SS823 **POLYMER CHEMISTRY** **3-1-0-4**

FUNDAMENTALS**:**Basics of polymers – polymer c,assifications based on occurrence, types, process, structure and end uses. Polymer microstructure – chemical and geometrical structure – ladder, star and telechelic polymers – interpenetrating networks – tacticity – crystalline and amorphous nature – crystallization and crystallizability – effect on properties – thermal transitions – TGA and DSC.

REACTION MECHANISMS: Reactive intermediates – carbocations, carbanions and free radicals. Nucleophilic aliphatic substitution -sN1, sN2. Electrophilic aliphatic and aromatic substitutions – orientation and reactivity in mono-substituted benzene rings, applications like nitration, sulphonation and halogenation.

POLYMERIZATION METHODS**:**Kinetics and mechanism of free radical, cationic, anionic and coordination polymerization – Ziegler Natta catalysts – monometallic mechanism – stereo regular polymerization – chain transfer reaction and constant – living polymers – alfin catalysts.

STEP GROWTH POLYMERIZATION AND COPOLYMERIZATION**:** Polycondensation polymerization – copolymerization – kinetics – copolymer equation – composition of copolymers by NMR – monomer reactivity ratios and their significance – polymerization reactions – metathetical, electrochemical, GTP and ring opening.

MOLECULAR WEIGHT, SOLUBILITY AND FRACTIONATION OF POLYMERS**:**Number, weight and viscosity average molecular weights – polydispersity – molecular weight distribution – determination of molecular weight by GPC and viscometry – polymer dissolution – thermodynamics of polymer dissolution – solubility parameter – fractionation of polymers – reactions of polymer molecules with specific groups like OH, CHO, CO, COOH, NH_2 – polymer crosslinking, cyclisation – polymer degradation – thermal, mechanical, photo and radiation.

TEXT BOOKS / REFERENCES:

1. F. W. Billmayer, Text Book of Polymer Science, 3rd edition, John Wiley and sons, New York, 2002.
2. M. S. Bhatnagar, A Textbook of Polymers (Chemistry and Technology of Polymers), Vol. I, II and III, 1st edition, S. Chand and Company, New Delhi, 2007.
3. R. J. Young, Introduction to Polymers, Chapman and Hall Limited, London, 1999.
4. George Odeon, Principles of Polymerization, 4th edition, McGraw Hill Book Company, New York, 2004.