GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Plastic Engineering
SUBJECT NAME: SAFETY POLLUTION AND WASTE MANAGEMENT IN PLOYMER INDUSTRIES.

SUBJECT CODE:3712412
M.E. 1st SEMESTER

Type of course: Program Elective - II

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction –** Sources of plastics waste – Separation technologies, viz. Sorting – Manual, automated, Density separation, Flotation, Solvent separation, Melt filtration, Separation of resin from fiber in waste FRP.	7	15%
2	**Plastics waste management** – 4 R & I approach viz. Source reduction, Reuse, Repair, Recycling, and Incineration with examples. Plastics recycling – Classification – Code of practice - Primary, secondary, territory and quaternary recycling with examples – Co-extrusion and Co-injection moulding – Waste plastics as fillers	10	22%
3	**Mechanical Recycling of Commonly Used Plastics, Such as PP, PE, PET, Etc.** **Mixed Waste Recycling** – co-extruded films waste, commingled waste – Extrusion flow moulding for production of plastics lumbers, chemical recycling/feedstock recycling processes for recovery of oil, monomer and energy – thermolytic processes. Solvolysis –process outline for PMMA, PET, etc. Fluidised bed incinerator with energy recovery.	10	23%

4	**Recycling of Plastics by Surface Refurbishing** – Application of a coating, polishing with examples – Plastics ageing – Environmental ageing – Thermal ageing – Chemical degradation – Wear and erosion. Biodegradable plastics – an over view.	**9**	20%
5	Environmental issues, policies and legislation in India, Review, Tutorial section. Plastics – Energy saving, Eco-friendly – Case studies. Life cycle analysis – a model.	**6**	13%
6	REACTIVE EXTRUSION	**3**	7%

Reference Books:

1. R. Johanner Brandrup, Recycling and recovery of plastics, Hanser Publishers, New York, 1996.
2. Nabil Mustafa, Plastics Waste Management, Disposal Recycling and Reuse, Marcel Dekker, Inc. New York, 1993.
3. Ehrig, Plastics Recycling, Products and Processes, Hanser Publishers, New York, 1992.
4. Gerald D. Andrews & Pallatheri M. Subramanian, Emerging Technologies in Plastics
5. Recycling, American Chemical Society, Washington, DC 1992.

Course Outcome:

After learning the course the students should be able to:

List of Experiments:

1. **To Study and perform Primary Recycling**
2. **To understand separation of Plastics Waste**
3. **To understand the 4R s in Plastic waste Management**
4. **To understand mixed waste recycling**
5. **To perform recycling of Plastics films**
6. **To understand reuse of Plastics Waste**
7. **To STUDY reactive Extrusion process**
8. **To understand recycling of PET bottles**
9. **To understand recycling of Engg. Thermoplastics**
10. **To study life cycle analysis**