COURSE OVERVIEW EE0125
Basic Power Generator and Emergency Power

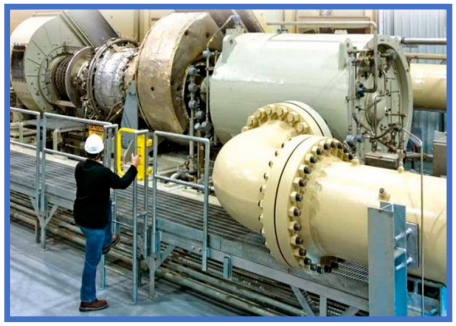
Course Title
Basic Power Generator and Emergency Power

Course Date/Venue
Session 1: June 15-19, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: November 10-14, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE0125

Course Duration
Five days/3.0 CEUs/30 PDHs

Course Description



This hands-on, highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

Maximum efficiency, reliability, and longevity of electrical generators are of great concern to many industries. These objectives can only be achieved by understanding the characteristics, selection criteria, protective systems, common problems and repair techniques, preventive and predictive maintenance.

This course is a MUST for anyone who is involved in the selection, applications, or maintenance of electrical generators. It provides the latest in technology. The course covers how these equipment operate and provide guidelines and rules that must be followed for a successful operation. Their basic design, operating characteristics, specification, selection criteria, advanced fault detection techniques, critical components as well as all maintenance issues are covered in detail.

The course is designed to provide a comprehensive understanding of the various types of generators.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on maintenance, troubleshooting, testing, protection, operation and selection techniques and procedures in generators and electrical systems
- Specify, select, commission and maintain electrical generators for their applications
- Achieve reduced capital, operating and maintenance costs along with increase in efficiency
- Carryout diagnostic testing and inspection, advanced fault detection techniques, critical components and common failure modes
- Discuss selection criteria, commissioning requirements, predictive and preventive maintenance, reliability, testing and cost
- Discover the maintenance required to minimize their operating cost and maximize their efficiency, reliability and longevity

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course is intended for engineers, supervisors, foremen and other technical maintenance and operational staff.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Professor Mike Kanova is a **Senior Electrical** & **Instrumentation Engineer** with **over 35 years** of industrial experience within the **Oil & Gas**, **Petrochemical** and **Refinery** industries. His expertise extends widely over the areas of **Fiber Optics Access Network** Planning, **Fiber Optics Technology**, **Fiber Optic** Cable Splicing, Termination and Testing, **Fiber Optic Applications** in Protective Relaying Systems, **Fiber Optic Termination** Equipment Operation & Maintenance, Foundation **Fieldbus Data Communication & Fieldbus Systems**, Data **Communication & Fieldbus** Systems, **Refining & Rotating Equipment, Process Equipment**, **Instrumentation & Control**, **Control Loop** Parameters, Control Loop Tuning, **Surge Protect**-Control, Business Management System **(BMS)**, **E&D Values** & **ROIVs** Partial Stroke Testify, **Alarm & Safety Interlocks** System, **P&IDs**, **Uninterruptible Power Supply** (**UPS**) Design & Maintenance, **UPS Construction**, **UPS DC & AC** Types & Application, **Static & Dynamic UPS**, **UPS Installation** Methods, **UPS Protection**, **Electric Heat Trace Syste**m, **Overhead Power Line** Construction, **Power Systems** Control & Stability, **Fault Analysis** in Electrical Networks, OLE for Process Control (**OPC**), **Process Control & Instrumentation**, **Distribution Cables**, **Custody Measurement**, Loss **Control & Multiphase Flowmetering** of Petroleum Products, General **Instrumentation & Process Control** for Industrial Applications, **Process Instrumentation**, **Process Control & Instrumentation**, **Process Measurement & Control**, **Experion PKS** Operator, **SCADA** Systems, **Generator Excitation**, **Process Control** Techniques, Programmable Logic Controllers (**PLC**) Operation & Maintenance, **Allen Bradley PLC**, **Siemens SIMATIC S7** Maintenance & Configuration, Distributed Control System (**DCS**) Applications, Selection & Troubleshooting, **Compressor** Control & Protection, **GE Mark V**, **Power Systems** Control & Stability, Advanced **Electrical Safety**, **Switchgear** Maintenance & Troubleshooting, Electrical Fault Investigation, **Power System Planning & Economics**, **Distribution System**, **Electrical Networks & Power Flow Analysis**, **Electrical Power Distribution System** Performance & Methods of Improvement, Practical **Fiber Optics** Technology, Electric **Motor** Testing & Troubleshooting, Fundamentals of **Telecommunication**, Synchronous Digital Hierarchy (**SDH**) & Dense Wavelength Division Multiplexing (**DWDM**), **WiMax Broadband Wireless**, **SDH Networks**, **IPT Avaya Network**, **WAN & Satellite** Communication, **Wireless** Technology RC-400, National Electrical Code (**NEC**), National Electrical Safety Code (**NESC**), **Security Systems** Installation & Maintenance, **Protection Relay**, **Power Generation**, **Circuit Breakers & Switchgears** and **Gas Turbine**. Further, his experience has proven him well in the practice and has given him the chance to work with **international organizations** such as the Instrument Society of America (**ISA**), the Institute of Measurements and Control, the **United** Nations Educational Scientific and Cultural Organization (**UNESCO**) and the International Electrical Testing Association (**NETA**).

