CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Dairy Technology)**

Semester: **V**

Course Code: **202200506**

Course Title: **Dairy Process Instrumentation and Control**

Course Group: Elective Course

Course Objectives: The course is intended to make students familiar with the concepts of Instruments used to control the industrial operation and manufacturing practices. Students can improve their vision in regard continuous production of constant quality product in food and dairy industry.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25 / 9	25 / 9	150/53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Basics of measurement system:** Variables, measurement, units of measurement, significance of Measurements, requirement of measurement system/instrument, Application and types of measurements	6
2	**Instrumentation system and its characteristics:** Functional elements of measurement system, classification of measurement, selection of instrumentation	5
3	**Transducers and Sensors:** Definition and requirements of transducer, Classification of Transducers, Characteristics of Transducers, principle of sensing & transduction, selection and applications of sensors, measurement of liquid level.	7

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4	**Pressure, Temperature and Flow measuring instruments:** Electrical Transducers, measurement of pressure, Manometer Gauges, Bourdon Tube, measurement of temperature, different types of Thermometers, Electric Methods, measurement of flow, Orifice and Venturi Flow Meters, Rotameter, Ultrasonic Flow Meters, Coriolis Flow meter, measurement of speed, Mechanical Tachometer, Electrical Tachometer, measurement of humidity, Resistive Hygrometer.	**10**
5	**Process control:** Elements of process control, Fundamental Structure of Control Systems, Basic Elements of Generalized Process Control, types of control system parameters, types of controller modes, P-I and P-I-D controller, Bode Diagram in dairy industry.	**8**
6	**Instrumentation process in dairy industry**: Control Valves, Types of Actuator, Air operated milk valve, self-acting steam thermostat, Online Density Transducer, Flow diversion valve controller in HTST pasteurizer, Control system in HTST pasteurizer, Outlet Air Temperature Controller in Spray Dryer, Automation for CIP	**9**
	Total	**45**

List of Practicals :

1	Calibration of dead weight pressure gauge
2	Performance on Temperature measurements and check different characteristics of measurements
3	Performance on stress, strain and force measurements
4	To study the characteristics of LVDT
5	Measurement of Strain and Load using Strain Gauge
6	Calibration of Thermocouple
7	Characteristics of various type of control valves using in dairy industry
8	To determine the coefficient of discharge for a given Orifice meter
9	Performance on Venturi meter to measure the flow rate
10	To study measurement of Speed & calibration.

Reference Books:

1	Mechanical Measurements and Instrumentation, Rajput, R. K. , S. K. Kataria & Sons, New Delhi.
2	Transducers and instrumentation, Murty, D. V. S. ,Prentice Hall of India Pvt. Ltd.
3	A Textbook of Electrical Technology, R.K. Rajput, Laxmi Publishers, New Delhi
4	A course in Mechanical Measurements and Instrumentation, A K Sawhney, Dhanpat Rai Publication
5	Mechanical Measurement and Metrology by R K Jain, Khanna Publisher
6	Mechanical Measurement & Control by D.S. Kumar, Metropolitan Book Co. (P) Ltd
7	Experimental Methods for Engineers, J P Holman, Mc Graw Hill Publications.

Supplementary learning Material:

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1	http://ecoursesonline.iasri.res.in/course/view.php?id=82
2	https://agrimoon.com/wp-content/uploads/Instrumentation-and-Process-Control.pdf

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20%	25%	25%	10%	10%	10%	

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.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the basics of measurement in dairy industry	**20**
CO-2	To gain a knowledge about various types of sensor and its requirements	**20**
CO-3	Study the working principles of various pressure, temperature and flow measuring instruments and applications	**30**
CO-4	Understand the controlling of various valves, actuator through various controller modes and system parameters in dairy industry	**30**

Curriculum Revision:	
Version:	1.0
Drafted on (Month-Year):	October -2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	

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