ANNA UNIVERSITY, CHENNAI

NON- AUTONOMOUS COLLEGES

AFFILIATED TO ANNA UNIVERSITY

M.TECH. PLASTICS TECHNOLOGY

REGULATIONS 2025

PROGRAMME OUTCOMES (POs):

PO	Programme Outcomes
PO1	An ability to independently carry out research /investigation and development work to solve practical problems
PO2	An ability to write and present a substantial technical report/document.
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

PROGRAMME SPECIFIC OUTCOMES(PSOs):

PSO	Programme Specific Outcomes
PSO1	Ability to analyze and characterize polymers and composites for developing innovative plastic products with enhanced performance.
PSO2	Capability to integrate theoretical knowledge and practical skills in plastic processing and testing for effective industrial application and problem-solving.

ANNA UNIVERSITY, CHENNAI

POST GRADUATE CURRICULUM (NON.AUTONOMOUS AFFILIATED INSTITUTIONS)

Programme: M.Tech. Plastics Technology **Regulations:** 2025

Abbreviations:

BS – Basic Science (Mathematics)
ES – Engineering Science (General (G), Programme Core (PC), Programme Elective (PE))
SD – Skill Development
SL – Self Learning
OE – Open Elective

L – Laboratory Course
T – Theory

LIT – Laboratory Integrated Theory
PW – Project Work
TCP – Total Contact Period(s)

Semester I

S. No.	Course Code	Course Title	Type	Periods per week			TCP	Credits	Category
				L	T	P			
1.	PA25101	Mathematics for Plastic Technologists	T	3	1	0	4	4	ES (PC)
2.	PA25102	Plastics Materials Technology	T	4	0	0	4	4	ES (PC)
3.	PA25103	Manufacture of Plastic Products	T	3	0	0	3	3	ES (PC)
4.	PA25104	Polymer Characterization	T	3	0	0	3	3	ES (PC)
5.	PA25105	Polymer Characterization Laboratory	L	0	0	4	4	2	ES (PC)
6.	PA25106	Plastic Processing Laboratory	L	0	0	4	4	2	ES (PC)
7.	PA25107	Technical Seminar	-	0	0	2	2	1	SD
						Total Credits	**24**	**19**	

Semester II

S. No.	Course Code	Course Title	Type	Periods per week			TCP	Credits	Category
				L	T	P			
1.		Plastics Materials & Products Testing	T	3	0	0	3	3	ES (PC)
2.		Polymer Composites	T	3	0	0	3	3	ES (PC)
3.		Plastics Product and Mould Design	T	3	1	0	3	4	ES (PC)
4.		Programme Elective I	T	3	0	0	3	3	ES (PE)
5.		Industry Oriented Course I	-	1	0	0	1	1	SD
6.		Plastics Testing Laboratory	L	0	0	4	4	2	ES (PC)
7.		Product Design Laboratory	L	0	0	4	4	2	ES (PC)
8.		Industrial Training	---	---	---	---	---	---	SD
9.		Self Learning Course	---	-	-	-	-	1	-
Total Credits							**21**	**19**	

Semester III

S. No.	Course Code	Course Title	Type	Periods per week			TCP	Credits	Category
				L	T	P			
1.		Programme Elective II	T	3	0	0	3	3	ES (PE)
2.		Programme Elective III	T	3	0	0	3	3	ES (PE)
3.		Programme Elective IV	T	3	0	0	3	3	ES (PE)
4.		Open Elective	---	3	0	0	3	3	OE
5.		Industry Oriented Course II	-	1	0	0	1	1	SD
6.		Project Work I	---	0	0	12	12	6	SD
7.		Industrial Training	-	-	-	-	-	1	SD
Total Credits							**25**	**20**	

Semester IV

S. No.	Course Code	Course Title	Type	Periods per week			TCP	Credits	Category
				L	T	P			
1.		Project Work II	---	0	0	24	24	12	SD
Total Credits							**24**	**12**	

Total Credits for the Programme = 67

Programme Elective Courses (PE)

