

IAF - 221

Process Control

(02 credits – 50 marks)

Course Outcomes:

On completion of the course, students should be able to-

1	Define Process Modeling Fundamentals.
2	Describe various modeling techniques of process control
3	Explain the Characteristics of Controller.
4	Summarize Control System configurations.
5	Describe Control systems with multiple loops.
6	Analyze Different Process loop and tuning techniques.

Course Contents:

Module– I: Modelling of processes

(08 Hrs)

Need for Process Control, Mathematical model of first order liquid and thermal processes, Processes with dead time, Processes with inverse response, Interacting and non-interacting systems, Continuous and batch processes, Servo and regulator operation

Module– II: Controller Characteristics

(05 Hrs)

Basic control action, Characteristics of ON-OFF, Proportional, Integral and Derivative Control Modes, Composite Control Modes, Electronic controllers to realize various control actions

Module– III: Control Systems with Multiple Loops

(07 Hrs)

Control system configurations; Cascade control, Feed forward control, Ratio Control, Selective Control system; Split Range Control, Adaptive and Inferential Control,

Module– IV: Process Loop tuning

(06 Hrs)

Evaluation criteria in control systems Quality, IAE, ISE, ITAE and $\frac{1}{4}$ decay ratio,; Process loop tuning- Open loop transient Response method, Ziegler – Nichols method, Cohencon method, Damped oscillations method

Module-V:

Presentations, case studies, Assignments, Tutorials based on Module I to IV.

Ref. Books:

1. D. P. Eckman – Automatic Process Control – Wiley Eastern Ltd., New Delhi, 1993
2. G. Stephanopoulos – Chemical Process Control- PHI, New Delhi, 1990
3. B. G. Liptak – Process Control – Chilton Book Company, 1994
4. C. D. Johnson – Process Control Instrumentation Technology – 7th edition, Pearson Education, New Delhi, 2002
5. J. G. Balchen, K. J. Mumme – Process Control Structures and Application – Van Nostrand Reinhold Co., New York, 1988