



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3142603

Rubber Engineering & its Economics

B.E. 4th SEMESTER

Type of course: Humanities and Social Science

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
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.	07
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.	07
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.	07
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.	07
5	Hand Building & Forming Equipments: Equipments for tank & pipe lining, roller covering, low pressure unreinforced hoses making .	03
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.	07
7	Finishing of Rubber Components: Equipments for flash & spew removal, hand trimming, roller trim, buffing, low temp	05



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	tumbling, punching, grinding, shot blasting, painting & lacquering. New techniques.	
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	05
9	ELEMENTS OF ECONOMICS. Laws of scarcity, diminishing return & increasing costs, Capital & labour, Depreciation & taxes, Investment criteria, Business cycles & forecasting Banking system installation. Basic economic concepts, Demand, Supply loan & grants, Economic planning etc.	03
10	INDUSTRIAL ORGANISATION Forms of Business enterprises, Organisational structure line, Staff line & staff organisation, function & responsibilities. Organisation development & types of organisation, Co-ordination & moral, Product development & research, simplification & standardisation of product & materials, processed & material inspection, productivity, profit & human relations.	03

Uggested 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	15	15	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:-

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



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Course Outcome:

After learning this course students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Explain the different components of rubber Equipments	20
CO-2	Compare the different molding techniques used for manufacturing of rubber products	15
CO-3	Select the appropriate vulcanizing equipment for specific rubber product	15
CO-4	Apply the proper safety devices for rubber machinery	15
CO-5	Analyze the relationship and economics of Reliability, Availability and Maintainability	20
CO-6	Identify the different components of organization	15

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Major Equipments:

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.hindhdraulics.com/rubber.asp