



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: UG

Branch: Plastic Technology

Subject Code : BE04023021

Course / Subject Name : Plastic Testing

w. e. f. Academic Year:	2024-25
Semester:	4
Category of the Course:	PCC-04

Prerequisite:	Students should have a fundamental understanding of: <ul style="list-style-type: none">• Basic polymer chemistry and the classification of plastics (thermoplastics, thermosets).• Awareness of standard units and measurements used in material testing.• Basic laboratory safety procedures.• Introductory physics concepts related to force, stress, and strain
Rationale:	This course is designed to equip students with the skills and knowledge required to evaluate the properties and performance of plastic materials. Understanding testing techniques, standards, and specifications is critical for quality control and product development in the plastic industry. This course provides hands-on experience in specimen preparation, identification, and various analytical and mechanical tests, enabling students to assess material suitability for specific applications and ensure compliance with industry standards.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand the importance of plastic testing, test standards, specimen preparation, and conditioning.
02	Understand and apply knowledge of identification techniques.
03	Explain analytical tests, flow characteristics and mechanical properties of plastic materials.
04	Perform standard tests to determine the properties of plastic materials.

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
L	T	P	PBL*	TH		Theory		Tutorial / Practical			
						ESE (E)	PA (M)	PA (I)	PBL (I)	ESE (V)	
45	00	30	45	120	04	70	30	20	30	50	200



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

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

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	INTRODUCTION: Basic concept, Purposes of testing, specification and standards, purpose of specifications, test conditioning, precautions required in plastic testing, quality control, list of applicable standards.	3	5
2.	SPECIMEN PREPARATION TECHNIQUE: Introduction, specimen preparation from thermoplastic- Specimen preparation from rigid & soft plastic sheet, specimen preparation from films, specimen preparation from thermo-set materials.	4	5
3.	IDENTIFICATION ANALYSIS OF PLASTICS MATERIALS: Plastic Identification chart, Identification of plastics materials- (i) thermoplastic (ii) thermosetting plastics. Miscellaneous observations - Visual, touch, copper wire test, Burning test, melting point, Solvents and non solvents for plastics.	7	15
4.	ANALYTICAL TESTS: Specific gravity, Density, Density-by-Density Gradient Technique, Bulk Density, Water absorption.	7	15
5.	FLOW PROPERTIES: Introduction to Flow Properties, Melt Flow Index, Spiral Flow, Cup Flow.	6	15
6.	MECHANICAL PROPERTIES: Introduction to stress-strain curves, Tensile properties, Flexural properties, Impact properties, Compressive properties, Burst Strength, Shear Strength, Hardness, Tear Strength, Abrasion, Creep and Stress relaxation	18	45
	Total	45	100



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Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level	C Level
10	25	20	10	5	0

Suggested Specification Table with Marks (Theory):

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:

- (b) 1. Hand Book of Plastic Testing Technology- Vishu Shah
- (c) 2. Identification and testing of plastics- A.S Athalye
- (d) 3. Simple methods for identification of plastics- Dietrich Braun (Hanser publications)
- (e) 4. Testing and evaluation of Plastics- A.B. Mathur & I.S Bhardwaj

(b) Open source software and website:

1. <https://pslc.ws/>
2. <https://nptel.ac.in>

Suggested Course Practical List: If any

List of suggested activities for Problem Based Learning:

Sr. No.	Activity	No. of hours	Total hours claimed	Evaluation Criteria
1	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h	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 2h each.	10	Based on the assignment submitted.
4	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h	10	Report /presentation based on the video learning outcomes.



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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- 1hr each	--	Based on Short report
7	Self-learning on-line course	Minimum duration of the course should be 10h.	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 hr Report preparation- 5 hr	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 = 5h Report preparation = 5h	10	Based on report submitted

Above activities are suggestive, faculty can choose any of these activities and cover up the rest of the 45 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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