GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)

RECYCLING AND PACKAGING OF POLYMER AND RUBBER
SUBJECT CODE: 2183611
B.E. VIIIth SEMESTER

Type of Course: Chemical Technology

Prerequisite: Studied subject PR-10(Recycling & Packaging of Polymers & Rubbers) basic knowledge of recycling and packaging.

Rationale: The main objective of this subject is to study the packaging and recycling of the rubber & polymers in chemical industries. This subject provides fundamental knowledge of various types of methods and procedure used in packaging and recycling of rubber & polymers in chemical industries.

Teaching 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		
4	0	0	4	70	20	10	0	0	0	100

Content:

Sr. No.	Topic	Teaching Hours	Module Weightage (%)
1	**Introduction of Plastics Waste-** Sources of plastics waste, Plastic identification and Separation techniques, recycling codes	7	14
2	**Plastics Waste Management-** (Reduce, reuse, recycle – mechanical and chemical, recover), recycling classification- - primary - secondary - tertiary - quaternary recycling with examples. Recycling of polyolefin's - PVC, PET, polystyrene, polyamides-nylon-6 and nylon-6, 6, polyurethanes, mechanical process, applications of recycled materials, Handling of E-Waste.	10	20
3	**Recycling of Rubber**– comparison of thermoset and thermoplastic composites, reclaiming of rubber – fuel source – pyrolysis, Depolymerisation of scrap rubber, tyre retreading, uses of recycled rubber – asphalt modification, rubber tiles and other uses.	10	20
4	**Introduction of Plastic and Rubber Packaging-** Plastics-performance all wrapped up, Flexible packaging material, Lamination techniques, Printing on films/ laminates	8	16
5	**Characteristics of Packaging-** films such as – Permeability, Heat	7	14

	seal, Printing, Drop impact		
6	**Selection Criteria-** Flexible packing materials. Product performance requirements for laminates.	8	16

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
60	**10**	**10**	**10**	**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. Progress in Rubber, Plastics and Recycling Technology
2. Recycling of Rubber By H. J. Manuel, W. Dierke
3. Recycled Polymers: Properties and Applications
4. Introduction to Plastics Recycling, 2nd Edition
5. Plastic Recyling by Sati Manrich, Amelia S.F. Santos

Course Outcomes:

1. To get a knowledge of how the material are recycle and how the packaging & what are recent trends in Polymer & Rubber Technology.
2. To be able to apply this knowledge in Polymer & Rubber industries.
3. To build a bridge between theoretical and practical concept used in industry

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.