GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3152611
Semester – V

Subject Name: Toxicity and Safe Handling of Rubber Chemicals

Type of course: Open Elective Course
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)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction: Toxicity, Occupational Exposure limits, Threshold limit values, Interpreting Exposure limits, Carcinogenicity, Mutagenicity, toxic to reproduction, Dermatitis, Respiratory Sensitizers, Risks and Safety Phrases, EINECS and CAS Numbers.	03
2	Classification of Rubber Chemicals: Health Effects, Carcinogenic, Mutagenic, Toxic for reproduction, Environment, other Hazards etc.	04
3	Recommendation for Handling Rubber Chemicals: Personal Hygiene, Handling, Storage and Disposal, General & Local exhaust Ventilation, Skin protection and protective clothing, Eye Protection, First Aid & Medical Fecilities	07
4	Health Surveillance for Rubber Workers: Exposure to Rubber Process Dust & Fume, Health Surveillance for miscellaneous exposures, for Isocynates, for respiratory systems, for MbOCA	06
5	Control of Workplace Exposure: Workplace Exposure Limits, Monitoring Strategies, Methods of measuring atmospheric dust levels, Measurement of Fumes from Hot Rubber, Measurement of atmospheric Solvent Concentrations, Safe to Breath-Dust & Fume control in rubber industry	06
6	Information for individual products or product groups : Introduction, group name, chemical name, structural formula, physical form, Melting point, Specific gravity, staining behavior, normal level of use, fire precautions, health hazards, regulatory labeling, emergency first aid procedure, use in food stuff applications, storage conditions for Natural & Synthetic Polymers, Reinforcing Agents, tackifiers, & Fillers, Accelerators & Retarders, Vulcanizing Agents, Antidegradants, Organic Peroxides, Plasticizers, Bonding and Blowing Agents, Rubber Solvents, Pigments etc.	10

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Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
12	12	16	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:

- Toxicity and Safe Handling of Rubber Chemicals, Fourth edition by Rapra Technology
- Plastic, Rubber & Health by Guneri Akovali
- Toxic Hazards of Rubber Chemicals By: A. R. Nutt.

Course Outcomes:

After learning this course students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Evaluate the exposure limits for using different rubbery chemicals in manufacturing rubber products.	15
CO-2	Solve the problems for Safe to Breath-Dust & Fume control in rubber industry	15
CO-3	Analyze the effects of different chemicals	15
CO-4	Identify the hazardous effects of rubbers & Rubbery materials	15
CO-5	Explain the importance of handling of Rubber Chemicals	10

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Major Equipment:

Specific gravity balance, Weighing balance, Muffle furnace, Oven etc.

List of Open Source Software/learning website:

- http://www.nocil.com/
- https://www.researchgate.net/publication/16548738_Toxicity_of_rubber_chemicals_towards_three-day_chicken_embryos