FIRST SEMESTER

1. POLYMER CHEMISTRY & PHYSICS (3-1-0) 4 Cr

Module I (10 hours)

Functionality, bi-functional and poly functional systems, classification and nomenclature of polymers, branching and crosslinking, glassy and crystalline states, thermodynamics of crystallization, kinetics of melting, crystal morphology, free volume, time - temp equivalency, distribution of molecular size, stoichiometric imbalance.

Module II (8 hours)

Molecular weight, molecular weight distribution, polydispersity, degree of polymerization, molecular weight determination, viscosity of polymers solutions, molecular weight dependence of viscosity and size of polymer molecules.

Module III (12 hours)

Types of polymerization, polymerization techniques, copolymers and stereo-regular polymers, reactivity ratios, copolymer composition and microstructure, Price - Alfrey equation, Flory - Huggins theory, polymer fractionation, Mark - Hownick equation, diffusion coefficient and friction factor.

Module IV (10 hours)

Elastic deformation, shear modulus and compliances, Maxwell model, Voigt model, dynamic viscoelasticity, molecular theory for viscoelasticity - Rouse model, Coefficient of viscosity, viscosity measurement, Power Law for pseudoplastic liquids, effect of shearing forces, segmental friction factor, Bueche theory, Reptation model.

Text Books

1. Gedde Ulf. W. Polymer Physics, Chapman & Hall London (1995)
2. Rodriguez, Ferdinand, Principles of Polymer Systems Mc. Craw – Hill, International Book Co. International Student Edn. 1985.

3. Cowie; JMG Polymers: Chemistry & Physics of Modern Materials, Nelson Thornes ltd. Chelterham, 2001
4. Hiemenz; Paul C. Polymer Chemistry- The Basic Concepts; Marcell & Deckker, Inc. New York (1984)

Reference Books

1. Principles of Polymer Chemistry, Paul J Flory
2. JL Fried, Polymer Science & Technology