PCH224 PROCESS DYNAMICS AND CONTROL

	L	T	P	Cr
	3	1	0	3.5

Course Objective:
To learn about dynamic behaviour of nonlinear, distributed and other complex systems, and design their control schemes.

Introduction: Review of dynamic behaviour of linear systems and their control system design, Linear processes with complex dynamics, Distributed-parameter systems, Stability, Stability improvement.

Nonlinear process dynamics: Phase-plane analysis, Limit cycle behaviour, Saddle point behaviour, Multiplicity of steady-states, Input and Output multiplicity, Bifurcation behaviour, Dynamic Response Characteristics of More Complicated Processes, Development of empirical models from Process Data, Illustrative case studies.

Design of Controller Using Frequency Response: Nyquist, Bode and Nichols analysis, Controller gain, Different methods of controller tuning.

Advanced Control Strategies: Cascade, feed-forward and ratio control, Override control, Model based control, Digital sampling, Filtering and Control, Multi-loop and multivariable control, Real-time optimization, Model predictive control, Computed variable control, Non-linear, Multivariable control, Process monitoring, Batch process control, Introduction to plant wide control, Plant wide control system design.

Course learning outcomes (CLOs):
The students will be able to
1. model, solve and analyze the system for its behavior.
2. design controllers for simple and complex processes.
3. design of control schemes and their applications in various processes.
4. understand advanced control strategies

Recommended Books:
1. *Seborg, D.E., Edgar, T.F., and Mellichamp, D.A., Process Dynamics and Control, John Wiley (2004).*
2. *Coughanowr, D.R. and Le Blanc S.E., Process Systems Analysis and Control, McGraw Hill (2009).*
3. *Luyben, W.L., Process Modeling Simulation and Control for Chemical Engineers, McGraw Hill (1990).*
4. *Bequette, B.W., Process Control: Modeling, Design and Simulation, Prentice Hall (2003).*

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessionals (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25