During Professor Mohamed's career life, he gained extensive experience in the electrical, instrumentation and control systems engineering field through various challenging **engineering** & **managerial** positions that he filled while working as the **Scientist/Inventor**, **Project Manager**, **Fiber Optic Engineer**, **Fiber Optic Technician**, **Fiber Optic Test Engineer**, **Development Engineer**, **Electronics Engineer**, **Stream Leader**, **Co-leader**, **Supervisor**, **Researcher**, **Conference Organizer**, **External Examiner**, **Lecturer** in Electronics, Opto-electronics and Power Electronics, **Course Developer**, **Organizing & Editorial Committee Member**, Part-time **Consultant** and Part-time **Lecturer** from the Cape Peninsula University of Technology, University of Cape Town, University of Western, University of Johannesburg Witwatersrand, Walter Sisulu University, **ESKOM**, NRF, SCINAC Tokai, Plessey Southern Africa Retreat, **Peninsula Technikon**, SA Nylon Spinners and R&B Electronics Rondebosch.

With the knowledge and skills he gained herein, he has produced **over 100 publications** and **papers** that were presented to numerous gatherings like the **International Conference on System Modelling & Control**; **International Conference on Industrial and Commercial Use of Energy**; **International Conference of Control Signals and Systems**; the **UICEE Annual Conference on Engineering Education**, the **ETMSA** (**Energy Technology Modelling**, **Simulation and Applications**), the **Symposium on Energy Technology**, **Modelling**, **Simulation & Applications**. Those papers were also published in journals such as the **NETA Journal**; the **IEEE Aerospace and Electronic Systems Journal**; the **International Journal of Power and Energy Systems**; the **Journal of the Electricity Supply Industry**; the **International Journal of Computers and Applications**; the **Journal of the Electronics Technology** and the **Quantum Journal**.

Professor Mohamed is a **Registered Professional Engineer** and has a **PhD**, **Master's** and **Bachelor's** degrees in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**) and a well-respected member of the **IEEE** and is actively engaged with numerous projects in affiliation with the **Society for Photo-optical Instrumentation** Engineers (**SPIE**), the **Aerospace and Electronic Systems Society** (**AESS-IEEE**), the **Circuits and Systems Society** (**CSS-IEEE**), the **Lasers and Electro-optics Society** (**LES- IEEE**) and the **Power Electronic Society** (**PELS-IEEE**). He has further delivered numerous trainings, seminars, courses, workshops and conferences internationally.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 - 0800	*Registration & Coffee*
0800 - 0815	*Welcome & Introduction*
0815 - 0830	*PRE- TEST*
0830 - 0930	***Fundamentals of Electric Systems*** *Capacitors ● Current and Resistance ● The Magnetic Field, Faraday's Law of Induction ● Lenz's Law, Inductance ● Alternating Currents ● Three-Phase System ● Lenz's Law ● Inductance ● Alternating Currents ● Three-Phase System*
0930 - 0945	*Break*
0945 - 1045	***Introduction to Machinery Principles*** *Electric Machines and Transformers ● Common Terms and Principles ● The Magnetic Field ● Magnetic Behavior of Ferromagnetic Materials ● Faraday's Law – Induced Voltage From a Magnetic Field Changing with Time ● Core Loss Values ● Permanent Magnets, Production of Induced Force on a Wire ● Induced Voltage on a Conductor Moving in a Magnetic Field*
1045 - 1230	***AC Machine Fundamentals*** *The Rotating Magnetic Field ● The Induced Voltage in AC Machines ● The Induced Torque in a Three-Phase Machine ● Winding Insulation in AC Machines ● AC Machine Power Flow and Losses*
1230 – 1245	*Break*
1315 - 1420	***Synchronous Machines*** *Physical Description ● Pole Pitch: Electrical Degrees ● Airgap and Magnetic Circuit of a Synchronous Machine*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 - 0930	***Synchronous Machines (cont'd)*** *Synchronous Machine Windings ● Field Excitation ● No-Load and Short-Circuit Values ● Torque Tests ● Excitation of a Synchronous Machine ● Machine Losses*
0930 - 0945	*Break*
0945 - 1100	***Synchronous Generators*** *Synchronous Generator Construction ● The Speed of Rotation of a Synchronous Generator ● The Internal Generated Voltage of a Synchronous Generator ● The Equivalent Circuit of a Synchronous Generator*
1100 - 1230	***Synchronous Generators (cont'd)*** *The Phasor Diagram of a Synchronous Generator ● Power and Torque in Synchronous Generators ● The Synchronous Generator Operating alone*
1230 – 1245	*Break*

