GUJARAT TECHNOLOGICAL UNIVERSITY

MANUFACTURING ENGINEERING (34)
PLASTIC MANUFACTURING TECHNOLOGY
SUBJECT CODE: 2163407
B.E. 6th SEMESTER

Type of course: Theoretical + Practical (Regular)

Prerequisite: To provide comprehensive knowledge about the principles and techniques of plastic manufacturing.

Rationale: To under the various principles and techniques for plastic manufacturing

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	1	0	4	70	20	10	30	0	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction to Processing Techniques:** Types of processing techniques – selection criteria for processing methods - Definition - Effect of polymer properties on processing behavior - Melting & Solidification behavior. **Injection Moulding:** Principle-Definition of Terms – Shot capacity, clamping force, injection pressure, speed etc-Technical specifications-selection criteria for types of machineries. Cycle time process variables & its effects on moulding quality-Cavity-pressure profile-factors influencing moulding shrinkage- Types of clamping systems-start up and shut down procedures - Common moulding defects, causes and remedies. **Thermoset Injection Moulding** - Process-Machine description, parts and their functions - process parameters-merits and de-merits.	**10**	**30**
2	**Compression Moulding:** Introduction-principles-definition of terms - Compression moulding process specifications- machine used-Bulk factor-flow-cure relationship - ageing of compound. Preforming, preheating-Methods, machines used, merits & demerits - Influence of process variables such as temperature, pressure, part size & configuration on quality and cycle time - Compression moulding of Thermoplastics. **Transfer Moulding:** Principles-Types of process-Machines used-pot transfer, Plunger transfer & screw transfer moulding techniques-moulding cycle-specification-merits and demerits of transfer moulding.	**10**	**15**
3	**Extrusion:** Introduction-principles-classification of extruders. **Single screw extruder:** specification- screw nomenclature-types of screws-L/D ratio, compression ratio-back pressure-factors governing back	**10**	**20**

	pressure-output and factors affecting output-heating & cooling systems-breaker plate-screen pack & its functions-screw & hopper cooling-die entry effects and die exit instabilities-shark skin, melt fracture & bambooing. **Twin screw extruder**: principle-types–process-merits & demerits -Vented barrel extruder - Process, machinery-downstream equipments-dies for producing products such as- blown film, cast film, -Sheets, - Tubes/pipes, corrugated pipes - Mono filaments - Coating/Lamination – Profiles.		
4	**Blow Moulding:** Introduction-principle-processes-Types of machines-Extrusion blow moulding-Injection blow moulding Stretch blow moulding –Process control Moulds & Dies, parison programming -Machine used constructional features-material and design factors affecting blow mould product-Trouble shooting.	**05**	**20**
5	**Thermoforming:** Introduction-pressure forming-vacuum forming- drape forming, plug assisted forming, snap-back vacuum forming.- Pressure forming –heating systems. Matched die forming-continuous forming methods–applications	**05**	**15**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
21	**14**	**14**	**14**	**07**	**0**

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. Seymour S. Schwartz & Sidney H. Goodman, Plastics materials and Processes, Van Nostrand Reinhold Company, New York, 1982.
2. M.S. Welling, Injection Moulding Technology, VDI-Verlag GmbH, 1981.
3. A.S. Athalya, Injection Moulding, Multi-tech Publishing Co., New Delhi, 1997.
4. Irvin Rubin, Injection Moulding Theory and Practice, A. Wiley Interscience Publication, 1972.
5. Lee, Blow Moulding Design Guide, Hanser Publishers, Munich, 1998.
6. Friedhelm Hensen, Plastics Extrusion Technology, Hanser Publishers Vienna, New York, 1988.

Course Outcome:

At the end of this course the student should be able to understand

- To understand about Injection moulding techniques.
- To understand about Compression techniques.
- To understand about Extrusion techniques.
- To understand about Blow Moulding techniques.
- To understand about Thermoforming techniques.

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.