

GUJARAT TECHNOLOGICAL UNIVERSITY

RUBBER TECHNOLOGY (26)

LATEX TECHNOLOGY

SUBJECT CODE: 2142605

B.E. 4th SEMESTER

Type of course: B.E. (Rubber Technology)

Prerequisite: Nil

Rationale: Nil

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
		PA	ALA		ESE	OEP				
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Natural Latices: Tapping: Introduction, Early tapping system, modern tapping system, factors which affect the yield of latex & rubber, other methods of tapping, improvement of latex yield.	4	5
2	Preservation of Natural rubber Latex: Preliminary consideration, The ideal preservative for natural rubber latex, Ammonia as a preservative, Low-ammonia preservation system, other preservative for natural rubber latex.	5	5
3	Concentration of natural rubber Latex: Preliminary consideration, Concentration by evaporation, creaming, centrifugation and electrodecantation, Properties of natural rubber latex concentrates, Redispersible natural rubber from natural rubber latex.	5	10
4	Fundamental Latex Characteristics: Particle size & distribution, Stability & destabilization of lattices, Concentration, viscosity, concentration relationship, surface, free energy & wetting behavior, zeta- potential, electrical prop. of colloidal systems, thermal measurement of molecules, kinetics of Brownian motion.	5	10
5	Gelation Of Natural Latex: Zinc oxide solubility with pH, Heat gelling systems, Delayed action gelling system using sodium silicofluoride, significance of pH/time gelation cure foaming, frothing time cure, foam, viscosity, delayed action gelling.	5	10
6	Latex Compounding Ingredients: Introduction, Rubber vulcanizing agents, rubber vulcanization	5	10

	accelerators, rubber vulcanization activators, rubber anti-oxidants, fillers and pigments, surface active substances, viscosity-modifiers and macromolecular colloid stabilizers, other latex compounding ingredients.		
7	Preparation of Solutions, dispersions and emulsions for Latex Compounding: General considerations, Preparation of aqueous solutions for addition to latices, Preparation of aqueous dispersions of solid latex compounding ingredients, preparation of oil -in-water emulsions for addition to latices, representation of latex formulations.	5	10
8	Latex Processing & Testing Equipments: Planetary mixer, turbo mixer, Jar mill, Ball mill or pebble mills, Indentation hardness tester for foam, flex resistance tester, Mechanical stability tester, difference between processing of latex and milled rubber, summary of hints for latex compounding and processing.	5	10
9	Latex Moulding & Casting: Outline of latex-moulding and casting processes, latex-moulding processes using plaster molds, latex-moulding processes using metal moulds, other latex-moulding and casting processes, after treatments for latex mouldings, castings and compounding.	5	10
10	Latex allergy: Introduction, causes, remedies, types of latex reactions and allergy, Diagnosis of latex allergy, management of latex allergies etc.	5	10
	Test for Latex: Viscosity, KOH number test, Mechanical stability test, VFA number, Surface tension, zinc oxide viscosity test, zinc oxide thickening test, kalaxon stability tester , determination of gelling pH, determination of pH, determination of total copper, determination of total iron, determination of total manganese, determination of total nitrogen, determination of total ash etc.	5	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
14	14	14	14	14

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate 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. Natural Rubber Science & Technology By: Roberts.
2. Hand book of Rubber Projects, Tech. & Product Formulary. By: SBP Consultants & Engineers (P) Ltd.
3. Polymer Latices Vol. 2 by D. C Blackley
4. Polymer Latices Vol. 3 by D. C Blackley

Course Outcome:

After learning the course the students should be able to:

1. Understand the factors which affect the yield of latex & rubber.
2. Learn the preservation system.
3. Study about Properties of natural rubber latex concentrates and concentration methods.
4. Know about gelation of natural rubber latex.
5. Learn about latex compounding ingredients.
6. Able to prepare the Solutions, dispersions and emulsions for Latex Compounding.
7. Study about latex processing equipment and its characteristics.
8. Differentiate between latex mouldings and castings.
9. Identify the Latex allergy and taking precaution for it..
10. Study about the various test for latex and check their purity..

List of Experiments:

Tutorials/Presentation/Practicals based on above topics

Design based Problems (DP)/Open Ended Problem:

- Development of Preservative for Natural Rubber Latex.
- Microbial activity in natural rubber latex with currently existing preservative systems.
- Preventing Allergic Reactions to Natural Rubber Latex.

Major Equipment:

Planetary Mixer, Turbo Mixer, Jar Mill, Flex Resistance Tester, Compression Set Tester etc

List of Open Source Software/learning website:

- www.sculpt.com/catalog_98/CastingMaterials/LATEX/latex.htm
- [material.eng.usm.my/stafhome/.../Week%205%20Elastomer\(rubber\).ppt](http://material.eng.usm.my/stafhome/.../Week%205%20Elastomer(rubber).ppt)
- www.mambaby.com/uploads/tx_dddownload/Latex_Report.pdf

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.