GUJARAT TECHNOLOGICAL UNIVERSITY

PLASTIC ENGINEERING (24)

PLASTICS MATERIALS

SUBJECT CODE: 2712401

M.E. 1st SEMESTER

Type of course: Theoretical

Prerequisite: Polymer chemistry

Rationale: Manufacturing, properties and applications of individual polymer

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
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.	3	10
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.	12	20
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.	12	20
4	Speciality Plastics: Sources and Manufacture of raw materials, Methods of manufacture of Polymer, General properties and applications of Polyphenyline Sulphide - Polyphenylene ether - Polyetherether ketone - Polyimide and related polymers - Liquid Crystal Polymers - Conductive Polymers – Plastic alloys and blends.	10	20
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 –	7	20

	Unsaturated Polyesters - Epoxy resins - Polyurethane and Silicones.		

Reference Books:

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

Course Outcome:

After learning the course the students should be able to: identify the plastic materials, learn about manufacturing process, structure properties relationship, applications and reactions of individual plastic

List of Open Source Software/learning website:

http://www.nptel.ac.in/