GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172315
Semester – VII
Subject Name: Blow, Compression and Thermoforming Mold Design

Type of course: Professional Elective Course

Prerequisite: Fundamentals of mold design, Plastic mold and die design.

Rationale: At the end of the course, the student will be able to design blow, compression and thermoforming molds for different plastic products. Students will understand the selection criteria for mold materials and design parameters for mold design.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
	Blow Mold Design	
1.	**Blow mold design considerations** Basic Design Considerations: Bottle and Container Design, Structural Design**,** Design Details, Selection of Materials, Characteristics For Blow Moulding, HDPE, Acrylonitrile Butadiene Styrene (ABS),Polycarbonate (PC), Polypropylene, Polyphenylene Oxide	**06**
2.	**Blow Mould design** Main Characteristics of the Mould, Basic Design and Construction Considerations, Mould Materials,Selection of Materials, Characteristics of Mould Materials,Cut Mould versus Cast Moulds,Cast Aluminium Moulds,Cut Moulds,Cast and Cut Moulds,4 Importance of Fast Mould Cooling, Fast Heat Transfer Material Considerations, Manifolds, Control of Flash, Rate of Cooling, Remedies for Flash The Pinch Off, High Quality, Undamaged Mould Cavity Finish, Mould Cavity Finish, Effects of Air and Moisture Trapped in the Mould, Polished Moulds, Moisture, Injection of the Blowing Air, Blowing Devices, Ejection of the Piece from the Mould, Ejection Methods, Manual Ejection, Automatic Ejection, Hydraulic Systems, Pre-Pinch Bars, Top Pinch, Bottom Pinch, Bottle Moulds, Neck Ring and Blow Pin Design, Mould Maintenance Program	**11**

	Compression Mold Design	
3.	**Introduction to Compression Mold Design** Basic Design Considerations, Mould Materials,Selection of Materials, Characteristics of Mould Materials Elements of hand compression mold , Assembly and detail drawing of hand compression mold, Types of Compression mold like Flash mold, positive mold, Semi positive mold.	**10**
	Thermoforming Mold Design	
4	I**ntroduction to Thermoforming Mould Design** Basic Design Considerations, Thermoforming Molds **Prototype Molds:** Wood, Fiberboard, Plaster, Plastic, White Metal, Nickel, **Production Molds:** Aluminum, Steel, Other Metals **Mold Coolant Channels:** Mold Channel Flow,Expansion, Contraction, Sharp-Edged Orifice Vent Holes, Surface Treatments, **Plug Design Considerations:** Plug Materials, Wood Plugs, Plastic Plugs, Metal Plugs, Plug Design Concepts, Sheet Clamping Other Aspects of Mold Design: Undercuts, Encapsulation, Moving Elements, Stripper Plates/Bars, Mold Releases, Chamfers and Radii, Dams and Double Steps Efficient use of sheets	**15**

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

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**25**	**15**	**05**	**03**	**02**

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. Practical guide to Blow molding by Norman C. lee
2. Technology of Thermoforming by James L.Throne
3. Thermosetting Plastics: Moulding Materials and Processes by John F. Monk
4. Plastics Mold Design by Carrol C. Sachs, Eugene H. Snyder

5. Plastics Products design handbook Part A & B by Edward Miller

Course Outcomes:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

Sr. No.	CO statement	Marks % weightage
CO-1	Explain mold design consideration.	20
CO-2	Identify appropriate mold material used for mold construction.	15
CO-3	Draw basic blow, compression and Thermoforming mold.	20
CO-4	Analyze important design parameters for mold design.	20
CO-5	Design specific mold as per product dimensions.	25

List of Experiments: - As per the syllabus topics

Major Equipment:

List of Open Source Software/learning website:

1. nptel.ac.in

2. bpf.co.uk