

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : IV

MANUFACTURING ENGINEERING

Subject Name: **PLASTIC MATERIALS**

Sr. No.	Course Contents
1.	Polymer Chemistry Introduction to polymer – Polymerization – Chain polymerization – Step polymerization. Polymerization techniques – Bulk polymerization – Solution polymerization – Suspension polymerization – Emulsion Polymerization. Molecular weight and its distribution.
2.	Commodity Plastics Sources and Manufacture of raw materials - Methods of manufacture of Polymer, General Properties and applications of Polyethylene - Polypropylene and their copolymers - Vinyl Polymers and Co-polymers - Polystyrene and Copolymers - Acrylic and copolymers - Cellulose Polymers.
3.	Engineering Plastics Sources and Manufacture of raw materials, Methods of Manufacture of Polymer, General Properties and applications of Acrylonitrile Butadiene Styrene - Polyamides (PA-6, PA-66, PA-6,10, PA-11 & 12) - Polycarbonates - Polyacetal & Copolymers - Thermoplastic Polyesters (PET & PBT) - Polyphenylene oxide - Polysulfones - Fluoro polymers (PVF, PVDF, PTFE, PCTFE) - Thermoplastic Polyurethane.
4.	Speciality Plastics Sources and Manufacture of raw materials, Methods of manufacture of Polymer, General properties and applications of Polyphenylene Sulphide - Polyphenylene ether - Polyetherether ketone - Polyimide and related polymers - Liquid Crystal Polymers - Conductive Polymers – Plastic alloys and blends.
5.	Thermosetting Plastics Sources and Manufacture of raw materials, Methods of manufacture of resin - Additives - Curing and cross linking agents - General properties and applications of Phenol Formaldehyde - Urea Formaldehyde - Melamine Formaldehyde - Unsaturated Polyesters - Epoxy resins - Polyurethane and Silicones.
6.	Bio-Degradable Plastics Overview of Recycling - Recycling of Polymers - Over view of plastics degradation - Natural Bio-degradable Polymers - Synthetic Bio-degradable Polymers - Water soluble Polymers.
7.	End Use Applications - Case Studies on Applications Applications in agriculture, building, electrical, electronics, industrial, packaging, medical, sports, transport, water management, telecommunication, toys, etc.

References:

1. Fred W. Billmeyer, JR., Text Book of Polymer Science, John Wiley & Sons, Singapore, 1994.
2. J. A. Brydson, Plastics Materials, Butterworth Heinemann Oxford, 1999.
3. Charles A. Harper, Modern Plastics Hand Book, McGraw-Hill, New York, 1999.
4. J. S. Anand, Applications of Plastics, CIPET, Chennai - 1997.
5. H. Domininghaus, Plastics for Engineers, Hanser Publishers, Munich - 1988.
6. Nabil Mustafa, Plastics Waste Management, Marcel Dekker Inc., New York, 1993.