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

MODULE DETAILS

MODULE 10: Power Quality, Uninterruptible Power Supplies, Surge Protection and Noise Control

Nominal duration: 5 weeks (40 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

Supplying reliable electric power for critical systems is an essential part of modern industrial installations. Very often the supply received from a distribution network has quality issues such as voltage sags and swells, transients, harmonics, and interruptions. While it is impossible to guarantee 100% availability of power at all points in any system, vulnerable sections can be provided with alternative emergency power supply to ensure more reliable power availability, thereby avoiding the problems caused by power interruption. Measures against power interruptions, voltage variations, transients and harmonics will be discussed in this module.

PRE-REQUISITE MODULES/UNIT(S)

Module 4: Power Distribution

ASSESSMENT STRATEGY

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

SUMMARY OF LEARNING OUTCOMES

1. Discuss the concept of power quality and methods of dealing with voltage variations and/or interruptions [10.1]
2. Describe the use of batteries for critical power supplies [10.2]
3. Describe methods used for surge and transient protection [10.3]
4. Identify methods for controlling harmonics and noise [10.4]
5. Explain the principles of Power Factor compensation and Power Quality studies [10.5]

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Learning Outcome 1	**Discuss the concept of power quality and methods dealing with voltage variations and/or interruptions [10.1]**
Assessment Criteria	1. Describe the basics of power quality and identify power quality issues [10.1.1]
	2. Discuss the problems associated with voltage fluctuations and supply interruptions [10.1.2]
	3. Describe a static UPS system and its subtypes [10.1.3]
Learning Outcome 2	**Describe the use of batteries for critical power supplies [10.2]**
Assessment Criteria	1. Explain the importance of uninterrupted dc and ac power supplies [10.2.1]
	2. Describe the basics of battery (a) construction, (b) charging/discharging, (c) sizing, (d) installation, and (e) failure/disposal [10.2.2]
Learning Outcome 3	**Describe methods used for surge and transient protection [10.3]**
Assessment Criteria	1. Identify the methods by which surges are coupled into the power system [10.3.1]
	2. Describe the methods available for surge protection [10.3.2]
Learning Outcome 4	**Identify methods for controlling harmonics and noise [10.4]**
Assessment Criteria	1. Identify sources of harmonics [10.4.1]
	2. Describe methods for controlling harmonics [10.4.2]
	3. Explain (a) the basics of noise, (b) its relationship with harmonics and (c) methods for noise control. [10.4.3]

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Learning Outcome 5	**Explain the principles of Power Factor compensation and Power Quality studies [10.5]**
Assessment Criteria	1. Explain Power Factor (PF) compensation methods [10.5.1]
	2. Describe the procedures followed in Power Quality studies [10.5.2]

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).