

## EE 520 ADVANCED PROCESS CONTROL (3-0-0: 3)

### Review of Systems

First and higher order systems, closed and open loop response. Control valve types linear, equal percentage and quick opening valve. ON/OFF control, proportional integral and derivative control, Anti-reset windup, concept of bumpless transfer and PID controller, effect of process characteristics on PID control, selection and application of control action.

### Stability Analysis

Frequency response, design of control system, controller tuning and process identification. Ziegler-Nichols and Cohen-Coon tuning methods, Bode-Nyquist plots - process modeling.

Advanced control techniques, stability analysis of nonlinear process, cascade, ratio, feed forward, adaptive control, selective controls, computing relays, simple alarms, Smith predictor, internal model control, theoretical analysis of complex processes.

### Multivariable and Interactive Process Control

Introduction to multivariable systems, importance of multivariable systems, interaction, dynamics and its role on control system design, multivariable control, classical approaches, tuning single loop controllers tuning of multivariable controllers for MIMO systems,

### Process Signal Conditioning for Measurement and Control

Need of transmitter (concept of field area & control room area), need for standardization of signals, current, voltage, and pneumatic signal standards, concept of live & dead zero. two and four wire transmitters, electronic and pneumatic transmitters electronic differential pressure transmitter: types, mounting, calibration setup, application of DPT for level measurement, suppression, square root extractor. Signal conditioning (analog & digital) for Wireless transmitters.

### Text Books and References

1. C.D.Johnson, "Process control and Instrument technology", TMH .
2. N.A. Anderson, "Instrumentation for Process measurement and control", CRC Press
3. C.D.Johnson, "Process control and Instrument technology", TMH
4. K. Kant, "Computer-Based Industrial Control", PHI Learning Pvt. Ltd
5. B. G Liptak, "Instrumentation Engineers Hand Book – Process Control" (Set Of 2 Vols) CBS Publishers & Distributors-New Delhi
6. D. M. Considine, "Process Instruments and Controls Handbook", McGraw-Hill.