S. No.	Course Code	Course Title	Periods			Total Contact Periods	Credits
			L	T	P		
1.		Rheology of Polymer Processing	3	0	0	3	3
2.		Plastics Packaging Technology	3	0	0	3	3
3.		Additives and Compounding	3	0	0	3	3
4.		Thermodynamics of polymer synthesis	3	0	0	3	3
5.		Polymer Reaction Engineering	3	0	0	3	3
6.		Polymer nanocomposites	3	0	0	3	3
7.		Rubber Technology					
8.		Science and Technology of Advanced Coatings	3	0	0	3	3
9.		CAD/CAM/CAE Applications in Mould / Die Designs	3	0	0	3	3
10.		Reverse Engineering and Rapid Prototyping	3	0	0	3	3
11.		Advanced Plastics Processing	3	0	0	3	3
12.		Fracture Mechanisms and Analysis in Polymers	3	0	0	3	3
13.		Biomedical Plastics	3	0	0	3	3
14.		Shape Memory Polymers	3	0	0	3	3
15.		Conducting Polymers	3	0	0	3	3
16.		Liquid Crystalline Polymers	3	0	0	3	3
17.		Plastics recycling and waste management	3	0	0	3	3
18.		Bioplastics and Biodegradable Polymers	3	0	0	3	3
19.		Applications of AI and ML in Plastic Industries	3	0	0	3	3

Semester I

PA25101	Mathematics for Plastic Technologists	L	T	P	C
		3	1	0	4

Course Objectives:

- To understand the basic concept of numerical methods in solving ordinary differential equations.
- To understand the basic concept of numerical methods in solving partial differential equations.
- To understand the concept of probability and common probability distributions.
- To apply statistical methods like curve fitting, correlation, and regression.
- To learn how to test assumptions using hypothesis testing methods.

Numerical Methods of Ordinary Differential Equations: Solution of first order ordinary differential equation, Taylor's method, Euler's method, Runge, Kutta method of fourth order, Predictor, Corrector Methods, Introduction to numeric use of the above techniques in plastics engineering and calculations.

Activity: Write a simple program (in MATLAB or Python) to solve a first-order ODE using Euler's method and compare results with Runge-Kutta 4th order.

Numerical Methods of Partial Differential Equations: Classification of second order linear partial differential equations, Elliptic equations, Solution of Laplace equations

Activity: Use finite difference method to solve Laplace's equation on a 2D grid and visualize the solution using contour plots.

Probability and Distributions: Probability, Addition theorem, Multiplication theorem, Conditional probability, Baye's theorem, Distribution functions, Binomial distribution, Poisson distribution, Normal distribution

Activity: Collect sample data from a plastics manufacturing process and calculate the probability of defects using Binomial and Poisson distributions.

Statistical Analysis and Curve Fitting: Curve fitting, Fitting a straight line and second degree curve, Fitting a non linear curve, Correlation and regression.,

Activity: Fit a linear and quadratic curve to sample stress-strain data from plastics testing and analyze the goodness of fit using correlation coefficients.

Testing of Hypothesis: Sampling distribution, Large sample and small samples Testing of null hypothesis, Type I and Type II errors, "t" test and Chi square test - Goodness of fit.

Activity: Conduct a hypothesis test (t-test) to compare the mean tensile strength of two different plastic materials using sample data.

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Quiz (20%), Assignments (30%) and Internal Examinations (50%)

References:
1. Burden, R. C., & Faires, J. D. (2016). *Numerical analysis* (9th ed.). Cengage Learning.
2. Johnson, R. A., Miller, I., & Freund, J. (2016). *Miller and Freund's probability and statistics for engineers* (9th ed.). Pearson Education Asia.
3. Gupta, S. C., & Kapoor, Y. K. (2020). *Fundamentals of mathematical statistics* (12th ed.). Sultan Chand & Sons.
4. Gross, D., Shortle, J. F., Thomson, J. M., & Harris, C. M. (2014). *Fundamentals of queuing theory* (4th ed.). Wiley.

