

## POLYMERIC MATERIALS

### UNIT I: Commodity Plastics

Introduction to polymer materials – advantages – classification of polymer materials - plastics, rubbers, fibres, adhesives and paints. Sources, raw materials, methods of manufacturing, properties and applications of polyethylenes-HDPE, LDPE, LLDPE, UHMHDPE - polypropylene and copolymers-vinyl polymers and co-polymers - polystyrene and copolymers – acrylic plastics - cellulose polymers.

### UNIT II: Engineering Plastics

Sources, raw materials, methods of manufacturing, properties and applications of polyamides (PA-6, PA-66, PA-6, 10, PA-11 & PA 12)-ABS (Acrylonitrile Butadiene Styrene) - polycarbonate-polyacetal & copolymers-thermoplastic polyesters (PET & PBT) - polyphenylene oxide - thermoplastic polyurethane.

### UNIT III: High Performance Polymers

Sources, raw materials, Methods of manufacturing, properties and applications of polyphenylene sulphide - polyphenylene ether - polyetherether ketone (PEEK) - polysulfones – fluoro polymers (PTFE, PCTFE, PVdF)-polyimide and related polymers–aromatic poly amides and aromatic polyesters. Concept of nanofillers and polymer nanocomposites. High energy absorbing polymer. Super absorbent polymers-their synthesis, properties and applications.

### UNIT IV: Thermosetting Plastics & Bioplastics

Sources, raw materials, methods of manufacturing, properties and applications of phenol formaldehyde resins - urea formaldehyde and melamine formaldehyde resins – unsaturated polyester resins - epoxy resins – vinyl ester resins – polyurethanes and silicones.

Sources, raw materials, methods of manufacturing, properties and applications of bio based polymers – PLA (Poly Lactic Acid), PHA (Polyhydroxy Alkanoates), PBAT[poly(butylene adipate-co-terephthlate)] -bioplastics – bio-PE, bio-PP, bio-PET. Polymers for biomedical applications

#### Text Books:

1. J. A. Brydson, Plastics Materials, Butterworth Heinemann Oxford, 1999.
2. Charles A. Harper, Modern Plastics Hand Book, McGraw-Hill, New York, 1999.

#### References:

1. H. Domininghaus, Plastics for Engineers, Hanser Publishers, Munich - 1988.
2. K.J. Saunders, Organic Polymer chemistry, Chapman & Hall, 1988.
3. Feldman.D and Barbalata.A, Synthetic polymers, Chapman & Hall, 1996.