

GUJARAT TECHNOLOGICAL UNIVERSITY

RUBBER TECHNOLOGY (26)

RUBBER ENGINEERING

SUBJECT CODE: 2142603

B.E. 4th SEMESTER

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

Prerequisite: Nil

Rationale: Nil

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		PA (V)		PA (I)		
				PA	ALA	ESE	OEP			
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Mixing Mill: Open mill mixer-internal mixer-semi continuous & automatic mixing equipments, single geared & double geared mills, energy & economic consideration, Kneaders, Transfer mix, Banbury mixer, Tandem mixing, new developments.	7	15
2	Calenders: Types & sizes of typical machines, roll configurations, roll cambering, single trip & double rip arrangements for sheeting, equipments for coating of textile fabrics, friction coating, axis crossing devices, roll bending etc New developments.	7	15
3	Extruders: Ram type & screw type extruders, hot & cold feed extrusion direct powder extruders, effects of screw length/dia. ratio, temp. control & ancillary equipment, extruder drives & power rating, machine selection. New developments.	7	15
4	Moulding Machine: Molding, Review of Molding Methods, Compression Molds, Transfer Molds, Injection Molds, Materials handling & Mold Stripping, Mould lubricants, Surface treatments & Cleaning Deflashing & Finishing of Moldings, Blank preparation for moulding, Blank heating methods, injection moulding machine, types, screw & ram type machines, vertical injection moulding machines ejection techniques, compression moulding machines, transfer moulding machine. New developments.	7	15
5	Hand Building & Forming Equipments: Equipments for tank & pipe lining, roller covering, low pressure	6	10

	unreinforced hoses making.		
6	Vulcanization Equipments: Equipments for Volume by methods other than moulding, Autoclave, curing methods, equipments for continuous vol. hot air tunnel, molten salt bath, fluidized bed, microwave curing, New developments.	7	10
7	Finishing of Rubber Components: Equipments for flash & spew removal, hand trimming, roller trim, buffing, low temp tumbling, punching, grinding, shot blasting, painting & lacquering. New techniques.	6	10
8	Safety In The Use of Rubber Machinery: Construction, use & maintenance of guards, fixed guards, interlocked guarding, trip devices, photo electric & pressure sensitive devices, maintenance of guards.	7	10
	Total Hours	45	100%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
10	15	15	15	15

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate 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:

1. Rubber Technology & Manufacturing: by C. M. Blow
2. Calendering & Extrusion Technology by : Arun V. Apte
3. Rubber Engineering: IRI.
4. Rubber Processing & Production Organization By: Philip K. Freakley
5. Rubber Technology : by Maurice Morton

Course Outcome:

After learning the course the students should be able to:

1. Know about the importance of mixing for manufacturing of rubber products.
2. Compare the different mixing equipments and their operations.
3. Learn the calender roll configurations and its characteristics.
4. Understand the application of calender machine in rubber industry.
5. Learn about the extruder and its components.
6. Compare the different types of extruder.
7. Learn the importance of different molding techniques.
8. Learn about different types of vulcanization techniques.
9. Study about the finishing equipments used for rubber products.
10. Know about importance of safety equipments and its function

List of Experiments:

Tutorials/Presentation/Practicals based on above topics

Design based Problems (DP)/Open Ended Problem:

- Rubber Processing and Safety issues .
- Importance of Radiation Cross linking for rubber products .
- Difference between Mechanical Splicing Vs. Vulcanizing.

Major Equipment:

Mixing Mill, Calender Machine, Extruder, Press, Moulds, Oven etc

List of Open Source Software/learning website:

- dir.indiamart.com/impcat/rubber-mixing-mill.html
- www.uttamrubtech.com/laboratory-rubber-mixing-mill.html
- dir.indiamart.com/impcat/calendering-machine.html
- www.motherson.com › Our Business › Rubber Moulding & Extrusion
- www.hindhydraulics.com/rubber.asp

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.