GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Under Graduate

Branch: Plastics Engineering

Subject Code: BE04053041

Subject Name: Engineering & Commodity Plastics: Properties & Manufacturing

w. e. f. Academic Year:	2025-26
Semester:	4
Category of the Course:	PCC-07

Prerequisite:	• Basic knowledge of polymer science. • Understanding of polymer structure and classification. • Familiarity with general polymer processing methods.
Rationale:	Engineering and commodity plastics represent the backbone of the polymer industry. Knowledge of their properties, synthesis, compounding, grades, applications, and manufacturing methods is essential for material selection, product design, and processing. This course provides students with a comprehensive understanding of how major plastics are produced, their structure, behavior, and engineering performance, enabling them to make informed decisions in real industrial scenarios.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	List the basic characteristics of thermoplastic moulding materials.
02	Identify and write the structure of thermoplastic materials.
03	Understand and explain the monomer preparation of thermoplastic resins.
04	Understand and explain the manufacturing process of thermoplastic materials.
05	Identify the properties and applications of different thermoplastic materials and apply this knowledge in analysing the appropriate parameters for processing them.

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL*	TH		ESE (E)	PA (M)	PA (I)	PBL (I)	ESE (V)	
45	00	15	30	90	03	70	30	10	10	30	150

Where L = Lecture, T = Tutorial, P = Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

*** Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.**

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction:** Basic characteristics of Thermoplastic Molding materials. -Basic characteristics of Thermoplastic materials. -Structures of various commodity and engineering thermoplastic materials.	5	10
2.	**Monomer Preparation:** Naptha cracking, Styrene , Vinyl chloride , Bisphenol-A, Methyl methacrylate, Ethylene glycol, Terephthalic acid, 1,4-Butanediol, Dimethyl terephthalate.	6	20
3.	**Manufacturing of Commodity Plastic Materials like:** PE (HDPE, LDPE & LLDPE), PP, PVC, PS, PMMA. **Properties, Applications and Processing Characteristics of:** HDPE, LDPE, LLDPE, PP, PVC, PS, PMMA, PAN, EVA, EVOH.	17	35
4.	**Manufacturing of Engineering Plastic Materials like:** Nylon 6 & Nylon 66, Polycarbonate, Polyacetal, PET, PBT. **Properties, Applications and Processing Characteristics of:** ABS, HIPS, Nylons, Polycarbonates, Polyacetal, PET, PBT.	17	35
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	25	10	10	5	5

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1) Plastic Materials by J. A. Brydson.
2) Plastics: Materials and Processing by A. Brent Strong.
3) Shreve's Chemical Process Industries by George Austin.
4) Plastics Materials & Processes by Sidney H. Goodman.

(b) Open source software and website:

1) https://nptel.ac.in/

Suggested Course Practical List:

Practical based on above topics.

- **List of suggested activities for Problem Based Learning:**

S. No.	Activity	No. of Hours	Total Hours Claimed	Evaluation Criteria
1	Industry / Research laboratory visit	Visit = 5 h, Report preparation = 5 h	10	Based on report submitted
2	Poster / chart / power point preparation on technical topics	Duration = 10 h	10	Based on Poster / Chart / PPT preparation and presentation skills
3	Assignment writing	5 assignments of 2 h each	10	Based on the assignment submitted
4	Technical Video based learning related to the subject	Duration of video = 5 h Report preparation = 5 h	10	Report / presentation based on the video learning outcomes
5	Group Discussion on emerging / trending technical topics based on subject	Duration = 1 h each	-	Based on performance in group discussion, technical depth, knowledge, etc.
6	Attending Expert Lecture/Webinar/Seminar	Duration = 1 h each	-	Based on Short report
7	Self-learning on-line course	Minimum duration of the course should be 10 h	10	Examination based assessment at the end of course. Based on the certificate produced
8	Exhibition / Conference / Trade Fair / Industrial exposure for 2-3 days	Visit = 15 h, Report preparation = 5 h	20	Based on learning, observations and short report
9	Working model on technical topics	Working = 15 h	15	Based on design, understanding & presentation of the model
10	Non-working model on technical topics	Non-working = 5 h	5	Based on design, understanding & presentation of the model
11	Videos on Industrial safety aspects based on subject	Duration of video = 5 h Report preparation = 5 h	10	Based on report submitted

- Above activities are suggestive, faculty can choose any of these activities and cover up the rest of the 30 Self Learning Hours.
- The number of hours is suggestive.
- Faculty can sub-divide the number of hours based on the activity. However, the total number of hours is fixed.

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