GUJARAT TECHNOLOGICAL UNIVERSITY

PLASTIC TECHNOLOGY (23)
PLASTIC EXTRUSION TECHNOLOGY
SUBJECT CODE: 2152307
B.E. 5th SEMESTER

Type of course: Core

Prerequisite: NA

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction : History Of Extrusion ., Origins During World War Ii , The Ram Extruder And Applications, Development History Of Screw Extruders , Classification Of Extruders And Applications , Advantages And Disadvantages,Etc. Extruders For Ptfe, Uhmwpe, And Process. Defination s	05	10%
2	Construction Of Extruders : Motor [Various Types : Ac V/S. Dc] ; Heating Systems With Emphasis On Electrical Heating Systems , Types Of Heaters : Mica /Ceramic Based ; Band Heaters, Cartridge Heaters, Etc. Selection Criteria For Heaters For Single And Twin Screw Extruders; Screws : Various Types Suitable For Different Materials Like General Purpose, Reverse Flighted , Mixing Screws, Zero Feed/Zero Meter Type ,Etc. With Applications, Thrust Bearing Assemblies : Single Screw Thrust Bearing Block Construction With Various Types Of Bearing, Twin Screw Machines Thrust Bearing Blocks With Plate Bearings., Life Of Thrust Bearing[B-10 Life] ., Screen Packs And Breaker Plate: Advantages And Various Types , Selection Of Screen Packs For Film, Monofilament, Pipe Lines, Etc…Devolatilization In Screw Extruders:Types, Significance, Applications	10	15%
3	Twin Screw Extruders : Principle , Construction Of Counter And Co-Rotating Twin Screw Extruders, Applications And Comparison Of Both Types, Screw Design Fundamentals, Flow Behaviour , Mixing Patterns.	05	15%
4	Post Extrusion Equipments : Sizing Equipments, Take Of Units With Design Features, Ibm Technology, Grooved Barrel Technology And Significance, Oscillating And Rotating Take Off Units, Winding	10	15%

	Technologies , Corona Treatment, Static Charge Eliminators , Latest Developments In Post Extrusion Equipments		
5	Raw Materials For Extrusion : Properties Like Bulk Density, Angle Of Repose, Coefficient Of Friction,Particle Size And Shape,..Material Selection Criteria For Extrusion Applications…	05	10%
6	Extrusion Lines : Film/Pipe/Sheet/Monofilament/Wire And Cable Covering Lines With Layout, Material Selection Criteria, Developments..	15	35%
7	Trouble Shooting In Extrusion Process : Identifying Faults , Corrective Methods, Safety Aspects	04	10%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**15**	**20**	**15**	**10**	**--**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Plastics Extrusion Technology by Hensen
2. Polymer Extrusion by Rauwendaal
3. Extrusion of Plastics by Fisher
4. Twin Screw Extrusion by White
5. EXTRUSION BY ALLAN GRIFF
6. Handbook of Polymer Science and Engg.

Course Outcome:

After learning the course the students should be able to:

1. Understand the extrusion process and trouble shoot the problems
2. Read and understand various extrusion lines.
3. Work effectively in Extrusion unit as Manager

List of Experiments

1. To Study the speed v/s. OUTPUT of a single screw extruder by actual performance on machine.
2. To Study the speed v/s. pressure profile
3. To estimate the thrust load in single screw and twin screw machines with reading and calculation.
4. To determine the shear rate in single and twin screw extruders
5. To determine process parameters for processing of blends of plastics by extrusion.
6. To determine the speed v/s. output of a twin screw extruder
7. To study the working of co rotating twin screw extruders
8. To study the conical twin screw extruders
9. To determine and establish the process parameters for processing of plastic composites
10. To study Devolatilization in screw extruders.

Design Based (DP)/Open Ended Problems:

1. Develop the process parameters for extrusion processing of Engg.Thermoplastics

Major Equipment:

1. Single screw extruder with all attachments
2. Twin screw extruders: co rotating and counter rotating types

List of Open Source Software/learning website:

www.wikipedia.org

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.