GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3152910
Semester – V
Subject Name: Electronic Controls for Textile

Type of course: Open Elective

Prerequisite: Basic Knowledge of Engineering and Textile Processes

Rationale: Basic knowledge of electronic controls and various instrumentation used in textile machines will help students in understanding ways in which various processes are controlled in textile manufacturing.

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)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction to control system engineering, Basic electrical terminology, Basic principles of control system, types of control system like open-loop and closed-loop, Automatic control system: functions and elements, feedback control system, controllers	5
2	Overview of basic analog electronics: Elements (R, L, C, V, I), circuit laws. Overview of basic digital electronics: Gates and ICs. Sensors and transducers (displacement, position, force, temperature, pressure, flow).	5
3	Instrumentation and control systems in spinning like bale management, auto levelers, automatic material transport, etc. Control systems in ring and rotor spinning system of yarn manufacturing	7
4	Instrumentation and control systems in weaving preparatory and loom shed. Drive systems, EYC, caddy, auto doffer, automatic tension control etc. at winding, Various controls at warping and sizing. Control systems for primary and secondary motions of loom, drive systems, loom data etc.	7
5	Basic idea about control system in testing.	4

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
20	**20**	**20**	**20**	**20**	**20**

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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 the above table.

Reference Books:

1. L. Ashokkumar & M. Senthilkumar, "Automation in Textile Machinery", CRC Press, Taylor & Francis, USA, 2018
2. Gauri Joshi, "Signal Conditioning and Data Converters: Building Blocks of Textile Automation", NCUTE Training Programme, Jan 11-12, 2000, IIT Delhi.
3. A. Majumdar, A. Das, R. Alagirusamy & V.K.Kothari, "Process Control in Textile Manufacturing", The Textile Institute, Manchester, 2013
4. Detailed literature of Machinery manufacturers

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Recognize the concept of electronics and control systems in the textile manufacturing	30
CO-2	Determine the role of control system in quality assurance.	30
CO-3	Suggest the types and use of control systems in textile machinery.	20
CO-4	Design a control system for automation in various textile machines	20

List of Experiments:

1. Measurement of linear displacement using inductive transducer
2. Light intensity measurement using photo electric transducer
3. Measurement of force using strain gauge and load cell
4. Measurement of temperature using Thermocouple and Thermistor
5. Measurement of Flow using Rotameter.
6. Measurement of voltage, current, frequency and phase angle using CRO
7. Determination of Transfer Function for AC Servomotor
8. Step response of first order system
9. Understanding control systems of spinning preparatory
10. Understanding control systems of Ring and Rotor yarn manufacturing system
11. Understanding control systems of weaving preparatory and looms
12. Understanding control systems of testing

Major Equipment: Basic spinning and weaving machinery, Basic electronic and instrumentation lab

List of Open Source Software/learning website: NPTEL, Swayam, search engine like Google etc.