

Sub-Module	:	Advanced Process Lab Equipment & System Maintenance
Prerequisite	:	Basic Electrical & Electronics
Duration	:	3 Days
PSMB Scheme	:	SBL
Training Approach	:	Theory & Practical

At the end of the module, participants should be able to:

- Summary of objectives** :
1. Describe the types of sensors used in process and explain the concept of working principle of analogue and digital sensor
 2. Perform test and measurement of a system by using the right instrument and the right methods.
 3. Describe process control loop design. scanning methods
 4. Identify the important attribute of instrument calibration as part of instrument and system maintenance.

References:

1. **Intro. To Automatic Process Control.ISA,** R.Mollemkemp
2. **Fundamental of Process Control Theory,** Paul Munill (Instrument Society America)
3. **Control System,** Norman Nise
4. **Process Control Instrument Engineer's Handbook,** Bela G. Liptak
5. **Feedback and Control System,** Joseph Allen
6. **Instrumentation for Process Measurement,** Norman A. Anderson
7. **Process Control Instrumentation Technology,** Curtis D. Johnson

Course Outline:**1. Digital Sensor**

- 1.1 Capacitive Proximity Sensor
- 1.2 Inductive Proximity sensor
- 1.3 Magnetic Proximity Sensor
- 1.4 Diffuse, Through-Beam and Retro-Reflective Optical Sensors

2. Analog Sensor

- 2.1 Definition of analog/ continuous sensor
- 2.2 Representation of analog sensor detection into standard current signal.
- 2.3 Continuous Measurement by Using Ultrasonic displacement sensor

3. Process Measurement

- 3.1 Introduction to transmitter in process measurement
- 3.2 Continuous Temperature measurement
- 3.3 Continuous Level Measurement
- 3.4 Continuous Flow Measurement

4. Understanding Process & Instrumentation Diagram (P&ID)

- 4.1 Identifying the symbols in P&ID
- 4.2 Identify Process Equipment and Control Loop Element from P&ID

5. Process Control Loop

- 5.1 Identify Process Instrument
- 5.2 Negative Feedback Control
- 5.3 ON-OFF Control Method.
- 5.4 Continuous Control Loops
- 5.5 Proportional, Integral and Derivative Control
- 5.6 Troubleshoot Process Control Loop

6. Introduction to Instrument Calibration

- 6.1 Definition of calibration
- 6.2 The importance of instrument calibration
- 6.3 Traceability in calibration

7. Equipment / Machine/ Software

Machines/ Equipment	:	Digital & Analogue sensors – Bosch/Rexroth & Leybold
Brand Name	:	Process Control Trainer – Feedback.
Software	:	Feedback/ ABB Controller

8. Certification

Certificate of attendance will be issued to those who fulfil 80% of attendance.