GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3152608
Semester – V
Subject Name: Synthetic Rubbers

Type of course: Professional Core Course
Prerequisite:
Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Styrene-Butadiene Rubber (SBR) : Introduction, Preparation, Structure and Variations of Emulsion SBRs, Structure and Variations of Solution SBRs, IISRP Numbering System, General Properties, Comparison of Solution and Emulsion SBRs, Compounding, Processing, Applications	06
2	Polybutadiene Rubber (PBR) : Manufacture, Structure and Properties of Polybutadienes, IISRP Numbering System, Classifications, Processing and Applications.	06
3	Synthetic Polyisoprene (IR) Rubbers: Preparation of Synthetic Polyisoprene (IR) Rubbers, Properties, IISRP Numbering System, Processing, Applications	06
4	Ethylene-Propylene Rubbers (EPM & EPDM): Introduction, Manufacture, Structure and Properties, Variables between Grades, General Vulcanizate Properties, Processing, and Compounding.	06
5	Isobutene-Isoprene (Butyl) Rubbers : Introduction, Manufacture, Structure-Property Relationships, Grades, General Vulcanizate Properties, Processing, Compounding, Applications of Unmodified Butyl Rubbers, Halobutyl Rubbers, Vulcanization, Applications, Cross-linked Butyl Rubbers.	06
6	Chloroprene Rubber (CR) : Introduction, Production of Polychloroprene, Structure of CR & Structural Variables, Classification ,Structure & Properties, Processing, Compounding (Curing Systems & other additives),Applications.	06
7	Acrylonitrile Butadiene (Nitrile) Rubbers: Introduction, Preparation, Structure & Properties General Vulcanizate Properties, Processing, Compounding (Blends with other polymers) Special Grades of Nitrile Rubber, Applications	06
8	Silicones/Silicone Rubber : Introduction, Nomenclature of Organosilicone Compounds & Elastomers, Manufacture of Silicone Elastomers, Structure & Properties of Silicone Elastomer Polymers, General	06

	Properties, Compounding (Curing Systems, Fillers, Other additives), Processing, Liquid Silicone Rubbers, Room Temperature Vulcanizing Rubbers (RTV), Applications	
9	Rubber-Rubber Blends: Introduction, Morphology, Analytical methods for Blend Characterisation, Preparation of Rubber Blends, Properties of Rubber Blends	**06**

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:

- Synthetic Rubbers, their Chemistry and Technology, by D. C. Blackley.
- Handbook of Elastomers: New Development & Technology by Anil K. Bhowmick, Howard L. Stephenes
- Rubber Technology, by Maurice Morton
- Rubbery Materials & their Compounds, by J. A. Brydson

Course Outcomes:

After learning this course students will be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Differentiate between Natural & Synthetic rubbers	15
CO-2	Identify chemistry & manufacturing process of different Synthetic rubbers	15
CO-3	Classify different grades of Synthetic rubber and its importance	10
CO-4	Develop various rubber products according to application	15
CO-5	Design the different rubber blend formulation according to application	15

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Major Equipment:

Hardness Tester, Compression Set Tester, Tensile Tester, Specific Gravity tester etc.

List of Open Source Software/learning website:

- http://chemwiki.ucdavis.edu/
- http://pubs.acs.org/
- https://www.crcpress.com/