



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3142310

Semester – IV

Subject Name: Injection Moulding Technology

Type of course: Professional Core Course

Prerequisite:

Rationale:

The Injection molding process is a versatile technique for manufacturing of finished plastic products. The course designed here will help the students to understand basic principle of Injection molding machine and its technology. It will help them to operate injection molding machine and troubleshoot the faults arising during processing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
3	0	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	INTRODUCTION: <ul style="list-style-type: none">Injection moulding Machine,Injection Machine Operation,<ul style="list-style-type: none">Basic Principles of Reciprocating Screw Machine,Basic Principles of Plunger MachineInjection CycleCycle time estimationTypes of Injection Machine by Injection Component,Different Terminologies	4
2	CONSTRUCTIONAL FEATURES : <ul style="list-style-type: none">Injection unit<ul style="list-style-type: none">HopperBarrel, Bimetallic Barrel, Grooved Barrel, Barrel Nitriding, Vented Barrel Etc.ThermocoupleScrew, Screw Types, Screw Plastification, Characteristics of Screw, Screw Conveying, Screw Output, Melt Mechanism, Screw Tip Assemblies, Screw DrivesNozzle, Standard Nozzle, Needle Type Nozzle, Nylon Nozzle, Etc.Injection end SpecificationClamping Unit	11



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3142310

	<ul style="list-style-type: none"> • Clamp Mechanisms, Clamp End Specification, Toggle Clamp, Hydraulic Clamps, Comparison of Hydraulic & Toggle Clamp, Other Clamp mechanism like Vertical or Horizontal Clamp, Long Stroke Clamp, Lock and Block Clamp, Tonnage calculations, Projected Area 	
3	<p>PROCESS DETAILS</p> <ul style="list-style-type: none"> • Machine Startup and Shutdown Procedure, • Injection Moulding Process, • Process Variables • Pressure profile in cavity and PVT diagram, • Advantages and Disadvantages of process 	6
4	<p>INJECTION MOLDING OF THERMOSETS</p> <ul style="list-style-type: none"> • Overview • Process Operations, Startup, Running and shutdown • Process and Design Considerations <ul style="list-style-type: none"> ➤ Materials ➤ Part design Consideration • Cold Runner Molding • Trouble shooting • Influence of Principle Injection Machine Variables 	8
5	<p>AUXILIARIES FOR INJECTION MOULDING MACHINE</p> <ul style="list-style-type: none"> • Hopper Dryers • Ovens • Hopper loaders • Granulators • Mold Temperature Regulators • Conveyors 	5
6	<p>FAULTS AND CORRECTION (TROUBLE SHOOTING) Brittleness -Bubbles and voids-Crazing-Discoloration-Flashing-Flow marks-Silver Streaks-Nozzle Drooling--Short Shots-Sink Marks-Sprue Sticking-Cavity Sticking-Surface Sticking-Warping-Weld Lines</p>	8

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
10	25	20	05	05	05

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.



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3142310

Reference Books:

1. Injection Moulding- Irwin I. Rubin
2. SPI Plastics Engineering Handbook of the Society of the Plastics Industry - Michael L. Berins
3. Thermosetting Plastics: Moulding Materials and Processes by John F Monk
4. Injection moulding M/c by Whelan,
5. Plastics Engg. Handbook by Jeol Frados.
6. Plastics material and Processes by Schwartz and Goodman.
7. Injection moulding machine by Johannaber.
8. A Guide to Injection Moulding of Plastics by Bolur

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 out comes in cognitive, psychomotor and affective domain to demonstrate

Following are the course outcomes.

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the Injection Moulding process	15
CO-2	Understand different constructional feature of Injection Machine Component	30
CO-3	Set up the different parameters of Injection Moulding machine	25
CO-4	Operate Injection Moulding Machine	12
CO-5	Trouble shoot Injection Moulding Defects	18

List of Experiments:

- As per the above syllabus topics

Major Equipment:

- Injection Moulding Machine
- List of Open Source Software/learning website:
 - <https://nptel.ac.in/courses/112107221/9>
 - <https://nptel.ac.in/courses/112107221/10>
 - <https://nptel.ac.in/courses/112107086/17>
 - <https://nptel.ac.in/courses/112107221/20>
 - <https://nptel.ac.in/courses/107103012/module2/lec4.pdf>
 - <https://nptel.ac.in/courses/112107085/module4/lecture5/lecture5.pdf>
 - <https://nptel.ac.in/courses/103103029/module7/lec38/7.html>
 - <http://www.pitfallsinmolding.com/>