TRAINING TITLE

POWER GENERATION AND DISTRIBUTION ENGINEERING

Training Duration

5 day

Training Venue and Dates

Ref. No. EE204	Power generation and distribution Engineering	5	25-29 Aug. 2025	$5,500	ABU DHABI, UAE

In any of the 4 or 5-star hotels. The exact venue will be informed later.

Training Fees

- **$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch**

Training Certificate

Define Management Consultants Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

This program is aimed to provide deep knowledge & experience on the applications of power system generation & distribution in the field of oil & gas industries. Where as a practical based knowledge of electrical generation and equipments could be applied on different case studies and gives a rule of thumb relevant to deal with the Electrical Equipments.

TRAINING OBJECTIVES

Delegates will gain a detailed appreciation of learnt from this training to interactive with the power plant equipments & network to identify , evaluate & put the suitable remedies for faults & troubles to get a stable operation and good plan for equipment maintenance. Concerning the following

- **Different types of generator's prime movers focuses on gas turbines & Diesel engine Main components , operations , control , protection and load control, starting & stopping sequence**

- **Generator theory , main components , types, Excitation system , AVR, Regulation , synchronizing of generators and parallel operations ,load sharing –shedding system , generator protections , fault finding and trouble shootings typical exercises &**

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Maintenance for generator and its associated Auxiliaries system – operators duties in control room

- **Power transformers ; Operational principles ,Design guidelines and different types, ,Maintenance and commissioning procedures ,Troubleshooting checklists and failure analysis techniques &Testing procedures**

- **Electric power distribution systems; Types of distribution systems. Overview of main components & interconnection of power systems; Standby & emergency (black start generators) power generators - control circuit & protection, automatic changeover, loading & unloading**

WHO SHOULD ATTEND?

This course is aimed at all Personnel involved in power plants operation & maintenance. The program is based on multi-disciplinary approach, which includes all personnel from Operators, Technicians , Supervisors, New graduated to Senior Engineers

TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.
Very useful Course Materials will be given.

- **30% Lectures**
- **30% Workshops and work presentation**
- **20% Group Work& Practical Exercises**
- **20% Videos& General Discussions**

COURSE PROGRAM:

Day-1

- **Gas turbines & types of prime movers**
  - **Main components &operations of single-shaft gas turbines**
  - **Main components & operations of Two shaft gas turbines**

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- Main components & operations of Diesel Engine
- Starting & stopping sequences
- Protection & load control

- **Principles of AC generators**
  - General; AC generator theory & principles.
  - Typical Generator main components, Construction, insulation & cooling Methods
  - Behavior under fault
  - Capability curve.
  - Neutral Earthing Resistor
  - Insulated Bearings
- **Generator Excitation and Voltage Control**
  - General
  - Conventional excitation
  - Static Excitation
  - Brushless Excitation (General Case)
  - Behavior Under Short Circuit
  - Brushless Excitation (Without Pilot Exciter)
  - Brushless Excitation (With Pilot Exciter)
  - The diode bridges
  - Regulation response time
  - Automatic voltage regulators (AVR)
  - AVR set-point
- **GENERATOR INTERNAL IMPEDANCE AND REGULATION**
  - General
  - D.C. Generator
  - A.C. Generator
  - Regulation
  - Practical Application
  - Synchronous Reactance
  - Percentage Reactance

Day-2

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- **GENERATOR SPEED CONTROL**
  - General
  - mechanical governors
  - modern mechanical governors
  - electronic governors
  - typical single-shaft gas turbine governor
  - single shaft over speed protection
  - typical two-shaft gas turbine governor
  - two-shaft auto and manual speed control
  - Two-shaft speed protection
  - load sharing
  - Typical fault finding and troubleshooting technique
- **DIESEL GENERATOR SETS**
  - General
  - basic services
  - availability of basic services generator
  - basic services generator utilities
- **Generator protection**
  - Standard protection
  - Special generator protection
  - Protection diagrams
- **Generator Maintenance and troubleshooting**
  - Preventive Maintenance of Generator
  - Preventive Maintenance of generator's Auxiliaries
  - Troubleshooting and fault finding typical practical case study

Day-3

- **Control Persons Main duties in the power station control room**
  - An Electrical Person operating from a control room specially equipped with system control facilities.
  - Responsibilities Of Authorized Persons

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- **Transformer; Introduction, General Principles and Classification**
  - General Classification of Transformers: Transformer Construction, Core-Type, Shell-Type, Dry-type Transformers, Oil-filled Transformers, Cooling Techniques
  - Transformer Windings, Interconnection of Windings, Advantages and Disadvantages of Principal Connections. Tertiary Windings, Autotransformers
  - Parallel Operation of Transformers, Loadings of Transformers in Parallel, Paralleling Requirements, Polarity
  - Standards for Transformers, Types and Requirements
  - Transformer Tapings and Connections
  - Ability to withstand Short Circuit, Sound Level
- **Transformer Constructional Details**
  - Transformer Oil, Characteristics, Oil Oxidation, Breakdown Voltage, Water Content, Acidity, Oil Testing, Field Oil Testing, Dissolved Gas Analysis, Treatment and Filtering of Oil
  - Effect of Oil Expansion, Breathing Action, Buchholz Relay, Explosion Vents
  - Instrument Transformers

Day-4

- **Transformer Operation and Maintenance**
  - Distribution Voltage Adjustment, Off-Load Tap Changing, On-Load Tap Changing
  - Switching of high voltage underground cables supplying Distribution Transformers
  - Earthing and Over-Current Protection of Distribution Transformers
  - Transformer Maintenance: Oil preservation , Deterioration of oil, Breathers, Condition Monitoring, Faults in Transformers, Tappings and Windings
  - Advanced Transformer Maintenance
  - Guidelines on how to care for your Distribution Transformer
- **Transformer Testing**
  - Transformer Routine Tests
  - Transformer oil test
  - Transformer gas test
  - Measurement of winding resistance

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- **Measurement of voltage ratio**
- **Measurement of impedance voltage short-circuit impedance and load loss**
- **Measurement of No-load loss and current**
- **Insulation resistance**
- **Analysis of the tests result**

Day-5

- **<u>Electric power distribution systems</u>**
  - **Types of distribution systems.**
  - **Overview of main components & interconnection of power systems**
  - **Standby & emergency (black start generators) power generators - control circuit & protection, automatic changeover, loading & unloading**

NOTE:
<u>Pre-& Post Tests will be conducted.</u>
<u>Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.</u>

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