	Description of CO	**PO**	**PSO1**	**PSO2**
CO1	Develop computational skills to solve differential equations used in plastic engineering applications.	PO1(3), PO2(2)	3	2
CO2	Understand and apply key probability distributions in the context of material science and plastics.	PO1 (3), PO2(2), PO4(2)	2	3
CO3	Utilize regression and correlation techniques to analyze and interpret experimental data.	PO1 (3), PO2(2), PO4(2)	2	1
CO4	Evaluate hypotheses and perform statistical tests to support quality control and research in plastics technology.	PO1 (3), PO2(2), PO4(2)	2	2

PA25102	Plastics Materials Technology	L	T	P	C
		4	0	0	4

Course Objectives:

- To understand the mechanism of polymerization, techniques of polymerization and the significance of different molecular weight averages.
- To provide in depth knowledge about different kinds of plastic materials based on their structure and properties
- To make the student familiar about properties and end application of different plastics materials
- To apply knowledge of thermoplastics for industrial applications.
- To understand the role of polymer blends & alloys in current scenario

Introduction to Polymer Materials: Introduction to polymers and their Classification homopolymers, Copolymers. Different types of polymerizations, addition, condensation and stereoregular polymerization. Initiators, important steps involved, kinetics and mechanism of addition, condensation and stereoregular polymerizations. Copolymerization and its kinetics. Polymerization techniques, emulsion, bulk, solution and suspension, Molecular weight & its determination.

Activity: Classify given polymers into homopolymers, copolymers, and stereoregular polymers with reasoning.

Commodity Thermoplastics: Introduction, source of raw materials, Manufacture, General Properties, processing and applications of Olefine Polymers such as Polyethylenes, Polypropylene and their copolymers, Styrene Polymer such as Polystyrene and Copolymers (Styrene Acrylonitrile, Acrylonitrile Butadiene Styrene), Vinyl polymers such as Poly (Vinyl Chloride), Poly (vinyl acetate, Acrylics and copolymers- Cellulose Polymers Cellulose acetate cellulose nitrate cellulose butyrate.

Activity: Compare and list the physical and chemical properties of polyethylene and polypropylene and relate to their applications.

Engineering and High Performance Thermoplastics: Introduction, source of raw materials, Manufacture, General Properties, processing and applications of engineering thermoplastics such as-Acetal–Homopolymer & Co-polymer , polycarbonates, polyamides- Nylon 6, 6 6, 6 10, 11 and 12,Polyesters (Poly Ethylene Terephthalate & Poly (Butylene Terephthalate) polyimides, Poly (benzimidazoles), polyphenylene oxide, Poly(aryl ether ketone), Poly (ether ether ketone), Poly(aryl ether sulfone), poly (phenylene sulfides), Polysulfones, Fluoropolymers Poly (Vinyl Fluoride, Poly **(**Vinyledene Fluoride, Polytetrafluoro ethylene, Polychlorotrifluoro Ethylene), Liquid crystalline polymers and Thermoplastic Polyurethanes.

Activity: Research and present a case study on the use of polycarbonates in automotive or aerospace industries.

Thermosetting Plastics: Introduction, source of raw materials, Manufacture, General Properties, processing and applications of Phenolic resin, Urea Formaldehyde, Melamine Formaldehyde, Unsaturated Polyesters, DMC BMC SMC Epoxy resins, Crosslinking reactions Polyurethane and Silicones Cyanate esters.

Activity: Observe or simulate the curing process of epoxy resin and explain the role of crosslinking on material properties.

Polymer Blends and Alloys: Introduction to polymer blends and alloys- Definitions, compatibilization mechanism and methods, criteria for making polymer blends, Selection of polymer for blend, Types of polymer blends. Thermodynamics of polymer miscibility, Blend preparation techniques, Commercial polymer blends such as plastic-plastic, rubber-plastic, rubber-rubber blends, High performance polymer blends Interpenetrating polymer networks (IPN)

Activity: Analyze a given polymer blend and identify factors affecting its compatibility and performance.

