PEE5D002 INDUSTRIAL PROCESS CONTROL AND DYNAMICS (3-0-0)

Module-1 **(10 Hours)**

University portion (80%): (8 Hours)

1. Introduction to Process Control:

Introduction, control systems, process control block diagram, control system evaluation, analog and digital processing

[**Chapter : 1.1, 1.2, 1.3, 1.4, 1.5]**

2. Analog Signal Conditioning:

Introduction, principles of analog signal conditioning, passive circuits, operation, amplifiers, op-amp circuits in instrumentation

[Chapter : 2.1, 2.2, 2.3, 2.4, 2.5]

College/Institute portion (20%): (2 Hours)

Units, Standards and Definitions, Sensors time response, Significance and Statistics **[Chapter: 1.6, 1.7, 1.8]** Or related advanced topics as decided by the concerned faculty teaching the subject.

Module 2 **(10 Hours)**

University portion (80%): (8 Hours)

1. Digital Signal Conditioning:

Introduction, Review of digital fundamentals, converters, Data Acquisition system

[**Chapter: 3.1, 3.2, 3.3, 3.4]**

2. Thermal Sensors:

Introduction, Definition of temperature, Metal resistance versus Temperature devices, Thermistors, Thermocouples

[**Chapter: 4.1, 4.2, 4.3, 4.4, 4.5]**

3. Mechanical Sensors:

Introduction, Displacement, Location or Position sensors, Strain sensors, Motion sensors

[**Chapter: 5.1, 5.2, 5.3, 5.4]**

College/Institute portion (20%): (2 Hours)

Other thermal sensors, Pressure sensors, Flow sensors**[Chapter: 4.6, 5.5, 5.6]** Or related advanced topics as decided by the concerned faculty teaching the subject.

Module 3 **(10 Hours)**

University portion (80%): (8 Hours)

1. Optical Sensors:

Introduction, Photo detectors, Pyrometry, Optical Sources application

[Chapter: 6.1, 6.3, 6.4, 6.5]

2. Final Control:

Introduction, Final control operation, signal conversions, Industrial Electronics, Actuators, Control Elements

[Chapter: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6]

3. Discrete State Process Control:

Introduction, Definition of Discrete State Process control, Characteristics of the system, Relay controllers and ladder diagram, PLCs

[Chapter: 8.1, 8.2, 8.3, 8.4, 8.5]

College/Institute portion (20%): (2 Hours)

Control Loop Characteristics **[Chapter: 12.1 – 12.6] o**r related advanced topics as decided by the concerned faculty teaching the subject.

Module 4 **(10 Hours)**

University portion (80%): (8 Hours)

1. Controller Principles:

Introduction, Process characteristics, Control system parameters, Discontinuous controller modes, continuous controller modes, composite control modes

[Chapter: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6]

2. Analog Controllers:

Electronics Controller, Pneumatic controller

[Chapter: 10.3, 10.4]

3. Digital Controllers:

Digital electronics methods, Computers in process control, Characteristics of digital data

[Chapter: 11.2, 11.3, 11.4]

College/Institute portion (20%): (2 Hours)

Controller Software, Computer Controller Examples **[Chapter: 11.5, 11.6]** or related advanced topics as decided by the concerned faculty teaching the subject.

Text Books:

4. ***Process Control Instrumentation Technology*** by Curtis D. Johnson, PHI Publication