



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-5 (B. Tech)

Subject: Industrial Automation and Control – BETME15319.

Type of course: Professional Elective Courses.

Prerequisite: Physics and basic electrical engineering.

Rationale: This course equips students with fundamental knowledge of automation architecture, industrial sensors, PLCs, motion control, and distributed control systems (DCS). Additionally, it introduces robotics, IoT, and Industry 4.0, preparing students for modern industrial automation challenges.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	-	50	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No	Course content	Hrs.	% Weightage
1	Fundamentals of Industrial Automation & Control Introduction to industrial automation, Need for automation, Architecture of automation systems, Basics of control systems, Role of PLC & SCADA, Industrial communication (Modbus & Profibus), Role of computers in measurement & control.	10	20



2	Automation Components & Motion Control Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity & pH measurement, Process control valves, Actuators, Power electronics devices (DIAC, TRIAC, MOSFET, IGBT), Basics of DC & AC servo drives for motion control.	10	20
3	Programmable Logic Controllers (PLC) Basics of PLCs, Analog & digital I/O modules, PLC programming (Ladder logic & Sequential Flow Chart), PLC Communication & networking, PLC selection & installation, Industrial applications of PLC in process control.	15	35
4	Distributed Control Systems (DCS) & Industry 4.0 Overview of DCS, Software configuration & communication, DCS supervisory tasks, Integration of DCS with PLC & computers, Industrial automation using robots (Pick & place, Welding robots), Internet of Things (IoT) in plant automation, Overview of Industry 4.0.	10	25

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Industrial Automation System Analysis Research and prepare a case study on automation in a specific industry (e.g., automotive, food processing, pharmaceuticals) and upload insights on GMIU web portal by PPT or Report documentation.	10
2	Sensor & Actuator Identification Visit a lab/workshop and identify at least 5 sensors & actuators used in automation. Document their working principles and upload report on GMIU web portal.	10
3	Research Study on SCADA System Students will research on how SCADA is used for monitoring and control in industries and upload their observations on a GMIU web portal.	10
4	Motion Control with Servo Motor -- Role-Playing Activity Students will be divided into groups, where one student will play the role of a servo motor, another as a controller, and others as load and feedback sensors. They will act out how a servo system works, showing commands, movements, and feedback corrections and upload activity photos on GMIU web portal.	10



5	Industry 4.0 – Future Factory Presentation Students will create a simple presentation imagining a fully automated smart factory which works using DCS, IoT, and robotics. They will describe how machines, sensors, and AI work together to improve efficiency and upload their work on GMIU web portal.	10
Total		50

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	15%	25%	30%	15%	10%	5%

Course Outcome:

After learning the course, the students should be able to:	
CO1	Explain the fundamentals of industrial automation and control, including architecture, PLCs, and SCADA.
CO2	Identify and describe industrial sensors, actuators, and power electronics for automation systems.
CO3	Develop PLC ladder logic programs and analyze their applications in industrial automation.
CO4	Describe DCS, industrial robots, and the impact of IoT & Industry 4.0 on automation.

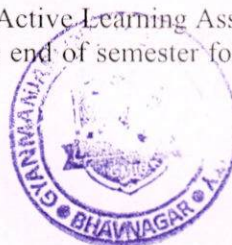
Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.



Reference Books:

- [1] "Industrial Automation and Robotics" – A. K. Gupta & S. K. Arora
- [2] "Programmable Logic Controllers" – W. Bolton
- [3] "Industrial Automation: Hands-on" – Frank Lamb
- [4] "Mechatronics: Principles and Applications" – Godfrey Onwubolu
- [5] "SCADA: Supervisory Control and Data Acquisition" – Stuart A. Boyer
- [6] "Introduction to Industrial Automation" – Stamatios Manesis, George Nikolakopoulos

