

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**PLASTIC TECHNOLOGY (23)  
MOLD MANUFACTURING TECHNOLOGY  
SUBJECT CODE: 2182310  
B.E. 8<sup>TH</sup> SEMESTER**

**Type of course:** ELECTIVE

**Prerequisite:** PMDD-I,IMT

**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	3	6	70	20	10	20	10	20	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
<b>1</b>	Introduction : Mould making techniques, factors to be considered, machines for mould making	<b>05</b>	10%
<b>2</b>	Material for Moulds: Selection of steels – Properties of steels – common steels used for moulds – strength of materials, calculation of wall thickness for cavity – Insert size – Life of mould Non-ferrous metals for mould construction: Application – Zinc base alloys – Aluminium alloys – Beryllium copper Non-metallic materials for mould construction: Advantages and its applications – epoxies - polyester – silicon	<b>09</b>	20%
<b>3</b>	Surface Treatment of Mould Materials: Introduction – Heat treatment process – case hardening – through hardening – nitriding – tips on successful heat treatment – vacuum hardening – cryogenic heat treatment – Hard chrome plating – Nickel plating – chemical etching – Mould Polishing techniques	<b>09</b>	20%
<b>4</b>	Mould Making Techniques: Pantograph engraving – Hydro copying – Jig boring – CNC machines – CNC Lathe – CNC Milling – CNC EDM – <b>CNC programming- Programming codes like G Code, M codes etc.</b> Advantages and its Applications – Assembly of moulds – Rapid prototyping <b>techniques.</b>	<b>09</b>	20%
<b>5</b>	Inspection and Quality Control of Moulds: Introduction to Tool Room measuring instruments – Vernier – Micrometer – Height Gauge – Slip	10	15%

	Gauge – Dial Gauge – Measuring tapers and angles – CMM		
6	Mould Estimation, Repair and Protection : Procedure for estimating mould cost – General outline – Cost calculation – Basic moulds – Cavity – Basic functional components – Special functions etc. Introduction – Mould Repair and maintenance – scheduling mould maintenance – advantages – storage – corrosion protection – wear and lubrication – special consideration.	10	15%

**Suggested Specification table with Marks (Theory):**

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
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**

**Reference Books:**

1. Injection Mould Design by RGW Pye
2. Workshop Technology by Hajra and Chaudhary
3. Cyril Donaldson George H. Lecain V C Goold, Tool Design, TATA McGraw-Hill, 1998.
4. Richard R. Kibbe John E. Neele, Roland O Meyer, Warran T. White, Machine Tool Practices, Prentice Hall of India Pvt. Ltd., 1999.
5. Irwin Rubin, Injection Moulded Theory and Practice, Wisely Interscience Publication,

**Course Outcome:**

1. Design mold manufacturing steps along with material selection, surface treatment
2. Understand inspection, quality control and protection of molds.
3. Understand basics of CNC machine

**After learning the course the students should be able to:**

1. Decide machines required to manufacture mould parts.
2. Work with basic machines like Lathe, Milling, shaping, Drilling, etc.
3. Be conversant with working of CNC machines.

**List of Experiments:**

1. To study various criteria for selection of Steels for mould manufacture.
2. To study the Non-ferrous metals for mould construction- Zinc base aluminium and Beryllium copper
3. 3 Heat treatment process for mold materials.
4. 4 Hard chrome plating and Nickel plating for surface treatment of mold materials.

5. CNC Lathe process, advantages and its applications
6. CNC Milling process, advantages and its applications
7. Study of Rapid prototyping

**Design based Problems (DP)/Open Ended Problem:**

1. Calculation of wall thickness for cavity
2. Determine mold dimension using Vernier Caliper
3. Determine mold dimension using Micrometer
4. Calculating mould cost

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

1. [www.wikipedia.org](http://www.wikipedia.org)
2. [www.sciencedirect.com](http://www.sciencedirect.com)
3. [www.mit.edu](http://www.mit.edu)
4. <http://www.nptel.ac.in/>

**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 be submitted to GTU.