

IV Year I Semester

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## MT 429 INDUSTRIAL AUTOMATION & CONTROL

### **Course Description & Objectives:**

The objective of this course is to teach students about different automation and control techniques used in various industries.

### **Course Outcomes:**

On completion of this course, students would be able to:

1. understand concept of sensors and actuators.
2. identify sensors and actuators required for specific applications.
3. evaluate the applications of distributed control systems in process automation.

### **UNIT I: Nature of Industrial Process:**

Continuous & discrete state sequential process, process variables and their classification. Introduction to Process **Control Philosophies:** type of relays, ladder logic methodology, ladder symbols.

### **UNIT II: Introduction to Programmable Logic Controllers:**

Advantages & disadvantages of PLC with respect to relay logic, PLC architecture, Input Output modules, PLC interfacing with plant, memory structure of PLC. **PLC programming methodologies:** ladder diagram, STL,

functional block diagram, creating ladder diagram from process control descriptions, introduction to IEC61131 international standard for PLC.

### **UNIT III: PLC Functions:**

Bit logic instructions, ladder diagram examples, interlocking, latching, interdependency and logical functions, PLC Timer & Counter functions on-delay timer, off-delay timers, retentive on-delay timers, pulse timers, timer examples, up-counter, down-counter and up-down counter, counter examples, register basics. **PLC Data Handling:** data move instructions, table and register moves, PLC FIFO & LIFO functions.

### **UNIT IV: PLC Arithmetic and Logical Functions:**

Addition, subtraction, multiplication, division instructions, increment decrement, trigonometric and log functions, AND, OR, XOR, NOT functions, PLC compare and convert functions. **PLC program control and interrupts:**

jumps, subroutine, sequence control relay, watchdog.

**UNIT V: Analog Value Processing:**

Types of analog modules, analog input and output examples, PID control of continuous process.

**TEXT BOOKS:**

1. JOHN WEBB: Programmable Logic Controllers Principles & applications, PHI
2. T. A. HUGHES: Programmable Controllers

**REFERENCES:**

1. A.K. Sawhany, "Electrical and Electronics Measurements & Instrumentation", Dhanpath Roy & Co, 2005.
2. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques" 5th ed., PHI, 2002.C. D. JOHNSON: Process Control Instrumentation