PLPC3004 ADVANCED PLASTICS PROCESSING TECHNIQUES (3-0-0)

Course Objective:

This course aims to provide an in-depth understanding of specialized injection molding processes, advanced blow molding techniques, extrusion methods, secondary processes, and casting and coating in plastics engineering. Students will learn about various injection molding processes, their control mechanisms, quality control techniques, and the application of statistical methods for process improvement.

Syllabus

Module - I (10 Hours)

Specialized Injection Moulding Processes

Thin wall product moulding-multi material and multi colour moulding-sandwich moulding-thermoset injection moulding. Micro Processor Controlled Injection moulding operation. Statistical quality control and process control. All electric injection moulding - Merits & Demerits, Gas Assist Moulding, Water Assist moulding, Reaction Injection moulding, Liquid Injection Moulding, Lost Core moulding, Thermoset Injection moulding, Structural foam moulding: a) Low pressure Foam b) High pressure Foam, Reaction Transfer Moulding, Metal/Ceramic Powder Moulding.

Module – II (08 Hours)

Advanced Blow Moulding

Classification of Advanced Blow Moulding Process, Deep draw Double Wall Blow Moulding, Press Blow Moulding, Stretch Blow Moulding – Injection Stretch Blow Moulding, Extrusion Stretch Blow Moulding Merits & Demerits.

Module – III (07 Hours)

Advanced Extrusion

Profile Extrusion Process, Multi layer film, Co- extruder Sheets & Pipes, – Process, Process Control, Process Optimization, Application, Merits & Demerits

Module – IV (09 Hours)

Secondary Processes

Machining & Joining of Plastics - Importance of machining –machining methods-joining-welding of plastics-Adhesive Bonding- Mechanical fasteners.

Other Secondary Processes-printing, painting, Hot stamping, In mould decoration, Electro-plating and vacuum metalizing.

Module – V (09 Hours)

Casting and coating

Introduction – casting processes-operation and control of casting processes- plastisol processing. Coating Process - Introduction-coating methods- process and applications

Cellular plastics - Introduction- foaming processes -foam moulding- RIM Casting foams, steam chest moulding structural foam moulding–applications-foamed extrusion.

Course outcomes:

After the completion of this course, students will be able to:

CO1: Remembering: Recall basics of primary, secondary polymer processing.

CO2: Understanding: Compare the methods of different processing techniques for product Manufacture with a given set of plastic materials for the specific use.

CO3: Apply: Apply most modern technology to modify the process variables on the existing machine to manufacture a specific plastic/ rubber/composite product.

CO4: Analyze: Inspect the defects in plastic products, examine the product quality in terms of machine parameters.

CO5: Explain: both practical and theoretical fundamentals of injection moulding and extrusion technology, including basic knowledge of the moulding process.

Books

1. Plastic Engineering Hand Book & D – 5 - By Society of Plastic Industry Inc.
2. Plastics Material & Processing- By Strong, A, Brent
3. Cheremisinoff; Nicholas P. and Cheremisinoff; Paul N. (Eds.), Handbook of Applied Polymer Processing Technology, Marcel Dekker Inc., New York (1996)
4. Plastics Materials & Processing - By Schwartz & Goodman Thermoforming - By James & Throne
5. Welding of Plastics - By New Man
6. Calendaring of Plastics - By Elden & Swan