National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Year of Regulation	**2019-20**
Department	**Electrical Engineering**	Semester	**VI**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE314	**Industrial Automation**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

		After the completion of the course, the student should be able to:		
Course Objectives	**To introduce the basic concepts, elements and terminologies of industrial automation and control systems.**	Course Outcomes	CO1	**acquire knowledge about the control and automation levels of an industry and tell the characteristics of well-known industrial devices.**
	To discuss and design compensators/ controllers using analytical and graphical techniques.		CO2	**recognise the well-known controller, actuators in electronic, pneumatic and hydraulic form.**
	To design a suitable programmable logic controller to meet a desired sequence control requirement.		CO3	**justify the choice of appropriate control scheme for well-known industrial situations and design the controller to meet the requirement.**
			CO4	**design a suitable programmable logic to meet a desired sequence control requirement.**
			CO5	**explain the measurement utility and operations in the various devices used for industrial control applications.**

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**3**	**2**	**1**	**0**	**2**	**2**	**2**	**0**	**0**	**2**	**0**	**2**	**1**	**1**	**1**
2	CO2	**1**	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**0**	**1**	**0**	**2**	**3**	**2**	**2**
3	CO3	**2**	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**2**	**3**	**2**	**3**
4	CO4	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**	**2**	**3**	**3**	**3**
5	CO5	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**3**	**3**
6	CO6															

SYLLABUS

No.	Content	Hours	COs
I	**Basic Concepts** Introduction to industrial automation and control, architecture of industrial automation systems. Functionality of each layer with industrial relevance. Introduction to process flow of different industries. A brief introduction to sensors and measurement systems.	**05**	**CO1**

II	**Industrial Actuators** Introduction to actuators: flow control valves, hydraulic actuator systems: principles, components and symbols, pumps and motors, proportional and servo valves, introduction to pneumatic control systems: system components, actuators, and controllers.	**06**	**CO1** **CO2**
III	**Industrial Control Systems** Introduction to process control, PID control, controller tuning, implementation of PID controllers, special control structures: feed forward control, ratio control, predictive control, control of systems with inverse Response, cascade control, overriding control, selective control, split range control.	**09**	**CO1** **CO3**
IV	**Programmable Automation** Introduction to sequence control, PLC and relay ladder logic, sequence control, structured design approach, IL, SFC, PLC hardware environment.	**08**	**CO1** **CO4**
V	**Measurement of Physical Variables** Measurement of temperature, pressure, force, displacement, speed, flow, level humidity, pH etc. signal conditioning and processing, estimation of errors and calibration, data acquisition.	**08**	**CO1** **CO5**
Total Hours		**36**	

Essential Readings

1. J. P. Bentley, “Principles of Measurement Systems”, Pearson Education India, 4th Edition, 2004
2. C. D. Johnson, “Process Control Instrumentation Technology”, Pearson Education India, 8th Edition, 2015.
3. J. W. Webb, Ronald A. Reis, “Programmable Logic Controllers – Principles and Applications”, Prentice Hall India, 5th Edition, 2002.

Supplementary Readings

1. R. Srinivasan, “Hydraulic and Pneumatic Controls”, Vijoy Nicole Imprints Private Limited, 2nd Edition, 2004.
2. B. E. Bequette, “Process Control – Modelling, Design, and Simulation”, Prentice Hall, 2nd Edition, 2003.
3. B. C. Kuo, “Automatic Control Systems”, Wiley India, 9th Edition, 2014.