

Syllabus for:

Post Graduate Diploma in Instrumentation Technology (PGDIT)

SEMESTER-II

Course No.: PDI-201

Marks: 80

PROCESS CONTROL INSTRUMENTATION

Unit-I:

Basic Control Concepts Open- and closed-loop properties of processes; Process lags; Dead-time; Stability of control systems; Block diagrams and process line diagrams to explain the operation of control systems.

Control Modes Two step, proportional (P), proportional + integral (PI), proportional + derivative (PD), proportional + integral + derivative (PID); Equations describing controller modes; Integral saturation and its elimination; Derivative kick and its solution; Effects of load changes on output response.

Unit-II:

Controller Response Response curves and stability; Controller mode response to step and ramp functions; Construction of Nyquist and Bode diagrams; Determination of the relative stability of a system from derived gain and phase margins; Frequency response versus time response;

Controller Tuning Loop tuning methods by observation and calculation; Interaction between loops; Auto tuning.

Unit-III:

Control Valves Valve types and characteristics; Factors influencing valve selection; Valve sizing; Valve positioners; Installed systems: control valve characteristics, pipe pressure drops and pump characteristics.

Digital Control Basic architecture of PLC (Programmable Logic Controller) and DCS (Distributed Control System)

Unit-IV:

Measurement

a. Flow Measurement: Construction, working principle, selection criteria and application of flow measurement with orifices, magnetic, ultrasonic, vortex flow meters, turbine flow meter and rotameter.

b. Level Measurement : Construction, working principle

c. Temp. Measurement: Construction, working principle, selection criteria and application of temp sensors – thermocouples, RTD's, thermistors, radiation pyrometry, IR detectors

d. Pressure Measurement: Construction, Working principle, selection criteria and application of pressure sensors

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BOOKS RECOMMENDED

- 1) Ogata K, “ Modern Control Engineering”, Prentice Hall/Pearson
- 2) Dorf Morden Communication Systems ,Pearson Education
- 3) Franklin Feed back Control Systems, Pearson Education
- 4) Kuo B. C , “Automatic Control System”, Prentice Hall
- 5) Nagoor Kani :Control Systems, R B P
- 6) Ogata Discrete Time Control Systems, Pearson Education
- 7) Nagarath & Gopal, “ Control System Engineering”, Wiley Eastern
- 8) Control Engineerng Ramkayan Vikas Pub
- 9) Control Theory M N Bandyopadhyaya ,PHI
- 10) Control Theory Glad , Vikas Thomson Pub