

# PEL6J004 INDUSTRIAL AUTOMATION AND CONTROL

(Prerequisite: Control System Engineering - I)

## Module I: (12 Hours)

**Process Control: Introduction:** Process Definition, Feedback Control, PID Control, Multivariable Control. (Chapter 1 of Text Book 1)

**PID Controller Tuning:** Introduction, Zeigler-Nichols Tuning Method (Based on Ultimate Gain and Period, and Process Reaction Curve), Digital PID Controllers. (Chapter 13 of Text Book 2)

## Module II: (15 Hours)

**Special Control Structures:** Cascade Control, Feedforward Control, Feedforward-Feedback Control Configuration, Ratio Control, Selective Control, Adaptive Control, Adaptive Control Configuration. (Chapter 10 and 11 of Text book 3)

**Actuators:** Introduction, Pneumatic Actuation, Hydraulic Actuation, Electric Actuation, Motor Actuators and Control Valves. (Chapter 8 of Text Book 1)

## Module III: (10 Hours)

**Industrial Automation: Programmable Logic Controllers:** Introduction, Principles of operation, Architecture, Programming (Programming Languages, Ladder Diagram, Boolean Mnemonics) (Chapter 5 of Text Book 1)

**Distributed Control:** Distributed vs. Centralized, Advantages, Functional Requirements, System Architecture, Distributed Control Systems (DCS), Communication options in DCS. (Chapter 6 of Text Book 1)

**Real-time Programming:** Multi-tasking, Task Management, Inter-task Communication, Real-time Operating System. (Chapter 9 of Text Book 1)

### Text Books:

1. Krishna Kant, "Computer-Based Industrial Control", PHI, 2009.
2. M. Gopal, "Digital Control and State Variable Methods" Tata McGraw Hill, 2003.
3. Surekha Bhanot, "Process Control: Principles and Applications, Oxford university Press, 2010

### Reference Books:

1. Smith Carlos and Corripio, "Principles and Practice of Automatic Process Control", John Wiley & Sons, 2006.
2. Jon Stenerson, "Industrial Automation and Process Control", Prentice Hall, 2003.
3. C. Johnson, "Process Control Instrumentation Technology", PHI, New Delhi
4. D.R. Coughnour, "Process System analysis and Control", McGraw Hill.