GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: IV

Plastic Technology

Subject Code: **142301**

Subject Name: **Basic Plastic Processing and Thermal Engineering**

Sr.No	Course contents
1	**Introduction:** What is Plastic Processing - Introduction to various processing methods for thermoplastics and thermo sets - consideration for selection of particular method of processing - flow behavior of polymer melts. Principle of processing of Plastic
2	**Compression molding:** Introduction - types of processes : up stroking, down stroking - materials used and selection criteria - preheating - bulk factor - performance -process steps - process advantages and disadvantages - process variables - molding machine details - mold types : flash, semi positive, positive -charging - post curing - cooling fixtures - finishing - molding defects : causes and remedies.
3	**Transfer molding:** Introduction - transfer molding process types - techniques of transfer molding: pot and plunger types - advantages and disadvantages - process variables - molding materials - types of molds - pot dimensions and its effects - trouble shooting - comparison with compression molding.
4	**Thermoforming:** Introduction-definition-various process steps-types of materials-material selection criteria in detail with properties like melt stability, plastic memory, etc. - sheet thickness in detail required by the process- limitations as regards the types of sheets that can be used, etc., - advantage and disadvantage with the injection molding process-types of machine, molds and its Material in brief-various process variables-cold forming process With advantage and disadvantage-trouble shooting for the process-Rheology, its importance and applications. Types of thermoforming processes like plug assist, reverse draw forming, bubble type forming, twin sheet thermoforming, etc. Differences between pressure and vacuum forming techniques, types of vacuum forming techniques in detail along with advantages and limitations of each in detail. Engineering applications of thermoformed articles in detail, along with latest developments.

5	**Blow molding** • Introduction - Basic process - Plastic materials for Blow molding • Extrusion blow molding - Continues extrusion process, Intermittent extrusion process, Parison programming • Injection Blow molding - Basic process of IBM, Stretch / orienting blow molding • Processing parameters, Troubleshooting of blow molding • Advantages & Dis-advantages of Bow molding **Thermal Engineering:** • Introduction to three modes of heat transfer:- Conduction convection & radiation. General laws of heat transfer. • Basic equations of Heat Transfer, • The Temperature correction factor f and its importance • The over all heat transfer coefficient • Brief over view of heat exchanger types • No phase change, phase change, • Compact heat transfer technologies –plate heat exchanger, finned tube heat exchanger etc. • basics of Shell and tube heat exchangers, types and technologies

Reference Books:

1. Thermosetting resins by J.F.Monk.
2. Plastics Processing Data Handbook by Rosato
3. Thermoforming by Throne.
4. Plastic engineering by Crawford.
5. "Process Heat Transfer" : D. Q. Kern, Mcgraw Hill.
6. "Fundamentals of Heat Transfer": M. Mikheyev, MIR Publications.
7. Unit operations of Chemical Engineering": W. L. Mccabe and J. C. Smith, Mcgraw Hill,
8. "Principles of Unit Operation" : A. S. Foust et al, Wiley International, 1990.
9. Plastics material and processes by Schwartz and Goodman
10. Plastics Engg. Handbook by Joel Frados 5."Heat transmission" : W. H. Mcadams, Mcgraw Hill, 3rd edition