

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : V

MANUFACTURING ENGINEERING

Subject Name: **PLASTICS MANUFACTURING TECHNOLOGY**

Sr. No.	Course Contents
1.	<p>Introduction to Processing Techniques – types of processing techniques – selection criteria for processing methods - Definition - Effect of polymer properties on processing behavior - Melting & Solidification behaviour.</p> <p>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-Dimensional control, annealing-factors influencing frozen in Stresses and their assessment-Types of clamping systems-start up and shut down procedures - Common moulding defects, causes and remedies.</p> <p>Thermoset Injection moulding - process-Machine description, parts and their functions - process parameters-merits and de-merits.</p>
2.	<p>Compression Moulding Introduction-principles-definition of terms - Compression moulding process-specifications-machine used-Bulk factor-flow-cure relationship - ageing of compound - Torque rheometer studies-cup flow and spiral flow tests & its significance-cycle time. 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-cold forming sintering and ram extrusion - Optimizing process parameters & Trouble shooting - Merits & Demerits of compression moulding - Finishing Operation</p> <p>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-Theoretical calculation of pressures-line pressure, Injection ram pressure-trouble shooting.</p>
3.	<p>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.</p> <p>Twin screw extruder-principle-types-process-merits & demerits -Vented barrel extruder - hopper loading devices-mould temperature controller - Drying equipments - Process, machinery-downstream equipments-dies for producing products such as- film-blown film, cast film, co-extruded films - Sheets, co-extruded sheets - Tubes/pipes, corrugated pipes - Mono filaments - Box strapping - Coating/Lamination – Profiles - New developments in extrusion process and machinery.</p>

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-recent advances in blow moulding-multi-layer blow moulding, PP/PEN stretch blow moulding.
5.	Thermoforming Introduction-pressure forming-vacuum forming-Techniques of Vacuum forming-simple vacuum forming, drape forming, plug assisted forming, snap-back vacuum forming-pressure snap-back vacuum forming-blow back forming-merits & demerits of vacuum forming- vacuum forming moulds. Pressure forming – Advantages over vacuum forming-material for Thermo forming –heating systems. Matched die forming–continuous forming methods–application.

References:

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.