GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162312
Semester – VI
Subject Name: Processing Techniques for Thermoplastics

Type of course: Professional core Course

Prerequisite:

Rationale: At the end of the course, the student will understand the various plastic processing techniques for manufacturing thin and thick walled, hollow and flexible products, etc. and the student will also have knowledge of various processing variables like heat transfer, pressure. They can apply this knowledge in effective processing of the thermoplastic.

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	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Thermoforming: Introduction-definition-various process steps-types of materials-material selection criteria in detail with properties like melt stability, plastic memory, etc. Types of forming process-Drape Forming, Pressure forming, Plug-Assist forming etc, Process variables, Mold materials, Mold variables, Trouble shooting.	8
2	Blow molding Introduction - Basic process - Advantages & Dis-advantages of Blow molding, Plastic materials for Blow molding, Extrusion blow molding - Continues extrusion process, Intermittent extrusion process, Parison programming, Injection Blow molding - Basic process of Injection Blow Molding, Stretch Blow Molding. Processing parameters, Troubleshooting of blow molding.	**8**
3	ROTATIONAL MOULDING : Introduction, Process Advantages and Disadvantages, Raw Material Selection Criteria, Machines – various types, Moulds and materials, , Process steps, Applications, etc.	**6**
4	Vinyl Dispersion Introduction, Resins, Rheology, Fusion, Formulating Vinyl Plastisols, Dispersion and Blending Resins. Molding: Rotational Method, Dip molding, Dip coating, Slush molding, Cavity in-place and Low pressure molding	**10**

5	Heat Transfer: Introduction, Engineering Heat transfer, Modes of Heat Transfer, Fourier's Law, Newton's Law, Stefan Boltzmann Law, Thermal Conductance and Resistance and related examples, Thermal Conductance and Resistance and related examples, Convective and Radiative Conductance, Combined Heat Transfer Process and related examples. Heat Exchanger: Introduction, Types of Heat Exchanger, Overall Heat Transfer coefficient .	**10**

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
20	**20**	**15**	**10**	**3**	**2**

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. Plastic materials & process: Schwartz & Goodman

2. SPI Plastics Engineering Handbook: Michael L Berins

3. Rotational Molding Technology: R J Crawford & J L Throne

4. Engineering Heat Transfer: Gupta &Prakash

5. Process Heat Transfer : D. Q. Kern.

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 course outcomes.

Sr. No.	CO statement	Marks % weightage
CO-1	Identify the plastic processing techniques for various products like thin and thick walled products , hollow products, flexible products.	15
CO-2	Understand and explain the process specific to products like thin and	25

	thick walled products , hollow products, flexible products.	
CO-3	Apply the knowledge of processing for manufacturing various products.	30
CO-4	Understand the variables of the process like Heat Exchange and pressure.	15
CO-5	Trouble shoot the problems related to processing of thermoplastic	15

List of Experiments: - As per the syllabus topics

Major Equipment:

List of Open Source Software/learning website:

i. www.nptel.ac.in

ii. www.rotomolding.org

iii. www.heatexdesign.com

Iv. www.bpf.co.uk