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Quiz (20%), Assignments (30%), Internal Examinations (50%)

References:

1. Gowriker, V. R., Viswanathan, N. V., & Sreedhar, J. (n.d.). *Polymer science*. New Age Publications.
2. Brydson, J. A. (1999). *Plastics materials*. Butterworth-Heinemann.
3. Paul, D. R., & Bucknall, C. B. (2000). *Polymer blends: Vol. 1*. Wiley.
4. Utracki, L. A. (2003). *Polymer blends handbook*.
5. Singh, R. P. S., Das, C. K., & Mustafi, S. K. (2002). *Polymer blends and alloys: An overview*. Asian Books Pvt.
6. Simon, G. P. (Ed.). (2019). *Polymer blends and alloys*. Routledge.
7. Gilbert, M., & Brydson, J. A. (2017). *Brydson's plastics materials*.

	Description of CO	PO	PSO1	PSO2
CO1	Explain and classify different types of polymers and their polymerization techniques.	PO1(3), PO2(2)	2	3
CO2	Describe the properties, processing, and applications of commodity and engineering thermoplastics.	PO1 (3), PO2(2), PO4(2)	2	2
CO3	Explain the chemistry, manufacturing, and uses of thermosetting plastics and crosslinking reactions.	PO1 (3), PO2(2), PO4(2)	3	2
CO4	Analyze polymer blends and alloys, including their compatibility and preparation methods.	PO1 (3), PO2(2), PO4(2)	1	2

PA25103	Manufacture of Plastic Products	L	T	P	C
		3	0	0	3

Course Objectives:

- To understand the functions of each of these additives, technical requirements, types & mechanism, and their effective evaluation are dealt with in this subject.
- To select suitable plastics material compounding and mixing techniques like two roll milling, internal blender, single / twin screw extruder, etc.
- To learn the fundamentals of compression moulding & transfer moulding.
- To impact knowledge on basic processing of thermoplastics
- To analyze the various processing techniques of plastics materials

Compounding of Thermoplastics: Compounding-Importance, ingredients, master batch, equipments, Twin screw extrusion, compression moulding and compounding lines, compounding of polyolefins, polystyrene and styrene copolymers, engineering thermoplastics **(e.g., PA, PC, PBT)**, natural fiber filled plastics. Post-compounding operations: pelletizing, drying, storage, and blending.

Activity: Prepare a sample of compounded polyolefin using twin-screw extrusion and analyze the effect of different masterbatch ingredients on the mechanical properties of the final product.

Injection Moulding and Extrusion Process: Injection Moulding: processing outline- Types-effect of processing parameters on moulding quality, Troubleshooting. Basic principles of extrusion, Types of extruders, general features of extruders. Melt fracture &Bambooing. Production of blown film, cast film/slot film, BO film, coextruded film. Tube/pipe-sizing take off equipment, extrusion coating, wire & cable covering–pretreatment of conductor, cooling, constructional features of dies for the above processes and trouble shooting. Applications of extrusion and new developments.

Activity: Conduct an injection moulding trial varying processing parameters (temperature, pressure) and document the effect on moulding defects and quality.

Blow Moulding, Compression & Transfer Moulding Process: Basic principles of blow moulding, Injection Blow moulding, extrusion blow moulding, Parison programming, Advantage & disadvantage of blow moulding. Basic principles of compression and transfer moulding-Bulk factor-Curing time-Mould temperature and Pressure requirements-Preforms and preheating-Techniques of preheating- Machines used-Types of compression mould-Common moulding faults and their correction. Advantages of transfer moulding over compression moulding- Equipment used-Moulding faults, causes and remedies.

Activity: Perform a compression moulding experiment with different curing times and mould temperatures; identify common faults and propose corrective measures.

