GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)
POLYMER & RUBBER MATERIAL-II
SUBJECT CODE: 2153606
B.E. 5thSEMESTER

Type of Course: Chemical Technology

Prerequisite: Studied subject PR-04(Polymer & Rubber Materials- II) basic knowledge of the material which are types of polymer and rubber.

Rationale: The main objective of this subject is to study the various materials which are included in rubber & polymers in chemical industries. This subject provides fundamental knowledge of various materials and how they are synthesis and what are the basic properties of materials in rubber & polymers in chemical industries.

Teaching and Examination 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		
3	0	3	6	70	20	10	20	10	20	150

Content:

Sr. No.	Topic	Teaching Hours	Module Weightage (%)
1.	Alkyl resins- Modified alkyls, raw materials, oils & film forming materials	7	14
2	Polyesters Resins-Unsaturated polyesters resins, composites & fibre reinforced polyesters	7	14
3	Phenolic resins- Alkali catalyzed & acid catalyzed reactions, CNSL based resins	8	16
4	Amino resins- Raw materials, UF, PF & MF resins.	8	16
5	Epoxy resins- Polyurethanes for molding & for coating industry.	9	18
6	Silicones- Elastomers of silicon, Thermosetting acrylics.	5	10
7	Vulcanization- Technology of Cross linking processes Technology of Vulcanization & DE vulcanization of rubbers.	6	12

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%**	**-**

Reference Books:

1. Text book of Polymer Science, Billmeyers,John Wiley & Sons 1984.
2. Encyclopedia of Polymer Science & Technology, John Wiley & Sons, Inc 1965
3. Encyclopedia of Polymer Science & Engineering, John Wiley & Sons, Inc 1988.
4. Polymer Chemistry Malcolm P. Stevens, Oxford University Press, Inc, 1990
5. Introduction to Polymer Science & Technology, H.S.Kaufman & J.J.Falcetta, Wiley – Interscience Publication, 1977
6. Introduction to Rubber Technology, Andrew Ciesielski, RAPRA Publications, 2000
7. Rubber Technology, Maurice Morton, Springer, 1st Ed, 1987
8. The Science and Technology of Rubber, Mark and Erman, Academic Press, 3rd Ed, 2005
9. Rubber Technology, Morell S H, Applied Science Publication, 1981

Course Outcome: After learning this course the students can:

1) To get knowledge of how the materials are synthesis and what are the raw materials used for the preparation of the materials 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.

List of Experiments:

1. Preparation of Phenol formaldehyde Resin.
2. To determine the amine value of given sample.
3. To determine the acid value of given sample.
4. To determine the saponification value of given sample.
5. To determine the iodine value of given sample.
6. To determine the epoxy equivalent weight of given sample.
7. To determine the acetylation of given sample.
8. To determine the ester value of given sample.
9. To determine the viscosity of given sample.
10. To determine the % oil length of given sample.

Design based Problems (DP)/Open Ended Problem:

Application and utility of AMINATION as unit process in Chemical Technology

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. The best three works should submit to GTU.