M. Sc. 4th Semester Examination,

May–2016

CHEMISTRY

Paper–CH-504 XIV

Physical Special-IV

Time allowed : 3 hours] *[Maximum marks : 80*

Note : *Attempt **five** questions in all, selecting **one** question from each section. **Question No. 1 is compulsory.***

1. (a) Define energy density of electricity storage.
   (b) What is maximum intrinsic efficiency?
   (c) Write about supporting electrolyte.
   (d) How can millicoulometry help in determination of no. of electrons involved in electrode reaction?
   (e) What is polydispersity index of a polymer sample?
   (f) Write criteria for polymer solubility.
   (g) What is meant by contour length of a micromolecule?
   (h) Comment on "radius of gyration". 2×8=16

Section–A

2. (a) Derive current-potential relation in an electrochemical energy converter. What is expected of an Ideal electrochemical energy converter? 10
   (b) Explain Amperometric titration. 6

3. (a) Explain Lead-Acid battery. 8

(b) Discuss the working of H_2-O_2 fuel cell and sodium-sulfur cell. 8

Section-B

4. (a) Explain the rigorous treatment of a slow electrode process. 8

(b) How can the formulae and stability constant of a complex be determined? 8

5. (a) Derive equation for cathodic-anodic wave. 6

(b) Write about Polarographic coulometry. 6

(c) Derive the expression for half wave potential and what are characteristic of half wave potential? 4

Section-C

6. (a) Describe the sedimentation method for determination of molecular weight of polymer. 12

(b) A polymer consists of 40% by mass of macromolecules of molecular mass 10,000 and 60% by weight of macromolecules of molecular mass 7000. Calculate the number average and mass average molecular mass of the polymer. 4

7. (a) Write a note on co-polymerization. 8

(b) Write a note on Anionic polymerization. 8

Section-D

8. (a) Draw structural formulas indicating the stereoregular chain configuration in :

(i) Atactic polystyrene

(ii) Isotactic polystyrene

(iii) Syndiotactic polystyrene. 9

(b) Define Ideal solution and show why polymer solution can never be ideal even at extreme dilution. 7

9. (a) Discuss Flory-Huggins theory of polymer solutions. State its limitations. 10

(b) Write notes on :

(i) Root mean square separation

(ii) Free energy of mixing. 6