1245 - 1420	***Synchronous Generators (cont'd)*** *Parallel Operation of AC Generators ● Operation of Generators in Parallel With Large Power Systems ● Synchronous Generator Ratings ● Synchronous Generator Capability Curves ● Short-Time Operation and Service Factor*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 - 0930	***Generator Components, Auxiliaries and Excitation*** *Introduction ● The Rotor ● Turbine-Generator Components ● Cooling Systems ● Shaft Seals and Seal Oil Systems*
0930 - 0945	*Break*
0945 - 1100	***Generator Components, Auxiliaries and Excitation (cont'd)*** *Stator Winding Water Cooling Systems ● Other Cooling Systems ● Excitation*
1100 - 1230	***Generator Components, Auxiliaries and Excitation (cont'd)*** *The Voltage Regulator ● The Power System Stabilizer ● Characteristics of Generator Exciter Power Systems (GEP) ● Generator Operation*
1230 – 1245	*Break*
1245 - 1420	***Generator Main Connections*** *Introduction, Isolated Phase Bus Bar Circulatory Currents ● System Description*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 - 0930	***Performance and Operation of Generators*** *Generator Systems, Condition Monitoring ● Operational Limitations ● Fault Conditions*
0930 - 0945	*Break*
0945 - 1100	***Generator Surveillance and Testing*** *Generator Operational Checks (Surveillance and Monitoring) ● Generator Diagnostic Testing ● Insulation Resistance and Polarization Index ● DC Hipot Test ● AC Tests for Stator Windings ● Synchronous Machine Rotor Windings ● Partial Discharge Tests ● Low Core Flux Test (EL-CID) ● Mechanical Tests ● Groundwall Insulation ● Rotor Winding ● Turn Insulation ● Slow Wedges and Bracing ● Stator and Rotor Cores*
1100 - 1230	***Generator Inspection and Maintenance*** *On-Load Maintenance and Monitoring, Off-Load Maintenance ● Generator Testing.*
1230 – 1245	*Break*

1245 - 1420	***Generator Operational Problems and Refurbishment Options*** *Typical Generator Operational Problems ● Generator Rotor Reliability and Life Expectancy ● Generator Rotor Refurbishment ● Types of Insulation ● Generator Rotor Modifications ● Upgrades and Uprates ● High Speed Balancing, Flux Probe Test*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 - 0900	***Bearings*** *Types of Bearings ● Statistical Nature of Bearing Life ● Materials and Finish ● Sizes of Bearings ● Types of Roller Bearings ● Thrust Bearings, Lubrication*
0900 - 1030	***Used Oil Analysis*** *Proper Lube Oil Sampling Technique ● Test Description and Significance ● Visual and Sensory Inspection ● Chemical and Physical tests ● Summary*
1030 - 1045	*Break*
1045 - 1100	***Vibration Analysis*** *The Application of Sine Waves to Vibration ● Multimass Systems ● Resonance ● Logarithms and Decibels (db) ● The Use of Filtering ● Vibration Instrumentation ● Time Domain ● Frequency Domain ● Machinery Example ● Vibration Analysis ● Resonant Frequency ● Vibration Severity*
1100 - 1200	***Power Station Electrical Systems and Design Requirements*** *Introduction ● System Requirements ● Electrical System Description ● System Performance ● Power Plant Outages and Faults ● Uninterruptible Power Supply (UPS) Systems, DC Systems*
1200 - 1215	*Break*
1215 - 1300	***Power Station Protective Systems*** *Introduction, Design Criteria ● Generator Protection ● DC Tripping Systems*
1300 – 1345	***Frequently Asked Questions*** *Fundamentals of Electric Systems, Introduction to Machinery Principles ● Transformers ● Transformer Components and Maintenance Interconnection With the Grid ● C Machine Fundamentals ● Induction Motors, Speed Control of Induction Motors ● Maintenance of Motors ● Variable Speed Drives ● Synchronous Generators ● Generator Components ● Auxiliaries ● and Excitation*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 - 1415	***POST- TEST***
1415 - 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This hands-on, highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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