Thermoforming, Calendering and Roto Mouldingprocess: Basic principles–Raw materials & types of thermoforming processes, Thermoforming moulds processing parameters, faults, causes and remedies. Calendaring-Principle and process description, types of calendar units 2, 3 and 4 rolled calendars, Design of calendar roll, Heating and temp control, roll crown, roll crossing and roll bending, materials for calendaring, calendaring

sheets and films, embossing, coating and lamination by calendar. Rotational moulding, Introduction-principle-process-machinery used-materials-moulds process parameters-merits & demerits of rotomoulding.

Activity: Visit a thermoforming or calendaring unit (or simulate process if lab unavailable), observe operational parameters, and prepare a report on fault diagnosis and process optimization.

Selective Laser Sintering (SLS) Process : Principle, process, Indirect and direct SLS-powder structures, materials, post processing, surface deviation and accuracy. Applications; Laser Engineered Net Shaping (LENS): Processes, materials, products, advantages, limitations and applications. Other Additive Manufacturing Systems: Shape Deposition Manufacturing (SDM), Ballastic Particle Manufacturing (BPM), Selective Laser Melting, Electron Beam Melting;

Activity: Design and 3D print a simple part using SLS technology; analyze surface finish and dimensional accuracy, then discuss potential applications.

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Quiz (20%), Assignments (30%), Internal Examinations (50%)

References:

1. Fisher, E. G., & Whitfield, E. C. (1976). Extrusion of plastics.
2. Hornsby, P. R. (1988). Plastics extrusion technology (F. Henson, Ed.). Carl Hanser Verlag.
3. Rossato, D. V. (1995). Injection moulding handbook. International Thomson Publishing Co.
4. Welling, M. S. (1981). Injection moulding technology. VDI–Verlag GmbH.
5. Schwartz, S. S., & Goodman, S. H. (1982). Plastics materials and process. Van Nostrand Reinhold Company.
6. Stevenson. (1996). Innovation in polymer processing.
7. Giles, H. H., & others. (2004). Extrusion: The definitive processing guide and handbook.
8. Iyesew, A. I. (n.d.). Compression molding.
9. Bruins. (n.d.). Basic principle of rotational molding.
10. Brycle, D. M. (n.d.). Basic principle of thermoforming.

	Description of CO	PO	PSO1	PSO2
CO1	Understand and perform compounding of thermoplastics using extrusion techniques.	PO1(3), PO2(2)	2	3
CO2	Apply injection moulding and extrusion processes for plastic product manufacturing.	PO1 (3), PO2(2), PO4(2)	2	2
CO3	Explain blow moulding, compression moulding, and thermoforming methods.	PO1 (3), PO2(2), PO4(2)	3	2
CO4	Describe Selective Laser Sintering and other additive manufacturing processes.	PO1 (3), PO2(2), PO4(2)	1	2

PA25104	Polymer Characterization	L	T	P	C
		3	0	0	3

Course Objectives:

- To develop knowledge of National & International standards for testing methods.
- To create the knowledge about the conditioning of samples and sample preparation techniques for testing various properties of plastics materials.
- To enable the students to learn about the evaluation of mechanical & thermal properties of plastics materials.
- To enable the students to learn about the evaluation of electrical & optical properties of plastics materials.
- To enable the students to understand the testing of raw materials and components for evaluating various properties; testing the products for predicting product performance

Molecular Weight Determination: Molecular weight averages - Molecular weight determination techniques like End-group analysis, Colligative Properties-Ebulliometry, Osmometry and Vapour phase Osmometry, Light scattering techniques, Solution viscometry, and Gel Permeation Chromatography.

Activity: Determine the molecular weight of a polymer using solution viscometry.

Spectroscopic Characterization: Introduction to Spectroscopic techniques, Ultraviolet, Visible Spectroscopy, Infra Red-Raman Spectroscopy and Fourier Transform Infrared Spectroscopy (FTIR), Nuclear Magnetic Resonance (NMR) Spectroscopy, Electron Spin Resonance Spectroscopy, X -Ray Diffraction

Activity: Analyze a polymer sample using FTIR to identify key functional groups.

