4th Semester	RPL4C001	Polymer Structure & Properties Relationship	L-T-P 3-0-0	3 CREDITS

Module- I: (10 hours)

Structure of polymers -Linear, branched, cross linked, an polymers-Homochain and hetero atomic chain polymers-Copolymers-Linear and cyclicarrangement - Prediction of polymer properties, group contribution techniques, topological techniques- Volumetric properties-molar volume, density, Van der Waals volume- Coefficient of linear thermal expansion and volumetric thermal expansion– PressureVolume temperature(PVT) relationship.

Mechanical properties-Stress-strain properties of polymers-Effect of polymer structure on modulus of elasticity, tensile strength, flexural strength, impact strength, yield strength, fracture toughness – Crazing in glassy polymers-Ductile brittle transition .Effect of additives on mechanical properties of polymers-Creep, stress relaxation ,and fatigue.

Module- II (10 hours)

Thermodynamic and transition properties

Transition temperature in polymers, glasstransition(Tg), melt transition(Tm),relationship betweenTg and Tm - other transitions like ß-transitions, upper and lower glass transition temperatures - Prediction of Tg and Tm of polymers by group contributions. Calorimetric properties - Heatcapacity, specificheat, latentheat of crystallization and fusion, enthalpy and entropy- Calculation of heat capacities of polymers.

Module- III (08 hours) Electrical properties

Effect of polymer structure on dielectric constant, power factor, dissipation factor, and lossfactor effect of frequency of voltage and temperature on dielectric properties- Prediction of molarpolarization and effective dipolemoment. Effect of additives on electrical properties of polymers.

Module- IV (08 hours)
Optical properties

Optical properties- Effect of polymer structure on optical properties-clarity, transparency, haze, transmittance, reflectance, and gloss – Prediction of refractive indices of polymers by Group contributions.

Module- V (09 hours) Chemical Properties-

Cohesive energy, cohesive energy density, solubility parameter, determination of Solubility parameter of polymers – Prediction of solubility parameter- Effect of polymer structure on solubility in solvents and oils- Influence of structure in prediction of flameretardancy, waterrepellency - Chemical resistance of polymers – Polymer toxicity

Books:

- D.W. Van Krevelen And P.J. Hoftyzen, "Properties Of Polymer , 3rd Edition Elsevier Scientific, Publishing Company Amsterdam - Oxford - Newyork . 1990.
- J.E. Mark Ed.AIP, Physical Properties of Polymers Hand Book, Williston, Vt, 1996.