

## Plastic Mould Technology

### PAPER -I

#### (a) Fundamentals of Polymer Science

Classification of polymers, types of polymerization, degree of polymerization, glass transition temperature, morphology of polymers.

#### (b) Chemistry and Thermodynamics of Polymers

Monomers, monomer reactivity ratio and its significance, kinetics of polymerization, stereochemistry of polymers, block and graft co-polymers, laws of thermodynamics, open and close systems, thermodynamics of melting and polymers, thermodynamics of glass transition, thermodynamics of polymer solutions.

#### (c) Plastic Materials and Processing

Sources and manufacture of plastic raw materials, olefin polymers, vinyl chloride polymers, PMMA, polystyrene, cellulose polymers, epoxy plastics, polyurethane, silicones, extrusion, types of extruders, compression and transfer moulding and its applications, calendaring and milling.

#### (d) Polymerization Engineering

Industrial methods of polymerization, types of polymer production processes and reactors, utility of catalysts in polymerization.

**(e) Mould and Die Manufacturing**

Types and applications of mould making, electrical discharge machining (EDM), Electroforming for mould manufacturing, heat treatment processes, various types of furnaces, hobbing for mould making, polishing technology in mould making, advantages and disadvantages of automation.

**(f) Plastic Packaging Technology**

Selection criteria for packaging materials, conversion process for packaging materials, process for flexible/rigid packaging, testing of plastic packaging.

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## PAPER-II

### (a) Additives and Compounding

Evaluation and functions of additives, selection criteria, fillers, stabilizers, pigments, antioxidants, metal deactivators, thermal stabilizers, UV stabilizers, impact modifiers, colourants, fire retardants, coupling and blowing agents, plasticizers, applications of additives, estimation of additives.

### (b) Polymer Composites

Introduction to composite materials, theory of composite materials, compounding of thermo plastics, fiber reinforced plastic (FRP) processing.

### (c) Characterization of Polymeric Materials

Molecular characterization of polymers, thermal analysis techniques, x-ray diffractometry, principles of microscopy, UV-visible spectroscopy, FTIR spectroscopy, Gas chromatograph( GC), mass spectrometer, nuclear magnetic resonance spectroscopy (NMR)

### (d) Polymer degradation and plastic waste management

Thermal degradation, mechanical and ultrasonic degradation, photo degradation, degradation by high energy radiation, biodegradation, plastic waste generation and separation techniques, processing of plastic waste, recycling of thermoplastics and thermosets.

**(e) Rheology of Polymers**

Properties of fluids, Newtonian and Non-newtonian fluids, shear stress and strain, viscoelasticity, rheometers and viscometers, rheology of polymeric liquids, rheology in polymer processing operations.

**(f) Diverse Applications of Polymers**

Structural and semi structural applications, biomedical application, speciality polymers, conducting polymers, polymer nanomaterials.

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