

UEIXXX: ADVANCED PROCESS CONTROL

L	T	P	Cr.
3	1	2	4.5

Course Objectives: To make the students understand the basic concepts of advanced process control schemes, DCS, Artificial intelligence techniques used in Process Control, PLC and digital control system.

Introduction to advanced Control Schemes: Cascade, Feed-forward, Feed-forward plus Feedback, Ratio control, Inferential control, Dead time and Inverse response compensation, Adaptive control, Model reference adaptive control, Self tuning regulator Interactions and Decoupling of Control Loops: Design of cross controllers and selection of loops using Relative Gain Array

Distributed Control System (DCS): Evolution and advantages of computer control, Configuration of Supervisory, Direct digital control (DDC) and DCS.

Artificial Intelligence in Process Control: Expert systems, Neural networks, Fuzzy logic, Neuro Fuzzy , Genetic algorithm, Virtual instrumentation.

Programmable Logic Controllers: Comparison with hard wired relay and semiconductor logic, Hardware, Ladder diagram programming, Case studies, Introduction to CPLD, SPLD, FPGA

Digital Control: Sampling and reconstruction, Discrete systems analysis, Stability and controller design using z transform and difference equations, Smoothing filter realization using difference equations

Course Learning Outcomes (CLO):

After the successful completion of the course the students will be able to:

1. explain the concept of advanced control schemes used in process control.
2. explain the working of distributed control system
3. elaborate the use of artificial intelligence techniques in process control.
4. explain the fundamental concepts of PLC.
5. explain the concept of digital control system.

Text Books:

1. *Stephanopoulos, G., Chemical Process Control, Prentice–Hall of India Private Limited (1983).*
2. *Liptak, B.G., Instrument Engineers Handbook , Chilton Book Company (1994).*

Reference Books:

1. *Deb, S.R., Robotics Technology and Flexible Automation, Tata McGraw–Hill (1994).*
2. *Johnson, C.D., Process Control Instrumentation Technology, Prentice–Hall of India Private Limited (2007).*
3. *Zaidi, A., SPC Concepts, Methodologies and Tools, Prentice–Hall of India Private Limited (1995).*

Evaluation Scheme:

S.NO.	Evaluation Elements	Weightage
1	MST	25
2	EST	35
3	Sessional (May include Assignments//Quizzes/Lab Evaluations)	40