss Butler Volmer treatment and its extension for complexity of the process of hydrogen evolution. 8½