GUJARAT TECHNOLOGICAL UNIVERSITY

Plastic Technology

B. E. SEMESTER: VI

Subject Name: **Plastic Extrusion Technologies**
Subject Code: **162301**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
3	0	3	6	70	30	50

Sr. No.	Course Contents	Total Hrs
1.	**Introduction**: Basic principles of extrusion- Types of extruders, General features of extruders viz. barrel, screw, types of screws, drive mechanisam, specifications, heating and cooling systems, flow mechanisam, die entry effects and exit instabilities. Process-Advantages and Limitations-Machines.	2
2.	**Process**: Description-Manufacture of Pipes, Films [3 layer, 5 layer , 7 layer], Sheets, Cables and Wires, Monofilament, Nets along with line diagram in detail; process variables in each of these processes; Trouble shooting.	12
3.	**Raw Materials**: Selection criteria based on MFI, Surface Characteristics, etc; Grades for various applications like Pipes, Films, Monofilament, etc.	04
4.	**Machine** : Drive systems like Motors: Various types and Selection criteria; Reduction gear boxes and types like worm wheel, helical, etc; Hopper and design features; Water cooling at hopper; Screw and Barrel assemblies; Various types of screws for different applications, Breaker plate and Screen packs; Dies: Straight through, Crosshead, Offset; Post extrusion equipments like cooling tank, corona treaters, take offs, static	12

	charge eliminators, gear pumps in monofilament lines, gadgets, equipments in pipe lines, winders, take off and cutting equipments, etc.	
5.	**Co extrusion:** Lamination, Extrusion coating, Manufacturing of raffia, Fibers and BOPP, Types of dies-bottom feed and helical	4
6.	**Extrusion Processing, For Net-Forming**	2
7.	**Processing parameters:** • Melting process • Increasing output of screw / output from screw • Variation in melt temperature • Improving mixing of the polymer	5
8.	**Utilizing Extrusion Plant Efficiently:** • Procedure for shutdown of extruder • How to reduce the waste of material during Sunday & holiday • Procedure of purging • Procedure for startup extruder • Preparation of startup • Applications of extrusion and new developments	4
9.	**Twin Screw Extrusion:** Machine types like co-rotating and counter rotating ; differences with single screw extrusion in detail ; advantages and disadvantages of each machine type along with applications ; design considerations., Rheology in twin screw extruders , etc.	5
10.	**Reactive Extrusion:** Purpose of development of the process ; description in detail ; materials that can be processed ; material selection criteria ; material specifications ; machine types along with latest developments; applications .,etc.	4

Text Books:

1. Plastics Extrusion Technology by Hensen
2. Polymer Extrusion by Rauwendaal
3. Extrusion of Plastics by Fisher

Reference Books:

1. Twin Screw Extrusion by White.
2. Reactive Extrusion by Xanthos.