GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3151402

Food Process Instrumentation and Control
B.E. 5th SEMESTER

Type of course: Open elective

Prerequisite: Nil

Rationale: Basic concept of process controls, types of control & their application, concept of automatic control and its classification. This will give in hand knowledge about instrumentation and its control of typical food processing units like reactor, evaporator, dryer and many more. The purpose of process control is to reduce the variability in final products so that legislative requirements and consumers' expectations of product quality and safety are met. It also aims to reduce wastage and production costs by improving the efficiency of processing.

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	% Weightage
1	**Transducers:** Types & classification and selection criteria, Basic principles, Construction and applications of transducer elements, Strain gauge with bridge circuits and calibration procedures.	4	19
2	**Temperature Measurement:** Mercury thermometers, Bimetal thermometers, Capillary type thermometers, Recording thermometers, Thermocouples, Resistance thermometers, thermistor.	8	20
3	**Pressure Measurement:** Pressure gauge, Elastic deformation elements, Basicconceptof pneumatic pressure transmitter, Pressure current and Pressure resistancetransducers.	5	19
4	**Flow Measurement:** Positive displacement meter, Turbine type, Float type, Timedflow and magnetic meters.	3	20
5	**Miscellaneous Measurements:** Weight measurement - Mechanical scale, Electronic tank scale, Conveyor scale and measurement of specific gravity, Measurement ofhumidity, Measurement of viscosity, Measurement of density, Automatic valves.	4	22

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**22**	**19**	**19**	**-**

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:

1. Manual for plant operators by Milk industry foundation, Washington,DC.
2. Process system analysis and control by Donald RC., Mc-GrawHill.
3. Process Instrumentation by Patranobish., Tata Mc-GrawHill.
4. Transducers and Instrumentation by MurtyDVS., Prentice Hall ofIndia.
5. Process Control Instrumentation Technology by Johnson C. Prentice Hall ofIndia.

Course Outcome:

After learning the course the students should be able to:

1. This programme will enable the students to gain skills and knowledge in instrumentation and process control of the food processsystem.
2. Apply principles of process control to analyze the performance of industrialprocesses.
3. Apply concepts of measurement and sensor selection to specify, install, configure,calibrate, troubleshoot, and maintain various process instruments commonly used inindustry.

List of Experiments:

1. Introduction to various electronic measurement equipments like CRO, DMM, Regulated PowerSupply
2. To study the characteristics of IC temperaturesensors
3. To study the characteristics of Resistance Temperature Detector usingPT100
4. To study the characteristics of NTCthermistor
5. To study the characteristics of Straingauge
6. To study the characteristics of Linear Variable Differential Transformer(LVDT)
7. To study the characteristics of K typethermocouple
8. To study therotameter
9. To study the pressuregauge
10. Working principle of pHmeter

Design based Problems (DP)/Open Ended Problems:

Generate a feedback loop in which a transmitter measures the temperature of a fluid

Major Equipments

1. Cathode Ray Oscillator(CRO)
2. Digital Multi Meter(DMM)
3. Regulated Power Supply
4. IC sensorkit
5. RTDKit
6. Thermistorkit
7. Strain gaugekit
8. Load cell
9. Rotameter

10. Pressuregauge

List of Open Source Software/learning website:

a. http://www.cna.nl.ca/
b. http://socs.curtin.edu.my/
c. http://www.foodprocessing.com