GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Plastics Engineering

Subject Code: DI04023061

Subject Name: Plastic Products Testing

w. e. f. Academic Year:	2025-26
Semester:	4th
Category of the Course:	Professional Elective - I

Prerequisite:	NA
Rationale:	Standard material test procedure and test data as per standard is of course, not much different from product performance test result. It is the product which has to perform and the surest way to test for product performance is to forget standard test pieces and test the actual product. Tests on products are standardized in product specifications, although perhaps not as often as would be desired, but a greater many more product tests are invented and used on an ad-hoc basis. Not all but some tests are performed directly for testing products for quality assurance hence the knowledge of product testing is essential for plastics engineers.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand concept of product testing and quality management.	R,U
02	Perform various testing of all types of products.	R,U,A
03	Identify defects in the products.	R,U,A
04	Observe and perform failure analysis.	R,U,A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit – I **Introduction**	1.1 Need for product testing. 1.2 Concept of product testing and quality control. 1.3 Co-relation of product testing and service conditions of product. 1.4 Applications of product testing in R&D , field test. 1.5 Legal aspects of plastics product liability and failure . 1.6 Standards such as IS, ASTM, & ISO 1.7 Presentation of test report.	06	14 % (10 Marks)
Unit – II **Testing Of Extruded Products**	2.1 Testing as per service requirements for the following extruded products. - Tube/Rod and Pipe testing. - Film testing. - multilayer / profile - Cable testing. 2.2 Monolayer and multilayer fiber and sheet testing 2.3 Profile testing 2.4 Tap and monofilament testing 2.5 Wire /Cable testing. 2.6 Coated and laminated product testing.	10	23 % (16 Marks)
Unit –III **Testing Of Injection Molded Products**	3.1 House hold products – table , chair, bucket, telephone, housing of appliances- T.V. , Washing Machine, A.C.. 3.2 Medical products - syringe, Iv parts, Cathedrals parts and needles. 3.3 Furniture products 3.4 I Industrial products. – Refrigerator parts, Computer parts, Textile parts (Bobbins), Valves and pumps parts. Automobile dashboards, Mudguards, Gears	10	23 % (16 Marks)
Unit – IV **Testing Of Blow Molded Products**	4.1 Bottles. 4.2 Container. 4.3	04	8 % (6 Marks)
Unit – V **Miscellaneous Product Testing**	5.1 Reinforced product. 5.2 Thermoformed products. 5.3 Cast products. 5.4 Rotational products. 5.5 Foam products.	08	16 % (12 Marks)

	5.6 Compression molded products. 5.7 Encapsulated products. 5.8 Composite products.		
Unit – VI **Failure Analysis**	6.1 Introduction 6.2 Failures related to design and material selection with a case study. 6.3 Failures related to processing with a case study. 6.4 Failures related to service conditions with a case study. 6.5 Failure analysis and test procedures. 6.6 Quality control and preventive failure analysis.	**07**	16 % (10 Marks)
	Total	**45**	**100 %** (70 Marks)

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
32	**48**	**20**	---------	_____	_____

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:

Sr. No.	**Title of Book**	**Author**	**Publication with place, year and ISBN**
1	Hand Book of Plastics Testing Technology	Vishu Shah	Wiley Inter-science publication
2	Hand Book of Polymer testing	R.P.Brown (roger brown)	Marcel- Dekker Inc.
3	Statistical Quality Control	O.P. Khanna	Khanna publishers
4	Hand book of plastics & elastomers	C.A.Harper	Wiley publication
5	Plastics processing data hand book	D.V.Rosato	Springer Berlin Heidelberg
6	Plastic failure guide	Myer Ezrin	Hanser Publication

(b) Open-source software and website:

1. http://www.ipolytech.com/
2. http://www.ulttc.com/
3. www.intertek.com
4. http://www.labtesting.com/
5. www.nslanalytical.com/testing/polymer
6. http://www.exova.com/capabilities/polymer-testing/
7. http://www.chemir.com/plastic-polymer-testing.html

Suggested Practical List:

Sr. No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs Required
1	Determination of Tensile Strength of a Plastic Product	4
2	Measurement of Flexural Strength of a Plastic Specimen	2
3	Determination of Impact Strength using Izod Impact Test	2
4	Measurement of Hardness of Plastic using Rockwell/Shore Hardness Tester	4
5	Determination of Heat Deflection Temperature (HDT) of a Plastic Material	4
6	Measurement of Vicat Softening Temperature (VST) of a Plastic Sample	4
7	Determination of Dielectric Strength of an Insulating Plastic	2
8	Measurement of Environmental Stress Cracking Resistance (ESCR)	4
9	Determination of Melt Flow Index (MFI) of a Plastic Material	2
10	Determination of Oxygen Index and Flammability of a Plastic Sample	2
	Total	**30**

Suggested Activities for Students:

1. Draw tensile test specimen and collect tensile specimen sample
2. List MFI for various plastic materials and decide their processing grade
3. Draw and collect izod impact strength test specimen sample and give importance of impact strength
4. Give oxygen index of various material and correlate it with their flammability

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