

6th Semester		Industrial Automation & Control	L-T-P 3-0-0	3 CREDITS
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Course Outcome:

- Determine the effect of proportional gain, integral time, and derivative gain on the system performance and will be able to tune the controller using tuning methods, implementation of PID using electronic, digital, pneumatic and hydraulic methods.
- Study of various Control configurations structures such as Cascade Control, Feed forward Control, Feed forward Feedback Control Configuration, Ratio Control, Selective Control, Adaptive Control, Adaptive Control Configuration.
- Design the ladder logic to implement process operation with given problem statement.
- Analyze DCS hardware and its merits/demerits in an industrial automation
- Analyze concept of implementation of Real Time Programming.
- Design the complex control scheme to a particular process.

Module I:**(12Hours)**

Process Control: Introduction: Process Definition, Open Loop Control, Closed Loop Control, Two Position Control, Multi Position Control, PID Control, Multi variable Control; Control Loop Tuning – PID Controller Tuning Techniques, Process Reaction Curve Technique, Closed Loop Cycling Technique(Chapter 1 of Book 1)

Module II:**(14Hours)**

Special Control Structures: Cascade Control, Feed forward Control, Feed forward Feedback Control Configuration, Ratio Control, Selective Control, Adaptive Control, Adaptive Control Configuration. (Chapter 10 and 11 of Book 2)

Actuators: Introduction, Pneumatic Actuation, Hydraulic Actuation, Electric Actuation, Motor Actuators and Control Valves. (Chapter 4 of Book 1)

Module III:**(10Hours)**

Programmable Controllers: Introduction, Principles of Operation, Architecture, Programming (Programming Languages, Ladder Diagram, Boolean Mnemonics) (Chapter 10 of Book 1)

Distributed Digital Control: Distributed vs. Centralized, Advantages, Functional Requirements, System Architecture, Distributed Control Systems (DCS), Communication Options in DCS. (Chapter 7 of Book 1)

Real-time Programming: Multi-tasking, Task Management, Inter-task Communication, Real-time Operating Systems [Chapter 8 Book 1]

Books:

- [1] Krishna Kant, “Computer-Based Industrial Control”, PHI, 2011.
- [2] Surekha Bhanot, Process Control: Principles and Applications, Oxford university Press, 2010.
- [3] Process Control Instrumentation Technology By-Curtis D. Johnson. PHI Publication.

Digital Learning Resources: