

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Plastic Technology (23)
SUBJECT NAME: Plastics Mold and Die Design
SUBJECT CODE: 2172302

B.E. 7TH SEMESTER

Type of course: CORE

Prerequisite: Basic Plastic Processing, IMT, PET

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Learning Objectives: To learn basics of mold and Die Design.

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction Basics , Principles of mould design, selection of materials for moulds and dies, method of fabrication, economical consideration	04	8%
2	Material Of Molds & Dies Steels, various types, selection criteria, ferrous & non ferrous material, alloys, heat treatment processes. Material selection for various parts of mould like cavity, core, back plates, inserts, and guide pins, guide bushes, ejector elements, etc. Material selection for various parts of Dies like approach section , land ,etc.	06	10%
3	Fabrication Techniques Lathe, milling, grinding, drilling, shaping, planning, spark erosion, honing, electroforming, EDM, CNC, etc.	06	10%

4	<p>Injection Mold Design</p> <p>Introduction: Two plates, three plate, runnerless molds, parting lines, split molds, molds for threaded components.</p> <p>Feed system: Designs of various types of runners, gates, balancing of runners, runner efficiency calculations, requirements of runners and gates, positioning of gates, mold filling patterns, etc.</p> <p>Ejection system: Pin ejection, stripper plates, valve ejection, blade ejection, air ejection, etc.</p> <p>Cooling & heating arrangements: Design of cooling channels, layouts, etc.</p> <p>Numericals on shot capacity calculations, plasticizing capacity, no. of impressions, to be done. Actual sheet work showing design of hand moulds to be done. Calculations on gate, runners, etc.</p>	10	40%
5	<p>Design of Extrusion Dies :</p> <p>Parts of the Die, its functions, design formulae for design of approach section, land, etc. Rheological considerations, Design of straight through dies with calculations.</p>	08	10%
6	<p>Design Of Compression Moulds:</p> <p>Design of positive, semi positive and flash moulds in detail along with examples, sheet work, performs, etc.</p>	05	6%
7	<p>Design of Transfer moulds:</p> <p>Pot type, plunger type, mould design, design of Pot, feed systems, etc.</p>	04	5%
8	<p>Practical Design of Moulds, Dies : Sheet work to be highlighted , third angle method of projection , bill of materials, etc.</p>	08	11%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks							
Remembrance R Level	Understanding Level	U	Application Level	A	Analyze N Level	Evaluate Level	E
10	15		20		15	10	

Legends: R: Remembrance; U = Understanding; A = Application 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

Text Book:

1. Injection Mould Design by RGW PYE

Reference Books:

1. Injection mould design fundamentals by Denton and Glanvill
2. Extrusion Dies Walter Michael
3. Dies for Plastic Extrusion: M. V. Joshi

Course Outcome:

After learning the course the students should be able to:

1. Design and Draw Hand Injection moulds
2. Calculate feed system dimensions
3. Design Extrusion Dies

List of Experiments:

1. Design a hand Injection mould for the product given in figure.
2. Draw the above designed mould in a half imperial sheet.
3. Design and Draw a Hand Injection 2 impression mould for the given product. Show feed System calculations.
4. Draw a detailed sheet for sheet no.1
5. Show calculations for shot capacity for data given. [Based on shot capacity calculations for New material, calculations for required machine shot capacity, etc]
6. For the products given, suggest and design suitable feed system.
7. For the extruded product, design suitable die
8. For the mould parts shown in figure, suggest step by step machining.
9. Design and Draw a suitable compression for the product suggested.
10. Design and Draw a Pot type transfer mould.

Design based Problems (DP)/Open Ended Problem:

1. For the product given, design, draw and fabricate a suitable hand injection mould.
2. For the product given, design, draw and fabricate a compression mould.

Major Equipment: List of Open Source Software/learning website:

1. www.wikipedia.org
2. www.sciencedirect.com
3. www.mit.edu

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire

syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.