GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3132605
Semester III
Subject Name: Latex Technology

Type of course: Professional Core 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)	
3	0	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Cultivation of Natural Rubber Latex:** The principal rubber tree: General description, more detailed structure of the mature trunk, The Hevea brasiliensis plantations: Conditions required for the growth of Hevea brasiliensis, Regions of the world where Hevea brasiliensis is found, outline of the history of the Hevea brasiliensis plantations, Propagation of Hevea brasiliensis: Introduction, Propagation by seed, Vegetative propagation.	5
2	**Natural Lattices :** Tapping: Introduction, Early tapping system, modern tapping system, factors which affect the yield of latex & rubber, other methods of tapping, improvement of latex yield, Redispersible natural rubber from natural rubber latex.	5
3	**Preservation of Natural Rubber Latex:** Preliminary considerations, The ideal preservative for natural rubber latex, Ammonia as a preservative, Ammoniation, Low-ammonia preservation system, other preservative for natural rubber latex.	5
4	**Concentration of Natural Rubber Latex:** Preliminary considerations, Concentration by evaporation, creaming, centrifugation and electrodecantation, Properties of natural rubber latex concentrates.	5
5	**Colloid Science :** Colloidal Dispersions, Stability of Colloidal Dispersions, Types of Colloidal Solution, Preparation and general characteristics of Colloidal Solution, Dialysis, Electrical Properties of colloidal systems, Electrophoresis of Lattices, Thermal measurement of molecules, kinetics of Brownian motion, Association Colloids, Gels, Emulsions, Applications of Colloids.	8
6	**Fundamental Latex Characteristics & Its Gelation:** Particle size & distribution, Stability & destabilization of lattices, viscosity, concentration relationship, surface free energy & wetting behavior, zeta- potential, Zinc oxide solubility with pH, Significance of Gelation , Heat gelling systems, Delayed action gelling system , significance of pH/time gelation cure.	8
7	**Latex Compounding Ingredients:** Introduction, Rubber vulcanizing agents, rubber vulcanization accelerators, rubber	7

	vulcanization activators, rubber anti-oxidants, fillers and pigments, surface active substances, viscosity-modifiers and macromolecular colloid stabilizers, other latex compounding ingredients.	
8	**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.	**6**
9	**Latex allergy:** Introduction, causes, remedies, types of latex reactions and allergy, Diagnosis of latex allergy, management of latex allergies etc.	**5**

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**
10	10	20	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:

- Natural Rubber Science & Technology By: Roberts.
- Hand book of Rubber Projects, Tech. & Product Formulary. By: SBP Consultants & Engineers (P) Ltd.
- Polymer Latices Vol. 2 by D. C Blackley.
- Polymer Latices Vol. 3 by D. C Blackley.
- Rubber Engineering, IRI

Course Outcomes:

After learning this course students will be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Understand the factors which affecting the yield of latex	15
CO-2	Compare the different preservation systems and their importance in latex	15
CO-3	Analyze the various Colloidal systems and gelation mechanism of natural rubber latex.	20
CO-4	Design the latex compounding ingredient Formulation.	20
CO-5	Prepare the Solutions, dispersions and emulsions for Latex Compounding.	15
CO-6	Diagnose Latex allergies	15

List of Experiments:

Tutorials/Presentation/Practicalsbased on above topics.

Major Equipment:

Jar Mill, pH Meter, Density bottle, Hot Air Oven

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
- www.mambaby.com/uploads/tx_dddownload/Latex_Report.pdf
- shodhganga.inflibnet.ac.in/bitstream/10603/70533/7/07_chapter%201.pdf