



ADVANCED DIPLOMA OF ELECTRICAL AND INSTRUMENTATION (E&I) ENGINEERING FOR OIL AND GAS FACILITIES

MODULE DETAILS

MODULE 2: Fundamentals of Process Instrumentation

Nominal duration: 7 weeks (56 hours total time commitment)

This time commitment includes the preparation reading, attendance at each webinar (1 hour plus 15-30 minutes for discussion), and the time necessary to complete the assignments and further study.

MODULE PURPOSE

A clear understanding and rigorous application of instrument design, specification, selection, commissioning and maintenance principles is the most important factor in an efficient process system. Proper control of a process can only be achieved when instrumentation provides the correct information. This module focuses on real applications, with attention to special installation considerations and application limitations when selecting or installing different measurement or control equipment.

PRE-REQUISITE MODULES/UNIT(S)

Module 1: Fundamentals of Electrical Engineering

ASSESSMENT STRATEGY

To evaluate the achievement of the learning outcomes; written assignments, group projects and practical exercises are set.

SUMMARY OF LEARNING OUTCOMES

1. Outline the fundamentals of process measurement [2.1]
2. Describe the methods used for pressure measurement [2.2]
3. Describe the methods used for level measurement [2.3]
4. Describe the methods used for temperature measurement [2.4]
5. Describe the methods used for flow measurement [2.5]
6. Examine and discuss process considerations in selecting instrumentation components [2.6]
7. Examine and discuss the integration of process instrumentation systems [2.7]



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Learning Outcome 1 Outline the fundamentals of process measurement [2.1]

- Assessment Criteria**
1. Recognize and apply process measurement concepts and terminology [2.1.1]
 2. Examine and discuss pneumatic and hydraulic instrumentation systems [2.1.2]
 3. Discuss the hardware and accessories related to process measurement [2.1.3]

Learning Outcome 2 Describe the methods used for pressure measurement [2.2]

- Assessment Criteria**
1. Discuss basic pressure measurement concepts [2.2.1]
 2. Describe pressure measurement devices and accessories [2.2.2]
 3. Explain the operation of overpressure relief devices [2.2.3]
 4. Examine issues related to pressure measurement [2.2.4]

Learning Outcome 3 Describe the methods used for level measurement [2.3]

- Assessment Criteria**
1. Explain level measurement techniques [2.3.1]
 2. Describe level measurement devices and accessories [2.3.2]
 3. Examine issues related to level measurement [2.3.3]

Learning Outcome 4 Describe the methods used for temperature measurement [2.4]

- Assessment Criteria**
1. Describe methods of temperature measurement based on:
 - (a) Thermoelectric effect [2.4.1]
 - (b) Resistance [2.4.2]
 - (c) Radiation [2.4.3]
 - (d) Expansion [2.4.4]
 2. Examine issues related to temperature measurement [2.4.5]



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Learning Outcome 5 **Describe the methods used for flow measurement** **[2.5]**

Assessment Criteria

1. Describe methods of flow measurement based on:
 - (a) Volume flow rate [2.5.1]
 - (b) Mass flow rate [2.5.2]
 - (c) Flow velocity [2.5.3]
2. Examine other types of flow measurement not based on volume, mass or velocity [2.5.4]

Learning Outcome 6 **Examine and discuss process considerations in selecting instrumentation** **[2.6]**

Assessment Criteria

1. Examine and discuss the relevance of the following in selecting appropriate instrumentation for a given process:
 - (a) Transmitters [2.6.1]
 - (b) Noise [2.6.2]
 - (c) Materials of construction [2.6.3]

Learning Outcome 7 **Examine and discuss the integration of process instrumentation systems** **[2.7]**

Assessment Criteria

1. Discuss tank farm instrumentation [2.7.1]
2. Describe the calculation of individual instrument error and total error for the system [2.7.2]
3. Discuss the integration of pressure, level, temperature and flow measurement systems [2.7.3]
4. Examine the integration of new smart instrumentation subsystems with data communication links [2.7.4]
5. Discuss the testing and commissioning of instrumentation subsystems [2.7.5]

Delivery Mode

A combination of asynchronous and synchronous e-learning delivery comprising a judicious mix of interactive online web conferencing, simulation (virtual labs) software, remote online labs, online videos, Power Points, notes, reading and study materials (in pdf, html and word format) accessed through the Moodle Learning Management System (LMS).