GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162611
Semester – VI
Subject Name: Engineering Rubber Products

Type of course: Professional Elective course- III

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	2	4	70	30	30	20	150

Content

Sr. No.	Content	Total Hrs
1.	Ebonite Rubber: Introduction, Properties, applications, Manufacturing of ebonite rod.	**03**
2.	Sports Goods: Tennis ball, Conventional wound golf ball, Solid golf ball, simple play ball, football bladder.	**04**
3.	Hospital Rubber Goods: Compound design, formulations, Manufacturing process of Hot water bags and ice bags, Rubber sheets, surgical tubing.	**04**
4.	Rubber Gasket, Washers & Seals: Properties of seal materials, selection of Rubber for oil seals, Types of seals, Methods of manufacture, formulations.	**05**
5.	Rubber Rollers: Introduction, Application, Method of manufacture, Compound design, Different types of rollers.	**04**
6.	Rubber Lining & Electro deposition of Metals: Lining of tanks, Lining of Piper and fittings, Lining of barrels and drums, Lining of pickling tanks etc., Rubber armor, Compounding and Formulations, Electro deposition of rubber.	**04**
7.	Printing Blankets: Introduction, Compound design, Method of manufacture, Practical problems, Remedies, Applications etc.	**04**
8.	Defense Rubber Articles: Introduction, Compound design, Method of manufacture, Applications etc.	**04**

9.	Rubber in Automobile Industries: Introduction, Automobile brake linings, Brake chamber diaphragm, Brake pedal pads, Formulations.	**05**
10.	Vibration Isolators and Mounts: Definition of Vibration & Shock, Principles of Isolation, Principles of Damping, Combination of Isolation and Damping, designing and Compounding for Vibration Isolation and Shock Absorption, Manufacturing Technology.	**05**
11.	Dockside Fenders: Introduction, Different types and designs of rubber fenders units: Tubular Fender, Oil Jetty Fender, Pneumatic Fender, The Rykin Fender, The Lord Fender etc.	**04**
12.	Bridge Bearings: Introduction, types of bridge bearings, Design considerations, Installation, Testing & Developments.	**04**
13.	Expansion joints: Types of Joints, The sealing of Joints in various structures, Design and performance of Rubber Water stops, Rubber Bellows.	**04**

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	15	10	10	10	15

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:

- Rubber Products Manufacturing Technology by Anil K. Bhowmick
- Rubber Technology by C.M.Blow
- Theory and Practice of Engineering with Rubber by P.K. Freakley and A.R.Payne
- Use of Rubber in Engineering by P.W.Allen, P.B.Lindley, and A.R.Payne

Course Outcomes:

After learning this course students will be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Relate the importance of various rubber products and their properties for different engineering applications.	10
CO-2	Develop the rubber compound as per required product specifications.	15

CO-3	Explain and interpret the manufacturing techniques of different engineering rubber products.	15
CO-4	Evaluate the performance of rubber products during service life.	15
CO-5	Analyze the structure and design of different molded rubber articles.	15

List of Experiments:

Tutorials/Presentation/Practical based on above topics.

Major Equipment:

Mixing Mill, Calender Machine, Semi Hydraulic Press, Universal Tensile testing Machine, Oscillating Disc Rheometer, Mooney Viscometer, Compression Set Tester, Durometer etc.

List of Open Source Software/learning website:

- http://www.sciencedirect.com/
- http://www.warco.com/engineering/
- https://www.flexachem.com/pipes-fittings/expansion-joints-bellows/rubber-bellows/bellows-technology/
- https://www.express-journal.com/rubber-marine-fender-market-41969/
- https://www.essentracomponents.com/en-gb/news/guides/a-guide-to-anti-vibration-mounts