

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**COURSE CURRICULUM****DESIGNING OF PLASTIC PRODUCT****(Code: 3372304)**

Diploma Programme in which this course is offered	Semester in which offered
Plastic Engineering	7 th Semester

1. RATIONALE

Products made from plastics are used in a variety of applications and in many areas like electrical and electronics, medical, domestic appliances, engineering applications etc. This course will help the students to learn how to design a plastic product by understanding various design considerations, optimum material selection and process selection. It will also help to learn plastic product design with specialized properties and also understand the entire procedure for designing various plastic products by case study.

2. COMPETENCIES

The course should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Design various plastic products as per the requirement and area of application.
- Acquire the ability to judge the best material and process, suitable for manufacturing a plastic product.

3. COURSE OBJECTIVES:

At the end of the course students will be able to:

1. Learn the factors affecting product design.
2. Understand general product design considerations.
3. Select optimum material suitable for manufacturing the plastic product.
4. Select optimum process suitable for manufacturing the plastic product.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit
ESE - End Semester Examination; PA - Progressive Assessment.

5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT 1: INTRODUCTION TO PRODUCT DESIGN	1.a Understand the concept of product design 1.b Know the factors affecting product design 1.c Know steps in product design	1. Introduction to product design 2. Product design flow chart from concept to fabrication 3. Product Design steps 4. Factors affecting product design
UNIT 2: PRODUCT DESIGN FEATURES	2.a Know preliminary design considerations 2.b Understand general design considerations	1. Check list for product design 2. Preliminary design considerations 2.1 Designing end-use requirements 2.2 Drafting the preliminary design 2.3 Prototyping the design 2.4 Testing the design 2.5 Taking a second look 2.6 Writing meaningful specifications 2.7 Setting up production 2.8 Controlling the quality 3. General design considerations related to- 3.1 Wall thickness 3.2 Fillets and Radii 3.3 Ribs and bosses 3.4 Undercuts 3.5 Taper or draft 3.6 Holes 3.7 External and internal threads 3.8 Inserts 3.9 Parting lines 3.10 Surface treatments 3.11 Molded lettering

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT 3: MATERIAL SELECTION CONSIDERATIONS	3.a Understand the concept of material selection 3.b Know the short term and long term properties of plastic materials 3.c Judge the optimum material suitable for manufacturing a product	1. Concept of material selection 1.1 Various plastic materials used for making a product 1.2 Short term and long term properties of plastic materials 1.3 Comparison of properties for various plastic materials and optimization of material
UNIT 4: PROCESS SELECTION	4.a Understand the concept of process selection 4.b Judge the optimum process suitable for manufacturing a product	1. Concept of process selection 1.1 Different plastic processing methods and its features with respect to product design 1.2 Comparison and optimization of process with respect to product shape, size, quantity, quality, cost etc.
UNIT 5: PLASTIC PRODUCT DESIGN- CASE STUDY	5.a Know the procedures for designing various plastic products used in variety of areas	1. Design procedure for plastic products like- 1.1 Pipe – for agricultural and chemical applications 1.2 Disposable cups 1.3 Water Tank 1.4 Products with molded hinges 1.5 O-rings and seals 1.6 Gear 1.7 Bearing 1.8 Contact Lens 1.9 Camera lens 1.10 Wind Mill blade 1.11 Chemical Tank/Chemical reactor 1.12 Food package.....etc

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Product Design	04	04	02	01	07

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
II	Product Design Features	14	10	08	03	21
III	Material Selection Considerations	08	08	04	02	14
IV	Process Selection	08	08	04	02	14
V	Plastic Product Design-Case Study	08	08	04	02	14
Total		42	38	22	10	70

7. SUGGESTED LIST OF EXERCISES/PRACTICALS

S. No.	Unit Number	Description of Laboratory Experiment	Hours
1	I	Study and list the factors affecting product design	02
2		Study and list the steps in product design	02
3		Study product design flow chart from concept to fabrication	02
4	II	Prepare a checklist for product design	04
5		Study general design considerations related to wall thickness, fillets and radii	04
6		Study general design considerations related to ribs and bosses, undercuts and holes	04
7	III	Tabulate and compare properties of various plastic materials	04
8	IV	Tabulate various types of plastic processing methods with respect to product design	04
9	V	Study the procedure for designing a plastic product- Pipe	02

10		Study the procedure for designing a plastic product- Disposable cups	02
11		Study the procedure for designing a plastic product- Overhead water storage tank	02
12		Study the procedure for designing a plastic product- Chemical Tank	02
13		Study the procedure for designing a plastic product- Contact Lens	02
14		Study the procedure for designing a plastic product- Gears	02
		Total	40

8. SUGGESTED LEARNING RESOURCES

(A) List of Books:

SR. NO.	TITLE OF BOOK	AUTHORS	PUBLICATION
1	Product design with plastics	J.B.Dym	Industrial Press Inc. , New York
2	Plastics Product Design Hand Book	Edward Miller	Marcel Dekker , Inc., New York
3	Plastics Engineered Product Design	Dominick V Rosato and Donald V Rosato	Elsevier Advanced Technology, U.K
4	Plasticss End Use Applications	Donald V Rosato	Springer (India) Private limited
5	Plastic Materials & Processes	S.S. Schwartz and S. H. Goodman	Van Nostrand Reinhold
6	Hand Book of Plastics a& Elastomers	C. A.Harper	
7	Plastics Product Design Engg. Hand Book	Levy & Dubois	Van Nostrand Reinhold
8	Plastics Product Design	R.D.Back	

(B) List of Software/Learning Websites:

1. <http://www.madehow.com/Volume-2/Contact-Lens.html>
2. <http://www.designboom.com/history/monobloc.html>
3. http://en.wikipedia.org/wiki/Water_tank
4. <http://plastics.dupont.com/plastics/pdflit/americas/general/H76838.pdf>

9. SUGGESTED LIST OF STUDENT ACTIVITIES

1. Students will collect different shaped plastic products and plastic materials made from different materials and analyze the type of processing method and material required for that product.
2. Students will collect information related to product design through internet.
3. Students will visit nearby processing industry.

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics:

1. **Prof. A.S.Amin, LPE, Government Polytechnic, Ahmedabad.**
2. **Prof. J.R.Desai, LPE, Government Polytechnic, Valsad.**
3. **Smt. S.R.Shah, LPE, Government Polytechnic, Valsad.**
4. **Prof. B.I.Oza, LPE, Government Polytechnic, Ahmedabad.**
5. **Prof. N.C.Suvagya, LPE, Government Polytechnic, Chhotaudepur.**

Coordinator and Faculty Members from NITTTR Bhopal

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