

GUJARAT TECHNOLOGICAL UNIVERSITY

RUBBER TECHNOLOGY (40)

RUBBER BLENDS (RB)

SUBJECT CODE: 2724002

SEMESTER: II

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

Prerequisite: NA

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		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	% Weightage
1.	Rubber-Rubber blends: Introduction, morphology, analytical methods for blend characterization, preparation of rubber blends, properties of rubber blends, multiphase elastomers, miscible blends.	9	15
2.	NR/NBR Blends: Introduction, NR/BR41, NR/Krynac 34.50 Blends, Improving the Morphology and Properties of NR/NBR Blends with NR/PMMA Graft Copolymers, Improving the Morphology and Properties of NR/NBR Blends with Polychloroprene as the Compatibilizing Agent, NR/NBR Blends – Compounding for Food Contact Applications.	9	20
3.	Novel Natural Rubber/Ethylene Propylene Copolymer (EPM) Blends: Introduction, Dynamic Vulcanization, Selection of Dynamic Cure System, Dynamic Vulcanization of NR/EPM Blends, The Sandwich Mix Cycle, Processing Behaviour, Vulcanization of DV Blends, Resistance to Environmental Damage.	9	15
4.	Natural Rubber/ENR-25 Blends : Introduction, Designed Experiments, Plasticizer Investigations, Cure Systems, Dynamic: Static Modulus Ratios, Tri-Blends, Improving Resistance to Low Temperature Crystallization in NR/ENR-25 Blends.	9	15
5.	NR/EPDM Blends : Solutions to the Basic Problems of Poor Physical Properties of NR/EPDM Blends, Approaches to Improving NR/EPDM Blend Properties, Mixing Procedures, Effect of EPDM Modification on Crosslink Density, Effect of EPDM Modification on Phase Morphology, Interaction of Modified EPDM and Carbon Black, Physical Properties, High Temperature Curing Effects, Modification of Different EPDM Grades, Compounding NR/EPDM Blends for Light-Coloured Applications NR/EPDM Blends for Extruded Profile Weather-strip.	9	20

6.	Blends of carboxylated elastomers with other polymers : Blends of carboxylated and regular nbr, blends of carboxylated NBR with polybutadiene, with epichlorohydrin rubber, with pvc, with regular NBR and pvc, with chlorosulfonated polyethylene, with chlorobutyl rubber, with polychloroprene, with modified natural rubber, with polyacrylic rubber, with polyolefins, blends of carboxylated elastomers with polyamides, blends of carboxylated EPDM with polyethylene terephthalate.	9	15
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Reference Books:

- Blends of Natural Rubber Novel Techniques for Blending with Specialty Polymers Edited by Andrew .J Tinker and Kevin P. Jones; Publisher: CHAPMAN & HALL
- Handbook of Elastomers edited by Ani K. Bhowmick and Howard I. Stephens

Course Outcome:

After learning the course the students should be able to:

- To learn the morphology of rubber & its blends..
- To Learn about analytical methods for blend characterization.
- Understand the Processing Behaviour of Blends.
- Develop the Solutions to the Basic Problems of Poor Physical Properties of Blends.
- Able to do Modification of Different Rubber Grades.
- To Learn the Improving the Morphology and Properties of Blends

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Open Ended Problems:

1. Multiphase design of autonomic self-healing thermoplastic elastomers.
2. Improving Phase Morphology & Properties of NR/NBR blends with Compatibilizers.
3. Radiation Modification of EPDM Rubber : Evaluation of Wettability and Biocompatibility.

Major Equipments:

Mixing Mill, Moulds, Tensile Testing Machine, Oscillating Disc Rheometer, Mooney Viscometer etc.

List of Open Source Software/learning website:

- <http://www.sciencedirect.com/>
- <http://rri.nsf.ac.lk/>
- <http://www.scirp.org/>

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