

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM COURSE TITLE: MOULD FABRICATION TECHNOLOGY - II (COURSE CODE: 3362302)

Diploma Programme in which this course is offered	Semester in which offered
Plastics Engineering	Sixth

1. RATIONALE

To be in line with global developments the fabricators require faster, precise and economical fabrication techniques to produce moulds and other accessories associated with Plastic industries. A Plastic diploma engineer must be aware with modern fabrication techniques to cope up with recent fabrication requirements. This competency requires the knowledge of advanced fabrication techniques to produce intricate parts which are difficult to produce through conventional techniques. Hence the course has been designed to develop this competency and its associated cognitive, practical and affective domain learning outcomes.

2. COMPETENCY

The course should be taught and curriculum should be implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

- **Fabricate different parts of mould using appropriate fabrication method/machine**

3. COURSE OBJECTIVES (COs)

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.

- i. Identify needs of fabrication techniques.
- ii. Compare fabrication techniques with respect to part production.
- iii. Select suitable process for given shape, size and material of mould part..
- iv. Fabricate mould part based on selected method/machine

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	200
3	0	4	7	70	30	40	60	

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

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Introduction	1a. Identify Conventional Fabrication Techniques. 1b. Compare Conventional And Advanced Fabrication Techniques.	1.0 Introduction 1.1 Introduction To Conventional Fabrication Techniques 1.2 Advancements In Fabrication Techniques 1.3 Advantages Of Advance Fabrication Techniques
Unit- II Electronic Discharge Method (EDM)	2a. Identify Needs For EDM. 2b. Select Proper EDM Process.	2.1 Spark Erosion Process 2.1.1 Working Principle 2.1.2 Construction & Working 2.1.3 Dielectric Medium 2.1.4 Different Tool Materials 2.1.5 Advantages And Disadvantages 2.2 Wire-Cut EDM 2.2.1 Working Principle 2.2.2 Construction & Working 2.2.3 Advantages And Disadvantages
Unit – III Copying Lathe and Copying Milling	3a. Identify Needs Of Copying Lathe. 3b. Identify Needs Of Copying Milling.	3.1 Copying Lathe 3.1.1 Types Of Attachments-Electronics, Hydraulic And Mechanical 3.1.2 Construction & Working 3.1.3 Advantages And Disadvantages 3.2 Copying Milling 3.2.1 Types Of Attachments-Electronics, Hydraulic And Mechanical 3.2.2 Construction & Working 3.2.3 Advantages And Disadvantages
Unit – IV Pantograph Die Sinking Machine	4a. Identify Needs Of Pantograph Machine.	4.1 Pantograph Die Sinking Machine 4.1.1 Basic Working Principle 4.1.2 Construction & Working 4.1.3 Advantages And Disadvantages
Unit – V Jig Boring Machines	5a. Identify Needs Of Jig Boring Machine.	5.1 Jig Boring Machine 5.1.1 working Principle Of Jig Boring Machine 5.1.2 Construction & Working 5.1.3 Comparison With Vertical Milling Machine

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – VI Cold Hobbing Process	6a. Identify Needs Of Cold Hobbing Process. 6b. Classify Hob Materials.	6.1 Cold Hobbing Process 6.1.1 Characteristics Of Mould Materials 6.1.2 Types Of Hob Materials 6.1.3 Process 6.1.4 Advantages And Disadvantages
Unit – VII Electroforming Process	7a. Identify Needs Of Electroforming Process.	7.1 Electroforming Process 7.1.1 Basic Working Principle 7.1.2 Process 7.1.3 Advantages And Disadvantages
Unit – VIII Polishing Methods	8a. Identify Needs Of Polishing. 8b. Classify Polishing Materials. 8c. Select Proper Polishing Method.	8.1 Polishing Methods 8.1.1 Need And Significance Of Polishing 8.1.2 Types Of Polishing Materials 8.1.3 Types Of Polishing Methods
Unit – IX Fundamentals of CNC machines	9a. Compare CNC With Conventional Machines.	9.1 Fundamentals Of CNC Machines 9.1.1 CAM – Concept And Definition. 9.1.2 Components Of CNC Machines 9.1.3 Advantages Over Conventional Machines
Unit – X Rapid Prototyping Processes	10a. Classify Various Processes. 10b. Select Proper Prototyping Process.	10.1 Rapid Prototyping Processes 10.1.1 Need And Significance 10.1.2 Types Of Processes And Applications i. Stereo Lithography ii. Selective Laser Sintering iii. Fused Deposition Method iv. Laminated Object Manufacturing v. 3 D Printing

