Reg. No. ☐☐☐☐☐☐☐☐

ACH 503

Third Semester M.Sc. Degree Examination, December 2018
APPLIED CHEMISTRY
Polymers and Photochemistry
(CBCS : 2016-17 Syllabus)

Time : 3 Hours

Max. Marks : 70

Note : i) *Answer Part – **A** and **any four** questions from Part – **B**.*
ii) *Figures to the **right** indicate **marks**.*

PART – A

1. Answer **all** sub-divisions of the following : **(2×9=18)**

   a) Differentiate between addition and condensation polymers with two examples for each type.

   b) Calculate the average molecular weight of a polypropylene sample with average degree of polymerization of 1000.

   c) Write the structure of repeating units of the following polymers :

      i) polybutylene

      ii) poly(methyl methacrylate)

      iii) poly (ethylene terephthalate)

      iv) polyterafluroethylene.

   d) Amorphous polymers exhibit glass transition whereas crystalline polymers exhibit melting. Justify.

   e) Explain optical isomerism in polymers with PVC as an example.

   f) Give the reactions involved in the preparation of polycarbonates.

   g) Using Jablonski diagram, represent radiationless transitions and radiative transitions and explain the diagram.

   h) Explain the principle involved in flash photolysis technique.

   i) Mention the types of photoisomerization reactions with one example for each type.

P.T.O.

PART – B

Answer **any four** of the following : **(4×13=52)**

2. a) Explain the system of representing the structure and naming of polymers considering the following classes : **6**
   i) polyolefins
   ii) polyesters
   iii) polyamides.
   b) Outline the principle of GPC technique and explain its use in polymer characterization. **7**

3. a) Explain polydispersity in polymers. Calculate the polydispersity index of a sample containing equal number of molecules of molecular weights 10^5 and 10^6 gmol^{-1}. **6**
   b) Discuss the kinetics of cationic and anionic polymerization. **(4+3)**

4. a) What are stereoregular polymers ? How are they made ? Explain. **6**
   b) Write a note on conducting polymers considering the following aspects : structure, preparation and applications. **7**

5. a) Explain any six factors that influence the Tg and Tm of polymers with relevant data. **6**
   b) Outline the principle of the following techniques of polymer processing : **4**
   i) injection moulding and
   ii) melt spinning.
   c) Write a note on acrylic polymers. **3**

6. a) What is meant by actinometry ? Discuss the use of chemical actinometers in the study of photochemical reactions. **6**
   b) Write notes on the following photochemical reactions : **4**
   i) Photo Fries rearrangements
   ii) Norrish type I and II cleavage reactions.
   c) Certain reaction absorbs 4×10^{16} quanta of light/sec. On irradiation for 20 mins, 0.008 mole of reactant is found to have reacted. Find out the quantum yield. **3**

7. a) Discuss the kinetics of collissional quenching and obtain the Stern-Volmer equation. Explain the significance of the equation. **6**
   b) Define the Franck-Condon principle. Describe its implications in predicting the shapes of absorption and emission spectra. **7**

_____