

GUJARAT TECHNOLOGICAL UNIVERSITY

RUBBER TECHNOLOGY (40) SPECIALITY ELASTOMERS & ITS TECHNOLOGY (SET) SUBJECT CODE: 2724006 SEMESTER: II

Type of course: Major elective-II (M.E.Rubber Technology)

Prerequisite: NA

Rationale: NA

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)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No	Course Content	Total Hrs	% Weig htag e
1.	Modified natural rubber: Hydrogenated natural rubber, chlorinated natural rubber, hydro halogenated natural rubber, cyclized natural rubber, resin-modified natural rubber, poly(methylmethacrylate)-grafted natural rubber, enpcaf-modified natural rubber, liquid natural rubber.	8	15
2.	Chemical modification of synthetic elastomers : Hydrogenation, cyclization, isomerization, halogenation and hydrohalogenation and recent developments.	8	15
3.	Short fiber-filled rubber composites : Introduction to rubber composites, methods for the analysis of fiber orientation, mixing effects.	8	15
4.	Tetrafluoroethylene-propylene rubber: Introduction, manufacturing, polymer structure and fundamental properties, compounding and vulcanization, vulcanizate properties and applications.	7	10
5.	Carboxylated rubber : Introduction, preparation of carboxylic rubbers, composition of carboxylated emulsion polyfvlrs, vulcanization of carboxylated rubbers, scorch, and bin storage stability of carboxylic elastomers, compounding ingredients for carboxylated elastomers, physical properties, applications for carboxylated elastomers	8	15
6.	Acrylic-based elastomers : Introduction, basic structure, methods of production, compounding techniques, processing characteristics, vulcanization methods, physical properties, applications.	7	15
7.	Crosslinked polyethylene : Introduction, basic structure, compounding and mixing of polyethylene, processing, physical properties of crosslinked polyethylene, applications of crosslinked polyethylene.	8	15

Reference Books:

- Handbook of Elastomers edited by Ani1 K. Bhowmick and Howard I. Stephens

Course Outcome:

After learning the course the students should be able to:

- Learn about different grades of Natural Rubber.
- Learn about the Composites of rubber with short fiber.
- Know about the importance of fibre orientation.
- Understand the vulcanizate properties and applications of Tetrafluoroethylene-propylene rubber.
- Production of Acrylic-based elastomers.
- Learn about processing & physical properties of crosslinked polyethylene.
- Understand the mixing effects of Short fiber-filled rubber composites.

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Open Ended Problems:

1. The Physical Modification of a Natural Rubber-Polypropylene Thermoplastic Elastomer Blend by Azobisformamide Blowing Agent.
2. Biomedical Applications of Nondegradable Polymers.
3. Dynamic Properties and Swelling Behaviour of Bamboo Filled Natural Rubber Composites : The Effect of Bonding Agent.
4. Exploring a novel multifunctional agent to improve the dispersion of short aramid fiber in polymer matrix.

Major Equipments:

Mixing Mill, Calender Machine, Abrasion Tester, Ross Flexing Machine etc.

List of Open Source Software/learning website:

- <http://www.crcpress.com>
- <http://journal.ippi.ac.ir/>
- [http://www.expresspolymlett.com/.](http://www.expresspolymlett.com/)

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website