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	3	3	0	0	3
II	Electronic Discharge Method (EDM)	7	3	3	4	10
III	Copying Lathe and Copying Milling	4	3	2	2	7
IV	Pantograph Die Sinking Machine	3	3	2	2	7

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
V	Jig Boring Machines	3	2	2	2	6
VI	Cold Hobbing Process	3	2	2	2	6
VII	Electroforming Process	4	3	2	2	7
VIII	Polishing Methods	5	2	3	3	8
IX	Fundamentals of CNC Machines	5	3	3	3	9
X	Rapid Prototyping Processes	5	3	4	0	7
TOTAL		42	27	23	20	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised 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.

7. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical. However, if these practical are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical/Exercise	Approx Hours Required
1	II, III VIII	Manufacture any two mould parts. (parts having different shapes, number of parts to be fabricated may be more than two, it would depend upon complexity of shapes. Faculty should give enough number of shapes for fabrication to students to justify the time	40

		allocated)	
2	II	Fabricate parts with EDM process. (with help of industries)	16
TOTAL			56

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Collect information and prepare chart for advanced fabrication techniques.
- ii. Collect information about CNC and rapid prototyping machines through internet.
- iii. Visit nearby mould making industry.

9. SPECIAL INSTRUCTIONAL STRETEGIES (If any)

- i. Arrange expert lecture (may be faculty from Mechanical Engineering Department of same polytechnic)
- ii. Arrange visit to nearby machining/fabrication industry having state of art machines.
- iii. Show video/animation of different machining/fabrication operation

10. SUGGESTED LEARNING RESOURCES

(A) List of Books:

Sr. No.	Title Of Book	Authors	Publication
1	Elements of Workshop Technology	Hazra Choudhary	Media Promoters and Publishers Pvt. Ltd.
2	Workshop Technology	W. Chapman	Elseveir
3	Injection Mould Design	R.G.W Pye	Van Nostrand Reinhold
3	CNC Fundamentals and programming	P. M. Agrawal	Charotar Publishing
4	Rapid Prototyping	Andreas Gebhardt	Hanser Publications
5	A Textbook of Manufacturing Technology: Manufacturing Processes	R. K. Rajput	Laxmi Publications

(B) List of Software/Learning Websites:

- i. <http://nptel.ac.in/courses/112105127/pdf/LM-23.pdf>
- ii. http://web.iitd.ac.in/~pmpandey/MEL120_html/RP_document.pdf
- iii. http://www.reliableedm.com/Complete%20EDM%20Handbook/Complete%20EDM%20Handbook_1.pdf
- iv. <http://www.automationmag.com/images/stories/LWTechfiles/91%20Electrical%20Discharge.pdf>
- v. <http://www3.nd.edu/~rroeder/ame50542/slides/rapidprototyping.pdf>
- vi. [www.wikieducator.org/Workshop_Technology_\(Mechanical\)](http://www.wikieducator.org/Workshop_Technology_(Mechanical))
- vii. <http://www.ignou.ac.in/upload/Unit-3.pdf>

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics:**

- **Prof. A.S.Amin**, LPE, Government Polytechnic, Ahmedabad.
- **Prof. J.R.Desai**, LPE, Government Polytechnic, Valsad.
- **Smt. S.R.Shah**, LPE, Government Polytechnic, Valsad.
- **Prof. M.K.Thakarar**, LPE, Government Polytechnic, Valsad.
- **Prof. B.I.Oza**, LPE, Government Polytechnic, Ahmedabad.
- **Prof. N.C.Suvagya**, LPE, Government Polytechnic, Chhota Udepur.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Shashi Kant Gupta**, Professor and Coordinator for State of Gujarat
- **Dr. Joshua Earnest**, Professor, Department of Electrical and Electronics Engineering