

**Certificate Course**  
**in**  
**Polymer Technology**

**Unit I – Introduction to Polymers (6hrs)**

Brief history of macromolecular science, general characteristics of polymers in comparison with common organic compounds. Nomenclatures. Distinction between plastics, elastomers and fibres. Natural polymers- cellulose, silk, gums and resin.

**Unit II – Types of Polymers and Polymerisation (6hrs)**

Thermoplastics and thermosettings, functionality concept. Concept of cross linked polymers. Types of polymerization- addition, condensation, ionic, co-ordination. Addition – polymerisation – mechanism, initiation, propagation and termination processes, initiators, inhibitors. Mechanism of ionic polymerization.

**Unit III – Methods of Polymerisation (6hrs)**

Methods of polymerization-bulk, suspension, emulsion, solution necessity of copolymers and copolymerization, blocks and graft copolymers. Detailed study of the following thermosetting polymers : polyurethanes (a) epoxy resins- grades of epoxy resins, curing process and its importance with mechanism (b) poly carbonates, silicones.

**Unit IV – Elastomers (6hrs)**

Polyisoprene, polybutadiene, neoprene. Detailed study of the following thermoplastic polymers with respect to synthesis, chemistry, properties and applications. Vinyl polymers- polyvinyl acetate and its modifications like PVA, PVB and polyacetals. Polyamides - nylon -6, nylon-66 and other nylons. Poly ethers and poly esters, terephthalates.

**Unit V – Experimental Determination of Polymers: (6hrs)**

Molecular weight and molecular weight distribution – number , weight and viscosity average molecular weights of polymers, methods of determining molecular weight, practical significance of molecular weight distribution, size of polymers. Polymer processing- compression moulding,

casting, extrusion , fibre spinning, injection moulding, thermoforming, vulcanization of elastomers, polymer industry in India.

**References:**

1. Blmeyer, "Textbook of polymer science", John Wiley and Sons
2. D.D. Deshpande, "Physical chemistry of macromolecules", Vishal publications, New Delhi, 1985
3. V.R. Gowariker, N.V. Viswanathan and J.Sreethan, "Polymer Science", Wiley Eastern Ltd, 1986