Process Control and Instrumentation - Video course

COURSE OUTLINE

Automatic Process Control is being used in almost all the industry verticals today.This introductory course covers basics of process control and the instrumentation used for it.

The process control part begins with the introductory concepts, and mathematical modeling and its use for control purposes.

Subsequently, the dynamic behavior of chemical processes will be discussed.

This course goes deeper into the design of feedback controllers. A special emphasis will be placed on the controller tuning and stability analysis.

Several advanced control systems will also be covered under the process control part.

The instrumentation part will elaborate the valve characteristics along with the working principle, specifications, design and selection aspects of various measuring sensors.

A number of practical process examples will be used to illustrate the control theory.

Contents:

Introduction to process control; mathematical modeling; dynamic behavior of chemical processes; feedback control structures; advanced control schemes; and instrumentation.

COURSE DETAIL

S.No	Topics	No. of Hours
1	Introduction to Process Control.	1
2	Mathematical Modeling	3

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Chemical Engineering

Coordinators:

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	a. Development of mathematical models. b. Modeling considerations for control purposes.	
3	Dynamic Behavior of Chemical Processes a. Computer simulation and the linearization of nonlinear systems. b. Brief of Laplace transforms. c. Transfer functions and the input-output models. d. Dynamics and analysis of first, second and higher order systems.	8
4	Feedback Control Schemes a. Concept of feedback control. b. Dynamics and analysis of feedback-controlled processes. c. Stability analysis. d. Controller design. e. Frequency response analysis and its applications.	14
5	Advanced Control Schemes a. Feedback control of systems with dead time or inverse response. b. Control systems with multiple loops. c. Feedforward and ratio control.	4
6	Instrumentation a. Final control elements. b. Measuring devices for flow, temperature, pressure and level.	10
	Total	40

References:

1. Stephanopoulos, G. (1984). "Chemical process control: an introduction to theory and practice," Prentice-Hall, New Delhi.

2. Seborg, D.E., Edgar, T.F. and Mellichamp, D.A. (2003). "Process dynamics and control," Wiley, New York.

3. Smith, C.A. and Corripio, A.B. (1997). "Principles and practice of automatic process control," Wiley, New York.

4. Johnson, C.D. (2006). "Process control instrumentation technology," Prentice-Hall, New Delhi.