



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Under Graduate

Branch: Plastics Engineering

Subject Code: BE04053011

Subject Name: Plastics Extrusion Technology

w. e. f. Academic Year:	2024-25
Semester:	4
Category of the Course:	Professional Core Course

Prerequisite:	<ul style="list-style-type: none"> Understanding of polymer chemistry, structure and properties. Knowledge of material behaviour, thermal properties and mechanical characteristics. Understanding of basic engineering mathematics and mechanics.
Rationale:	<p>This course provides students with essential knowledge and skills needed to understand and operate extrusion-based manufacturing processes used widely in the plastics industry. By learning the principles of polymer behavior, extrusion machinery and product formation, students gain the foundation required to design, analyze and troubleshoot extrusion systems. This course prepares learners for industry roles where efficiency, product quality and process optimization are critical.</p>

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Explain the basic principles and components of plastics extrusion systems.
02	Identify suitable polymers and additives for different extrusion applications.
03	Operate and monitor extrusion equipment safely and efficiently.
04	Troubleshoot common defects and processing problems in extrusion products.
05	Apply process parameters to improve product quality and production performance.

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
L	T	P	TW / SL	TH		Theory		Tutorial / Practical			
						ESE (E)	PA (M)	PA (I)	TW/ SL (I)	ESE (V)	
45	00	30	45	120	04	70	30	20	30	50	200

Where L = Lecture, T = Tutorial, P = Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

*** Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.**



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Extrusion: Overview of extrusion technology, types of extruders (single screw, twin screw), working principles of different types of extruders, applications of extrusion in the plastics industry.	5	10
2.	Extruder Components and Functions: Feed hopper, feed throat, barrel, screw, die and die assembly; heating and cooling systems; thrust bearing assembly; drive mechanisms and control systems; screw design and its influence on mixing and output.	12	30
3.	Materials for Extrusion: Properties of thermoplastics relevant to extrusion, effect of various additives, material selection criteria for different products, rheological behavior of polymers during processing.	11	20
4.	Extrusion Processes and Techniques: Film extrusion (blown and cast); pipe, tube and profile extrusion; sheet extrusion; wire and cable coating; monofilament extrusion; co-extrusion; compounding and pelletizing processes; various die designs involved.	12	30
5.	Process Control and Troubleshooting: Key process parameters (temperature, speed, pressure), monitoring and quality control tools, common defects: causes and remedies, safety practices in extrusion operations.	5	10
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	10	5	5	5

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

- 1) Polymer Extrusion by C. Rauwendaal.
- 2) Extrusion of Plastics by E. G. Fisher.
- 3) Twin Screw Extrusion: Technology and Principles by J. L. White and E. K. Kim.
- 4) Plastics Extrusion Technology by A. L. Griff.
- 5) Plastics Extrusion Technology by F. Hensen.

(b) Open source software and website:

- 1) <https://nptel.ac.in/>



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Suggested Course Practical List:

1. Pipe / tube extrusion.
2. Sheet extrusion.
3. Blown film extrusion.
4. Plastic compounding and pelletizing using extrusion process.

• **List of suggested activities for Problem Based Learning:**

S. No.	Activity	No. of Hours	Total Hours Claimed	Evaluation Criteria
1	Industry / Research laboratory visit	Visit = 5 h, Report preparation = 5 h	10	Based on report submitted
2	Poster / chart / power point preparation on technical topics	Duration = 10 h	10	Based on Poster / Chart / PPT preparation and presentation skills
3	Assignment writing	5 assignments of 2 h each	10	Based on the assignment submitted
4	Technical Video based learning related to the subject	Duration of video = 5 h Report preparation = 5 h	10	Report / presentation based on the video learning outcomes
5	Group Discussion on emerging / trending technical topics based on subject	Duration = 1 h each	-	Based on performance in group discussion, technical depth, knowledge, etc.
6	Attending Expert Lecture/Webinar/Seminar	Duration = 1 h each	-	Based on Short report
7	Self-learning on-line course	Minimum duration of the course should be 10 h	10	Examination based assessment at the end of course. Based on the certificate produced
8	Exhibition / Conference / Trade Fair / Industrial exposure for 2-3 days	Visit = 15 h, Report preparation = 5 h	20	Based on learning, observations and short report
9	Working model on technical topics	Working = 15 h	15	Based on design, understanding & presentation of the model
10	Non-working model on technical topics	Non-working = 5 h	5	Based on design, understanding & presentation of the model
11	Videos on Industrial safety aspects based on subject	Duration of video = 5 h Report preparation = 5 h	10	Based on report submitted



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- Above activities are suggestive, faculty can choose any of these activities and cover up the rest of the 45 Self Learning Hours.
- The number of hours is suggestive.
- Faculty can sub-divide the number of hours based on the activity. However, the total number of hours is fixed.

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