Course Type	Course Code	Name of Course	L	T	P	Credit
DC	EEO405	**Industrial Automation**	3	0	0	9

Course Objective
The course will give basic understanding on components of Industrial processes and their role for automated system. It will also help to understand the different control techniques and their implementation for automated system.

Learning Outcomes
Upon successful completion of this course, students will: • understand the roles and operations of different components of Industrial Automation, • understand operating principle of different control techniques and their implementation for an automated industry.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to Industrial Processes and their automation:** Industrial automation, Industrial information technology, role of Industrial Automation, types of production and automation systems, industrial sensors and actuator system, the architecture of elements.	7	Explain Industrial Automation, its role and their types as well their needs for modern industries.
2	**Actuator Systems:** Pneumatic Actuators like: Flapper nozzle amplifier, Electro-pneumatic signal converter, Pneumatic valve positioner. Control valves and their characteristics, Electrical Actuators and their energy efficient Drives, BLDC Drives.	11	Understand the functionality of different pneumatic actuators and their characteristics. Also understand the use of energy efficient electrical actuators.
3	**Process Control and their Implementation:** Introduction to automatic controls, PID controllers. Tuning of gain parameters, Pneumatic Controllers and their implementation, Implementation of electronic PID Controllers, digital PID controller, Industrial Process with Feed-forward control, ratio control, predictive control and inverse response control strategies.	13	Understand the role of basic PID Controllers, their tuning as well as their implementation for automated industries. Also Understand the operations and need of some special control techniques for various industrial automated system.
4	**Introduction to Programmable Logic Controllers:** Introduction to Sequence, Logic Control and Programmable Logic Controllers and their applications, Microcomputer based PLC, Architecture of PLCs, Structure of a PLC Program, The Relay Ladder Logic (RLL) Diagram.	7	Implement the Interfacing techniques of PLCs with actuators, sensors and plant. Moreover, the understanding of ladder logic programming can be done.
5	**Introduction to SCADA System:** Principles of modern SCADA systems, SCADA hardware and SCADA software, subsystems of a typical SCADA system	4	Understand the role of SCADA system for Industrial Automation as well as their communications with the remote plant.

Text Books
1. Industrial Instrumentation, Control and Automation, S. Mukhopadhyay, S. Sen and A.K. Deb, Jaico Publishing House, 2013.
2. Chemical Process Control, An Introduction to Theory and Practice, George Stephanopoulos, Prentice Hall India, 2012.

Reference Books
1. Electric Motor Drives, Modelling, Analysis and Control, R. Krishnan, Prentice Hall India, 2002.