

IAGE – 310

Industrial Processes and Instrumentation

(02 credits – 50 marks)

Course Outcomes:

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

1	Interpret type of controller that can be used for specific problems in chemical industry
2	Design of controllers for interacting multivariable systems
3	Work with controller tuning
4	Ability to design feed forward and cascade control system
5	Predict multivariable system

Course Contents:

Module-I : Process characteristics

(07 Hrs)

Incentives for process control, Process Variables types and selection criteria,, Process degree of freedom, Characteristics of physical System, Elements of Process Dynamics, Types of processes- Dead time, Single /multicapacity, self-Regulating /non self regulating, Interacting /noninteracting, Linear/non linear, and Selection of control action for them. Study of Liquid Processes, Gas Processes, Flow Processes, Thermal Processes in respect to above concepts

Module-II : Performance of Feedback Control system

(06 Hrs)

Basic principles, Elements of the feedback Loop, Block Diagram, Control Performance Measures for Common Input Changes, Selection of Variables for Control Approach to Process Control. Controller tuning based on stability Control Performance via closed loop frequency Response, Control system factors influencing control Performance

Module-III : MultiLoop & Nonlinear Systems

(07 Hrs)

Cascade control, Feed forward control, feedback-feedforward control, Ratio control, Selective Control , Split range control- Basic principles, Design Criteria , Performance, Controller Algorithm and Tuning, Examples and any special features of the individual loop and industrial applications. Nonlinear Elements in Loop: Limiters, Dead Zones, Backlash, Dead Band Velocity Limiting, Negative Resistance,

Module-IV : Automation Multivariable Control**(07 Hrs)**

Concept of Multivariable Control: Interactions and its effects, Modelling and transfer functions, Influence of Interaction on the possibility of feedback control, important effects on Multivariable system behavior Relative Gain Array, effect of Interaction on stability and Multiloop Control system. Multiloop control Performance through: Loop Paring, tuning, Enhancement through Decoupling, Single Loop Enhancements.

Module-V ; Tutorials, assignments and presentation based on Module I to IV**References:**

1. S Donald Eckman – Automatic Process Control, Wiley Eastern Limited
2. Thomas E Marlin - Process Control- Designing processes and Control Systems for Dynamic Performance, McGraw-Hill International Editions
3. Process control Systems-F.G.Shinskey, TMH
4. Computer Based Industrial Control –Krishna Kant, PHI
5. Process Instrumentation and control Handbook –Considine
6. Fuzzy Logic with Engineering Applications, T.J.Ross