GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3163409

PLASTIC TECHNOLOGY

6th SEMESTER

Type of Course: - Professional Elective

Pre-requisite:-

Rationale: To provide comprehensive knowledge about the principles and techniques of plastic processing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

CONTENT:-

Sr. No.	Course Content	Total Hours
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 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
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
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 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,	10

	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.	08
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	07
	Total	**45**

Reference Books:

1. Seymour S. Schwartz & Sidney H. Goodman, Plastics materials and Processes, Publisher Van Nostrand Reinhold Company, New York, 1982.
2. M.S. Welling, Injection Moulding Technology, Publisher 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. Publisher 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.

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage
Recall	20
Comprehension	10
Application	40
Analysis	30
Evaluate	-
Create	-

Course Outcome:

After learning the course the students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Illustrate plastic processing techniques.	30
CO-2	Make use of injection moulding, compression moulding, extrusion and blow moulding for plastic processing.	40
CO-3	Examine process parameters of injection moulding, compression moulding and extrusion.	20
CO-4	Analyze parameters of thermoforming process.	10

List of Experiments:

1. Study of Injection moulding process.
2. Study of Compression moulding process.
3. Study of Extrusion process.
4. Study of Blow moulding process.
5. Study of Thermoforming process,
6. Case study

Major Equipment:

1. Facility for plastic processing.

List of Open Source Software/learning website:

1. http://nptel.ac.in