GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Plastic Engineering

Subject Name: Plastics Processing Technology
SUBJECT CODE:3712411

Type of course: Program Elective-II

Prerequisite:

Rationale:

Teaching and Examination Scheme:

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

Content:

Sr. No	Content	Total Hrs	% Weightage
1	**Introduction to Plastics Processing: definition, How does processing happen, rheology aspects.**	5	11%
2	**Injection Moulding:** Basic principles – Classification of processing methods – Effect of polymer properties on processing behaviour.Injection Moulding – Definition of terms – Specification – Types of machines used – Parts of machine & their functions – Cycle time – Process variables & its effect on Moulding quality – Cavity pressure profile – Factor influencing moulding shrinkage, annealing – Frozen-in – Stresses – Types of clamping systems and their merits & demerits – Start up and shut down procedures – Processing parameters and special precaution to be taken while processing of Engineering plastics such as Nylon, Acetal, PC, etc., - Common moulding defects, causes and remedies	10	23%
3	**Compression Moulding :** Introduction – principles – definition of Terms – Compression moulding process – specifications – machine used – Bulk factor – flow – cure relationship – ageing of compound – cup flow 5and spiral flow tests & its significance – cycle time - Preforming,	6	13%

	preheating – Methods, machine used, merits & demerits - Influence of process variables such as temperature, pressure, part size & configuration on quality and cycle time - Compression moulding of Thermoplastics – cold forming – sintering - Optimising process parameters & Trouble shooting - Merits & Demerits of Compression moulding - Finishing operation.		
4	**Transfer Moulding & Thermoset Injection Moulding:** Transfer Moulding - Principles – Types of process – machine used – pot transfer, plunger transfer & screw transfer moulding techniques – moulding cycle – specification – merits and demerits of transfer moulding – Theoretical calculation of pressures – line pressure, Injection ram pressure – trouble shooting.Difference between transfer moulding and Thermoset Injection Moulding.	**7**	**15%**
5	**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 – hopper loading devices - Drying equipments Process, machinery – down stream equipments – dies for producing products such as – film – blow film, cast film – Sheets -	**10**	**23%**

	Tubes / pipes, corrugated pipes – Mono filaments - Box strapping- Coating Lamination		
6	**Blow Moulding:** Introduction – Principle – Processes – Extrusion Blow Moulding – Injection Blow Moulding – Process control – Parison programming – Moulds – Machine used – Constructional features – Material and design factors affecting bottle performance – Trouble shooting – Stretch Blow moulding – Process outline	**7**	**15%**

Reference Books:

1. Denold V. Rosato, Injection Moulding Handbook, International Thomson Publishing Co., 1995.
2. M.S. Welling, Injection Moulding Technology, VDI-Verlag GmbH, 1981.
3. Seymour S. Schwartz & Sidney H. Goodman, Plastics materials and Processes, Van Nostrand Reinhold Company, New York, 1982.
4. A.S. Athalya, Injection Moulding, Multi-tech Publishing Co., New Delhi, 1997.
5. Irvin Rubin, Injection Moulding Theory and Practice, A. Wiley Interscience Publication, 1972.
6. Lee, Blow Moulding Design Guide, Hanser Publishers, Munich, 1998.
7. Friedhelm Hensen, Plastics Extrusion Technology, Hanser Publishers Vienna, New York, 1988.
8. Polymer Extrusion by Rauwendaal.

Course Outcome:

1. **Students completely familiar with major processing techniques**
2. **Students able to choose right kind of processing method for particular product**
3. **Students able to troubleshoot**

List of Experiments:

1. **Working on Injection moulding machine , determining parameters and ability to process any plastic material.**
2. **To study various types of Injection moulding techniques**
3. **To work on Compression moulding press and manufacture products in Melamine formaldehyde, Phenol Formaldehyde**

4. **To work on Single screw extruder machine and produce various products**
5. **To work on twin screw extruder machine and determine process parameters for alloys and blends**
6. **To study Transfer moulding process**
7. **To understand troubleshooting in Injection moulding process**
8. **To work on Blow moulding machine**
9. **To determine the process parameters on Thermoset Injection moudling machine**
10. **To study materials selection in Injection/Extrusion/Blow Moulding processes.**