

ME351: PLASTIC TECHNOLOGY
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

To illustrate the properties, applications, manufacturing techniques and waste management's systems of plastic materials.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				Total Marks
L	T	P	C	Theory		Practical		
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Contents:

Sr. No.	Topics	Teaching Hrs.
1	<p><u>Plastic Materials and its Advantages:</u></p> <p>Introduction, nomenclature of polymers, mechanical properties, effect of environmental parameters on properties of plastic. Standards and specifications for polymers including test specimen preparation – preconditioning procedure.</p> <p>Use and advantage of polymers as a substitute materials.</p>	08
2	<p><u>Manufacturing processes for Polymers:</u></p> <p>Principle of operation, equipments and applications for processes like Extrusion, Injection molding, Blow molding, rotational molding, Thermoforming molding, compression and transfer molding. Economic processes of plastic.</p>	12
3	<p><u>Plastic Product Design:</u></p> <p>Design consideration of plastic products, Aesthetics, Ergonomics and DFMA.</p>	05
4	<p><u>Plastic Mould Design:</u></p> <p>Parting line-Construction of core and cavity-types of gate-types of ejection-Mould temperature control - cooling - Mould alignment Mould ancillary parts. Types of moulds-two plate - three plate - split moulds - Machine selection-Principles of shrinkage allowances-materials for mould parts-life of mould-mould maintenance-case studies on mould design. Injection Moulds for threaded components – automatic unscrewing – various unscrewing methods.</p>	07
5	<p><u>Plastic Storage:</u></p> <p>Storage and handling of plastic and chemicals used in plastic industry (such as resins, solvents, plasticisers, pigments etc), and problems such as flammability, toxic fumes, limitation of working under heat etc.</p>	04

Plastic & environment value additions, global policy, regulations, waste energy management. Waste treatment of various plastic plants, environment pollution. Need for recycling – Sorting and segregation of waste – Plastic identification-Plastic production and composition – Plastic waste – Composition, quantities and disposal alternatives. Primary recycling – Equipments for primary recycling. Specific recycling techniques – PE films, PP battery case – Crushing and separation – PET films. Recycling of plastic from urban waste – Bio-Degradable plastic-rheology, density, mechanical behavior. Secondary recycling Plastic wastes containing paper – hydrolytic treatment – processing methods – processing of mixed plastic waste – household waste – industrial sector.

TOTAL 42

List of References:

1. Plastic Waste Management" Marcel Dekker, New York, 1995.
2. Edited by Nabil Mustafa, Plastic waste management, 1st edition, Marcel Decker, New York, 1993.
3. John Schiles, Polymer Recycling. Edited by Dr.J.S.Anand, Recyclic & Plastic Waste Management, CIPET, Journal of India, 1997.
4. Robert A. Malloy, "Plastic Part Design for Injection Moulding", Hanser Publishers, Munich Vienna, New York, 1994.
5. Paul A. Tres, "Designing Plastic Parts for Assembly", 2nd Revised Edition, Hanser Publishers, Munich Vienna New York, 1994.
6. N G Mc Crum, Principles of Polymer Engineering, Oxford Science Publications, New York, 1997
7. Pye, R.G.W, Injection Mould Design for Thermoplastic
8. Dym, Injection Mould & Molding
9. Sharma, S.C,Plastic Design & Processing
10. Glanvill & Denton, Injection Mould Design Fundamentals (Vol. I& II)
11. Serope Kalpakjian, Steven R Schmid and Hamiden Musa Manufacturing Engineering and Technology Sixth Edition, Pearson publication 2009

Course Outcomes (COs):

At the end of this course students will be able to ...

1. Illustrate the properties of plastic and their advantages and determine Standards and Specifications.
2. Explain capabilities and applications of processes used fir polymers.
3. To analyze plastic product design.
4. To analyze mould design for plastic.
5. Illustrate the storage and handling of plastic materials.
6. Illustrate plastic waste management & recycling techniques as per the government policy.