GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Vocation

Level: Under Graduate

Branch: Food Processing and Quality Control

Subject Code: BV05009021

Subject Name: Automation and Robotics in Food Processing

w. e. f. Academic Year:	2026-27
Semester:	05
Category of the Course:	Core Course

Prerequisite:	Automation and robotics in food processing
Rationale:	The food processing industry operates under strict requirements of hygiene, safety, quality consistency, and high productivity. Traditional manual operations are often associated with human error, contamination risks, lower efficiency and higher production cost. Automation and robotics provide effective solutions to overcome these limitations.

Course Outcome:

After Completion of the Course, the student will be able to:

No	Course Outcomes
01	Explain the basic concepts, need, and scope of automation and robotics in food processing industries.
02	Operate and monitor simple automated food processing systems while following safety and hygiene standards.
03	Demonstrate the use of robotic systems for handling, sorting, packaging, and material movement in food industries.
04	Analyze practical applications of automation and robotics in different food sectors such as dairy, bakery, fruits and vegetables, and beverages.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	50	0	0	0	50

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Concepts of automation** Importance of automation in food industries: maintaining food hygiene, safety, quality, and productivity.	06	12
2.	**Sensors and devices** Role and types of sensors, including temperature, moisture, flow, and humidity sensors, in automation. Role of sensors in monitoring food quality, including pH, color and weight. Significance of the control panel and its use in food plants.	09	18
3.	**Control system** Concept of control system, Open-loop and closed-loop systems with food examples, Introduction to Programmable Logic Controllers (PLC), working principles and its application in food processing operations.	10	24
4.	**Robots and their significance in the food industry** Industrial robots in food processing, cost estimation of robots for food industry use, application of the following robots in food industries, including: Cartesian Robots, SCARA Robots, Articulated Robots, and Delta Robots	10	22
5.	**Role of automation and robotics in the food processing sector** Role of automation in fruit and vegetable processing, dairy and beverage industries and bakery industries. Application of robots in sorting, grading, cutting and slicing of food products.	11	24
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**20**	**10**	**0**	**0**	**0**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. *Robotics and Automation in the Food Industry: Current and Future Technologies* — Edited by Darwin G. Caldwell
2. *Food Engineering Automation with Robotics and AI* — Abir Chakravorty
3. *Measurement, Modeling and Automation in Advanced Food Processing* — Edited by Bernd Hitzmann
4. *Automation in the Food Industry* — Edited by C.A. Moore (Springer)

(b) Open-source software and website:

1. http://foodscience.uark.edu/
2. http://fssai.gov.in/manuals
3. http://fao.org/fao-who-codexalimentarius

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