GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172617
Semester – VII
Subject Name: Automation & Control in Rubber Industries

Type of course: Open Elective-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	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1.	**Instrumentation & Process Control:** Industrial managements for measurement & Control of process variables such as temp., pressure, gas, Concentration, Sp. gravity, pH, liquid level, liquid flow, humidity etc., Principles of automatic control, Proportional, Integral & derivative modes of control, elements of analogue & digital computer Application, microprocessor control.	05
2.	**Specifications:** The writing of specifications, Materials, Subcomponents, Machine settings, Manual Operations, products.	04
3.	**Process-Capability Studies:** Utility & General Considerations, Design of processing trails, Empirical modeling & statistical analysis of process performance, Representation & Optimization of process performance, tolerance bands & process precision.	06
4.	**Process Monitoring:** General considerations temp. Measurement pressure measurement, position, Displacement & viscosity measurement, product Dimensions & wt., energy & power measurement, Data acquisition system, Data analysis & presentation.	06
5.	**Process Control:** General consideration, Local automatic & closed-loop control, adaptive control, sequence control, safety & machine integrity, computer control systems.	06
6.	**Automation and Control in the Rubber Industry:** Introduction, Background, Reasons to Institute Change, Reasons to Postpone Change, Component Testing, Dimensional and Destructive Testing, Vehicle Testing.	06

7.	**Computer Integrated Manufacturing (CIM):** Introduction, Process, Sensors, Computer, Measurements, Control, Display,CIM.	**06**
8.	**Improving Rubber Testing with Microcomputers:** Introduction, Microcomputers and Hardware for Data Acquisition, Sensors used in Rubber testing, Signal Conditioning, Analog to digital Conversion, Interfacing to Microcomputers.	**06**

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	15	10	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 Processing & Production Organisation By: Philip K. Freakley
- Rubber Products Manufacturing Technology By: Anil K. Bhowmick
- Industrial Instrumentation By: Donald Eckman
- Automatic Process Control By: Donald Eckman

Course Outcomes:

After learning this course students will be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Classify the various process control variables and understand their significance in process atomization.	15
CO-2	Explain the specifications regarding machine settings and operations.	15
CO-3	Analyze the process performance and optimize the process design and control parameters.	15
CO-4	Evaluate the performance of various automatic and computer control systems and also define their validation & inspection mechanisms.	15
CO-5	Improve the rubber testing and accuracy by developing computer Integrated sensors and control systems.	10

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List of Open Source Software/learning website:

- https://premierautomation.com/who-we-help/industries/tire-rubber-industry/
- https://www.micro-epsilon.in/measurement-systems/rubber-tire/
- https://www.zwickroell.com/products/automated-testing-systems/
- https://www.techbriefs.com/component/content/article/tb/pub/techbriefs/physical-sciences/18876