



GCC Electrical
Testing Laboratory

المفتبر الفليبي لفمص الممدمم الكهرمالمية

Basic Protection Course for Integration and Protection of Conventional and Renewable Power Plants

This -3day course is intended for electrical engineers and senior level technicians who are working in industrial plants and power plants. The rapidly increasing use of renewables makes this course very valuable since this form of energy generation will become very prevalent in the coming years. It will be a refresher for experienced engineers involved with conventional generation and will open the door to application, integration and protection of renewable generation. In addition, it will help junior and entry level engineers by building a strong foundation and will sharpen their skills for future opportunities and challenges. Extensive math is simplified to help convey the concepts and the details associated with such protection. Participants should bring their scientific calculator to solve problems.



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Education
Course Code: **EXX1**



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JULY
15 - 19
2018



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المختبر الفليبي لفحص المعدات الكهربائية

Objectives

Upon completion of this course, the Participant will be able to:

Build a strong foundation for engineers and senior level technicians enabling them to get ready for future tasks and challenges. In the end it will help their company achieve its reliability, security and dependability targets.

Addressed to:

Electrical engineers and senior level technicians who are working in power generation, industrial plants and transmission systems.
Maximum recommended class size is 25 students (ideal class size is 15 students).

Duration:

3 Full Days

Location/Venue:

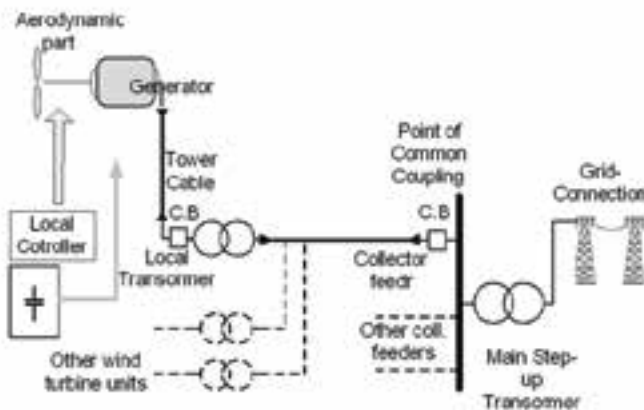
GCCIA HQ, Dammam

Course Fees:

PROGRAM

The Course program contains the following training outline:

DAY 1:	Basic layout of different types of power plants—differences and similarities. This includes Fault Calculations (Symmetrical Components, Short Circuits and Fault Current), Relay Protection applied at Conventional Power Plant (CTs, Loss of Field, Back up Protection, Reverse Power, Dead Machine Protection, Overspeed)
DAY 2:	<ul style="list-style-type: none"> Relay Protection applied at Conventional Power Plant—Continued (Differential Protection of winding, Ground Fault Protection, Over and Under Frequency, Field Ground Protection & Out-of-Step Relaying) Generator Synchronization, Various elements of synchronization What is Black Start? How is black start implemented? Time Taken to Start Various Units? (Hydro, Nuclear, Steam, Gas Turbine & Renewables).
DAY 3:	<ul style="list-style-type: none"> Renewables (Distributed Generation—Wind, and PV). This includes Frequency variation and Regulation, Islanding, Reactive power requirement, Harmonics, Power fluctuations, Voltage rise and reverse power & Voltage imbalance A case study of generator trip will be discussed (Trip description & How was this trip analyzed



Renewable energy

What is renewable energy?
Renewable energy comes from sources that won't run out, including the sun, the wind, the waves and tides, natural underground heat, geothermal energy, wind and water.
We can use renewable energy to produce electricity and heat for homes and businesses.

Why do we need renewable energy?
Most of the electricity we use in the UK comes from non-renewable sources such as coal and gas. These 'fossil fuels' are running out. Burning them to provide energy also releases gases that contribute to climate change. Renewable sources of energy don't run out or pollute the environment.

Why don't we get all our electricity from renewable energy?
It is important to have a mix of energy sources so that we have a secure and reliable supply of electricity. Renewable technologies are still being developed.

Wind energy
Wind turbines, which wind turbines, can be used to make electricity in windy areas. Groups of wind turbines, or wind farms, are being built on land and at sea.

Hydroelectric energy
Hydroelectric energy makes energy from flowing water. Water flowing from a reservoir to a turbine through a hydroelectric dam can be used to make power.

Geothermal energy
Geothermal energy heats the water deep inside the Earth. In natural geothermal plants we heat from steam underground to generate electricity.

Solar energy
Solar energy means energy from the sun. The sun's light and heat can be captured by solar panels and turned into electricity or used to heat water.

Hydrogen fuel cells
Hydrogen fuel cells take hydrogen electricity from hydrogen gas. They work like batteries, and can power cars or boats.

Wave energy
Waves are made when wind blows across the sea. The energy in waves can be used to make electricity for new technologies such as the Perpetua wave machine.

Tidal energy
Every day, the tide at the coast goes in and out, as the sea rises and falls. Marine turbines can use this movement to generate electricity.

It's Only Natural