Microscopic and Chromatographic Characterization: Light Microscopy, Scanning electron microscopy (SEM) and Transmission electron Microscopy (TEM) Analysis of residual monomer like VCM, Acetaldehyde, Acrylonitrile and Styrene content in Polymers by Gas Chromatography (GC)

Activity: Observe polymer surface morphology with Scanning Electron Microscopy (SEM).

Thermal Characterization: The basis of Thermal Analysis, Differential Thermal Analysis (DTA) and Differential Scanning Calorimetry (DSC), Thermo-mechanical Analysis (TMA), Thermo gravimetric Analysis (TGA) and Dynamic Mechanical Thermal Analysis (DMA).

Activity: Use Differential Scanning Calorimetry (DSC) to find the melting point of a polymer.

Rheological Characterization: Melt Viscosity measurements, Melt flow tests (MFI and MFR), Capillary Rheometer, Cone and Plate viscometer, torque rheometer, oscillating disc rheometer, cup flow and spiral flow tests for determination of flow behaviour of resins. Viscosity of solutions and resins, Brookfield Viscometer, Ubbelohde viscometer, Ostwald viscometer.

Activity: Measure the Melt Flow Index (MFI) of a polymer sample.

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Quiz (20%), Assignments (30%), Internal Examinations (50%)

References:

1. Campbell, D., & White, J. R. (1989). *Polymer characterization: Physical techniques*. Chapman and Hall.
2. Seidel, A. (2008). *Characterization and analysis of polymers*. Wiley Interscience.
3. Pethrick, R. A., & Viney, C. (2003). *Techniques for polymer organization and morphology characterization*. Wiley Interscience.
4. Mirau, P. A. (2005). *A practical guide to understanding the NMR of polymers*. Wiley Interscience.
5. Turi, E. A. (1982). *Thermal characterization of polymeric materials* (2nd ed., Vols. 1–2).
6. Allen, W. S., & Baker, P. N. (2004). *Handbook of plastics technology: Volume 2, Identification testing & recycling of plastics*. CBS Publishers and Distributors.
7. Brown, P. F. (Ed.). (1988). *Handbook of plastics test methods*. Longman Scientific and Technical.
8. Brown, R. P. (Ed.). (1999). *Handbook of polymer testing*. Marcel Dekker.
9. ASTM. (2002). *ASTM test standards for plastics* (Vols. 8.01–8.04, 9.01 & 9.02).
10. International Organization for Standardization. (1998). *ISO test standards*.
11. Shah, V. (1984). *Handbook of plastics testing technology*. John Wiley and Sons. (SPE Monograph)

	Description of CO	PO	PSO1	PSO2
CO1	Understand and apply various molecular weight determination techniques for polymers.	PO1(3), PO2(2)	3	2
CO2	Interpret polymer structures using spectroscopic methods like FTIR, NMR, and UV-Vis.	PO1 (3), PO2(2), PO4(2)	2	2
CO3	Analyze polymer morphology and composition using microscopic and chromatographic tools.	PO1 (3), PO2(2), PO4(2)	1	3
CO4	Evaluate thermal and rheological properties to assess polymer performance and processing behavior.	PO1 (3), PO2(2), PO4(2)	2	1

PA25105	Polymer Characterization Laboratory	L	T	P	C
		0	0	4	2

Course Objectives:

- To get practice in testing the Physico-mechanical properties of plastic materials.
- To provide hands on experience on various polymerization techniques.
- To make the student understand simple experimental procedures to determine molecular weight and molecular weight distribution of polymers.
- To make the student familiarize with the thermal properties of polymers.
- To make the student understand simple techniques to identify the plastic materials.

