

B. Tech. Year Semester – VII

Subject Name: Automation in food and Agriculture

Subject Code: BTIC15704

Type of course: Institute open elective

Prerequisite (if any): Fundamental knowledge of sensors & transducers, control valve, PLC and SCADA.

List of Courses where this course will be prerequisite: Not applicable

Rationale: Agricultural industries are mostly dependent on nature behavior. To avoid crop failure, increasing crop quantity and quality, protecting crop, etc is a big challenge for farmers as well as for agro industries. There for it will be very appropriate to provide knowledge of a automation and sensing technology associated with agriculture and food processing plants/ systems to instrumentation and control engineers.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
2	0	2	3	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Total Hrs	Module Weightage
1	Introduction Necessity of automation in agriculture and food processing requirement, remote sensing, biosensors in agriculture, Guidelines and regulations for Industries by Food Safety and Standards Authority of India (FSSAI).	6	15%
2	Soil Sensors & Farm Equipments Engineering properties of soil, PH, Conductivity, Resistivity, Temperature, Soil moisture and salinity, Method of soil analysis, Auto drip irrigation systems. control circuits in harvesters cotton pickers, tractor etc.	10	25%
3	Food Process Plant Instrumentation Flow diagram of sugar plant & instrumentation set up for it, Flow diagram of dairy industry & instrumentation set up for it, Juice extraction control process & instrumentation set up for it.	8	20%
4	Automation in Industry using PLC and SCADA Introduction of PLC and SCADA, Application in packing industry, cold storage systems, greenhouse automation system.	6	15%
5	Green Houses & Instrumentation Different types of green house structures, ventilation, Cooling & Heating, Wind speed, Temperature & Humidity, Carbon Dioxide enrichment measurement & control.	10	25%

Suggested Specification table with Marks (Theory):

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Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10 %	40 %	20 %	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:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Bioanalysis And Biosensors In Agriculture Science	Sandhya Agrawal	ABD Publisher ISBN 978-8189473723	2009	
2	Process Control Instrumentation Technology	C.D. Johnson	Pearson Education ISBN-13 978-9332549456 India	2015	8 th Edition
3	Process Industry Instrumentation and Control Handbook	D. M Considine	McGraw-Hill Education (ISE Editions) ISBN-978-0071132527	1994	
4	Mineral Processing Technology	Wills B.A	Pergamon Press ISBN-13 978-0080311593	2013	3 rd Edition

BSC: basic science course /ESC: Engineering Science Course /HSM: Humanities and management /PCC: Professional Core course /PEC: professional Elective course /OEC: Open Elective course/ MD: mandatory non-credit course

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5	Greenhouse Design and Control	Pedro Ponce, Arturo Molina, Paul Cepeda, Esther Lugo, Brian MacCleery	CRC Press ISBN-13 978-1138026292	2015	1 st Edition
6	Instrumentation Engineers Handbook- Process measurement volume I and Process control volume II	B.G.Liptak	Chilton Book Company,	2001	

Course Outcomes:

After learning the course the students should be able to:

Sr. No.	CO statement	Marks % weightage
CO1	characterize problems and possible technological solution of agro industries.	20%
CO2	familiarize with current literature, research in agricultural instrumentation.	30%
CO3	analyze and design of automation system by evaluating agricultural parameter measurement constraint.	20%
CO4	designing of PLC and SCADA of various agriculture automation systems.	30%

Mapping with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	3	3	2	0	0	0	2	0	1	2	3	3	2

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CO-2	1	2	2	3	1	1	0	2	1	1	1	1	3	2	2
CO-3	3	3	3	3	1	1	2	0	2	0	1	0	1	2	2
CO-4	2	1	0	2	3	0	1	0	0	0	2	1	3	3	2

List of Open Source Software/learning website:

<http://nptl.ac.in/video.php>

List of Open Source Software: Not applicable

FOR LAB SESSIONS:

List of Experiments and Design based Problems (DP)/Open Ended Problem:

1. To test soil pH, conductivity, resistivity, temperature, moisture and salinity.
2. To study instrumentation set up for sugar plant.
3. To study flow diagram of food industry and control.
4. To study flow diagram of dairy industry & confectionary industry and instrumentation set up
5. To study juice extraction control set up.
6. To study automation in farm equipment
7. To study instrumentation and control in Green house
8. study different bio sensors used in agro automation.

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9. To study application of PLC programming and SCADA for green house automation system.
10. To study application of PLC programming and SCADA for packaging system.
11. To study application of PLC programming and SCADA for cold storage system.

Major Equipment Needed: Agro sensors, SCADA software, Computers, Arduino, etc..

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