



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Bachelor of Engineering**

**Subject Code: 3153619**

**Semester – V**

**Subject Name: Synthesis of Thermoplastic**

**Type of course:** Chemical Technology

**Prerequisite:** Student should know the basics of polymeric materials.

**Rationale:** The main objective of this subject is to provide the knowledge about the different types of thermoplastic materials and its synthesis processes.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

**Content:**

Sr. No.	Content	Total Hrs
1	<b>Polyethylene:</b> HDPE, LDPE, LLDPE, VLDPE, UHMWPE, chlorinated PE (CPE). <b>Polypropylene:</b> Isotactic, Syndio tactic and Atactic PP.	15
2	<b>Polystyrene:</b> Polystyrene, HIPS & copolymers of styrene (SAN & ABS). <b>Acrylics:</b> PMA, PMMA, PAN <b>Polyvinyl chloride</b>	15
3	<b>Aliphatic and Aromatic Polyamides:</b> Nylon 6, Nylon 66 and Kevlar and Nomex	10
4	<b>Poly esters:</b> Thermoplastic (PET & PBT) <b>Poly carbonate</b>	10
5	<b>Specialty plastics-</b> PES, PAES, PEEK, PEAK,	05
6	Polyimides (PI), Polybenzimidazole (PBI)	05

**Suggested Specification table with Marks (Theory): (For BE only)**



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Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	25	05	05	05	05

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Reference Books:

1. Brydson, J. A. Plastics materials; Butterworth-Heinemann; 7 edition, Iliffe; London, 1966
2. W. Mayo Smith, Manufacture of Plastics - Vol. I & II; Van Nostrand Reinhold; New York, 41 1964
3. Irvin.I. Rubin, Hand Book of Plastics Materials & Technology; John Wiley & Sons Inc.; New York, 1990.
4. Handbook of Thermoplastic, Edited by Olagoke Olabisi, Kolapo Adewale, CRC Press, Taylor & Francis Group, Second Edition, 2016.
5. Handbook of Engineering and Speciality Thermoplastics by Sabu Thomas and Visakh P.M., Wiley, Scrivener, volume 3.
6. Text book of Polymer Science, Billmeyers, John Wiley & Sons 1984.
7. Encyclopedia of Polymer Science & Technology, John Wiley & Sons, Inc 1965
8. Encyclopedia of Polymer Science & Engineering, John Wiley & Sons, Inc 1988.
9. Introduction to Polymer Science & Technology, H.S.Kaufman & J.J.Falcetta, Wiley – Interscience Publication, 1977

### Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	To recognize the knowledge about the Chemistry, manufacturing process, properties and applications of polyolefin's.	30
CO-2	To identify the knowledge of Chemistry, manufacturing process, properties and applications of styrene's and acrylics.	28
CO-3	To apply this knowledge for the Chemistry, manufacturing process, properties and applications of polyamides with real world situation.	27
CO-4	To analyze the knowledge of Chemistry, manufacturing process, properties and applications polyester material.	5
CO-5	To formulate speciality polymeric materials.	5
CO-6	To correlate between theoretical and practical concept used in industry.	5



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## **List of Experiments:**

1. Preparation of PMMA from its monomer.
2. Determination of density of polymeric sample using specific gravity bottle.
3. To identify the given polymeric sample.
4. Synthesis of Polystyrene.
5. To determine the amine value of given sample.
6. To determine the acid value of given sample.
7. To determine the iodine value of given sample.
8. To determine the epoxy equivalent weight of given sample.
9. To determine the viscosity of given sample

## **List of Open Source Software/learning website:**

- 1) [www.iri.net.in](http://www.iri.net.in)
- 2) [www.ipiindia.org](http://www.ipiindia.org)
- 3) Delnet