Course Title: Polymer Chemistry

Semester: VIII
Course Code: CH-483
Credit Hours: 3-0
Pre-requisite: Nil

Course Objectives

1. Students will learn the fundamental principles of polymerization, synthesis methods and reaction mechanisms, thermodynamic and kinetic aspects of the polymerization, and physical and mechanical properties of polymers. Students will also know about the polymercharacterization techniques and various applications of polymers.

Course Contents

2. Introduction to Polymers: Natural and synthetic polymers, Nomenclature of polymers, Physical aspects of polymers with reference to their appplications, Concept of Molecular weight distribution of polymers, Various averages of molecular weight distribution, Size distribution. Synthesis of Polymers: Step-growth polymerization, Polymerchain growth, Ionic Polymerization, Kinetics of polymer chain growth, Co-polymerization and its kinetics, Emulsion polymerization, Characterization of polymers: Techniques implied for molecular weight determination (viscosity, osmometry, light scattering method, diffusion, sedimentation, optical rotation method). Polymer Chain Conformations & Configurations: Polymer chain statistics, Introduction to chain isomerism, Configurations, and conformations, Amorphous and crystalline state of polymers and their impact over mechanical and thermal behaviour. Rheology of polymers: Polymer viscoelasticity, Stressrelaxation, Mechanical models of polymer behavior, Time-temperature superposition. Polymer blending: Solution blending, Melt blending, Polymer Composites, Applications.

3. Text Book
   a. Ebewele, R. O., Polymer Science & Technology, CRC Press (2000).
   b. Malcolm P.S. Polymer Chemistry Oxford University Press (2005).
4. Recommended Books
   a. Sperling, L. H. *Introduction to Physical Polymer Science*, 4th ed., WileyInterscience, New York, USA, (2006).
   b. Odian, G., *Principles of Polymerization,* 4th ed., Wiley Interscience, (2004).
   c. Carraher Jr, C. E., *Carraher's, Polymer Chemistry,* 8th ed., CRC Press, Inc.,(2010).
   d. Ravve, A., *Principles of Polymer Chemistry,* 3rd ed., Springer, (2012).

Course Outcomes

5. Students will have knowledge of the fundamental principles of polymerization, synthesis methods and reaction mechanisms, thermodynamic and kinetic aspects of the polymerization, and physical and mechanical properties of polymers. Students will also

knowabout the polymer characterization techniques and various applications of polymers.