

AMPE22 PROCESS CONTROL AND INSTRUMENTATION

UNIT-1 INSTRUMENTATION

- 1.1 Principles of measurements and classification of process instruments,
- 1.2 Measurement of temperature, pressure, fluid flow, liquid weight and weight flow rate,
- 1.3 Viscosity, pH, concentration, electrical and thermal conductivity, humidity of gases.

UNIT-2 OPEN LOOP SYSTEMS

- 2.1 Laplace transformation and its application in process control.
- 2.2 First order systems and their transient response for standard input functions,
- 2.3 First order systems in series, linearization and its application in process control,
- 2.4 Second order systems and their dynamics; transportation lag.

UNIT-3 CLOSED LOOP SYSTEMS

- 3.1 Closed loop control systems, development of block diagram for feed-back control systems, servo and regulatory problems,
- 3.2 Transfer function for controllers and final control element,
- 3.3 Principles of pneumatic and electronic controllers,
- 3.4 Transient response of closed-loop control systems and their stability.

UNIT-4 FREQUENCY RESPONSE

- 4.1 Introduction to frequency response of closed-loop systems, control system design by frequency response techniques,
- 4.2 Bode diagram, stability criterion, tuning of controllers Z-N tuning rules, C-C tuning rules.

UNIT-5 ADVANCED CONTROL SYSTEMS

- 5.1 Introduction to advanced control systems, cascade control, feed forward control,
- 5.2 Smith predictor, control of distillation towers and heat exchangers,
- 5.3 Introduction to computer control of chemical processes

References Book:

1. Marlin, T. E., "Process Control", 2nd Edn, McGraw Hill, New York, 2000.
2. Smith, C. A. and Corripio, A. B., "Principles and Practice of Automatic Process Control", 2nd Edn., John Wiley, New York, 1997.
3. Jason L. Speyer, Walter H. Chung, "Stochastic Processes, Estimation, and Control", PHI Ltd (2013).