List of Experiments:

1. Identification of Plastics materials.
2. Density and moisture analysis.
3. Melt flow Test (MFI/MFR)
4. FTIR Analysis
5. Measurement of viscosity of polymer solutions and determination of molecular weight of the polymer.
6. End group analysis.
7. Determination of acid value of a resin.
8. Study of Molecular weight distribution (GPC).
9. Determination of cure of a phenolic moulding (percentage acetone soluble matter).
10. Study of Thermal Stability of polymers.
11. Determination of K-value for PVC.
12. Determination of Filler content

Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%

Assessment Methodology: Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

Equipment Required:

Glassware for reactions and spot tests, Ostwald/Ubbelohde viscometer,

References:

1. ASTM. (2002). ASTM test standards for plastics (Vols. 8.01–8.04, 9.01 & 9.02).
2. International Organization for Standardization. (1998). ISO test standards.
3. Shah, V. (1998). Handbook of plastics testing technology. John Wiley & Sons.
4. Saunders, K. J. (1970). The identification of plastics and rubbers. Chapman and Hall.
5. Brown, R. P. (1981). Handbook of plastics test methods. George Godwin Ltd.

	Description of CO	PO	PSO1	PSO2
CO1	Identify and characterize polymers using FTIR, viscosity, and molecular weight analysis.	PO1(3), PO2(2)	2	3
CO2	Analyze polymer properties such as thermal stability and melt flow.	PO1 (3), PO2(2), PO4(2)	1	2
CO3	Evaluate polymer curing and processing behaviors.	PO1 (3), PO2(2),	3	2

PA25106	Plastic Processing Laboratory	L	T	P	C
		0	0	4	2

Course Objectives:

- To gain practical knowledge about hand operated injection moulding, semi automatic & automatic injection moulding machine, Blow moulding process.
- To identify defects, causes & remedies of the process.
- To select the suitable process parameters for a particular process.
- To learn about microprocessor controlled injection moulding machines, Blow moulding process, rotational moulding, thermoforming with different moulds and material.
- To understand the possible defects, its causes and setting of process parameters.

List of Experiments

1. Injection Moulding (Hand Operated ,Semi-Automatic)
2. Microprocessor controlled Injection moulding operation
3. Extrusion Process
4. Compression Moulding
5. Blow Moulding and stretch blow moulding
6. Vacuum Forming
7. Rotational Moulding
8. Coating of Plastics
9. Welding & Sealing of Plastics
10. FRP, Hand layup process
11. Co-extrusion process
12. Machine Maintenance
13. Mould Study

References:

1. Athaly, A. S. (1997). *Injection moulding practice*. Multi-Tech Publishing Co.
2. Lee. (1998). *Blow moulding design guide*. Hausar Publishers.
3. Hensen, F. (1988). *Plastics extrusion technology*. Hansar Publishers.
4. Rubin, I. (1972). *Injection moulding theory and practice*. Wiley Interscience.

Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%

Assessment Methodology: Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

Laboratory Requirements

1. Injection moulding machine (conventional, semi automatic) - 2Nos.
2. Plastic tube extrusion machine - 1No.
3. Plastic film extrusion machine - 1No.
4. Compression moulding machine - 1No.
5. Microprocessor controlled injection moulding machine - 1 No.
6. Blow moulding machine (Automatic) - 1 No.
7. Vacuum forming machine - 1 No.
8. Rotational moulding machine - 1 No.
9. Plastics coating machine - 1 No.
10. Ultrasonic welding machine - 1 No.
11. Plastic sealing machine - 1 No.
12. Printing machine (on plastics) - 1 No.
13. Machine maintenance kit - 1 No.
14. Moulds maintenance kit - 2 Nos.
15. Moulds for plastic products - 1 No.
16. FRP hand layup kit - 1 No.
17. Plastic co-extrusion film plant - 1 No.

	Description of CO	PO	PSO1	PSO2
CO1	Demonstrate proficiency in operating and controlling plastic manufacturing processes such as injection moulding, extrusion, and blow moulding.	PO1(3), PO2(2)	3	2
CO2	Analyze and optimize the performance of plastic manufacturing equipment through techniques like welding, coating, and maintenance.	PO1 (3), PO2(2), PO4(2)	2	1
CO3	Evaluate and implement process improvements for enhanced product quality and operational efficiency in plastic production.	PO1 (3), PO2(2),	2	2