

UEI801 ADVANCED PROCESS CONTROL

L	T	P	Cr
3	1	2	4.5

Introduction: Review of general concepts, Terminology, Applications of process control Simulation, Mathematical modeling

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.

Statistical Process Control: Quality control and assurance, Control charts, Total quality management (TQM), ISO

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

Robotics: Kinematics, Sensors, Actuators, End Effectors

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

Laboratory Work:

Level control and flow control using feedback mechanism, Programming with Robotic Arm, PLC programming with hardware and Simulation package.

COURSE LEARNING OUTCOME (CLO):The student will be able to

1. Explain the concept of advanced control schemes used in process
2. Explain the working of distributed control system
3. Elaborate the use of artificial intelligence techniques in process
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:

Sr. No.	Evaluation Elements	Weightage (%)
1	MST	25
2	EST	35
3	Sessionals (May include Assignments/Projects/Tutorials/Quizzes/Lab Evaluations)	40

4.