

COURSE OVERVIEW EE0170
Generator Excitation Systems

Course Title

Generator Excitation Systems

Course Date/Venue

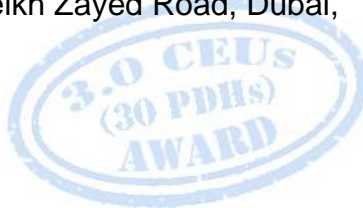
December 08-12, 2024/Plaza 2 Elite Byblos
 Hotel Al Barsha, Sheikh Zayed Road, Dubai,
 UAE

Course Reference

EE0170

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and 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.



Excitation systems directly affect power system stability where generators are large, connected with long lines, at sensitive voltage locations, or in systems with local or intertie oscillations. Excitation system reliability and availability can be a matter of skilled routine maintenance activity and proficient troubleshooting capability. Proficient troubleshooting is greatly aided by a solid operational understanding of the excitation system and its voltage regulator.



This course is designed to cover the excitation system design, commissioning, operation, maintenance, performance analysis, testing, tuning, repair and troubleshooting. The course will address the adjustment of excitation systems for high-initial response excitation using a PID controller.

The course will provide participants with the necessary knowledge to maintain, repair and calibrate an excitation system together with the automatic voltage regulator (AVR).

This includes using effective routine maintenance practices, knowing what checks may be performed on-line and how to perform these checks without causing an equipment shutdown, increasing the likelihood of accurate problem diagnosis by thoroughly understanding how the equipment operates, increasing the likelihood of accurate problem diagnosis by understanding any given circuit's impact upon operations; ie., quickly linking the symptom(s) to the faulty circuit, verifying suspected faulty circuit by analyzing voltage levels and/or signal traces, and understanding the necessary calibrations, after the faulty part has been replaced, including how the calibrations are performed.

Course Objectives

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

- Select, start-up, operate, maintain, test and troubleshoot the generator excitation systems and automatic voltage regulators (AVR)
- Apply and gain an in-depth knowledge on the major generator set components which include generator power sources, anatomy of a steam turbine, generator construction, ancillary equipment, governor systems, excitation systems and generator protection
- Illustrate the proper exciter operation and give emphasis to the anatomy of an excitation system, excitation configuration, AVR steady state operation & excitation protection
- Discuss the excitation system performance including the hardware configurations, generator dynamics, AVR dynamics & dynamic and transient stability
- Explain the hardware configuration of control electronics, static converters, crowbar, field circuit breaker, field discharge resistor and auto/manual dual systems
- Enumerate the different software functions for structures, software documentation, AVR communication systems and hardware & software interface
- Employ the proper commissioning, operation, troubleshooting and maintenance of AVR systems

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 designed for those who are involved in the selection, commissioning, operation, maintenance, testing or troubleshooting of the generator excitation systems and AVR including engineers, supervisors and other technical staff.

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:-


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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.

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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.

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:



Mr. Sherif Bayoumi, BSc, is a Senior Electrical Engineer with over 40 years of extensive experience within Oil, Gas, Petrochemical and Power industries. His expertise widely covers HV/LV Equipment, High Voltage Electrical Safety, LV & HV Electrical System, HV Equipments Inspection & Maintenance, HV Switchgear Operation & Maintenance, LV Distribution Switchgear & Equipment, Lock & Tag Out, Circuit Breakers & Switchgears, Electrical Systematics Troubleshooting, Electrical

Distribution Systems & Control Circuits, Electrical Parameters, Symmetrical & Unsymmetrical Faults, Electrical Drawings, Relay Logic Circuits, Test Requirements, Component Testing Procedures, Electrical & Control System, Troubleshooting Transformers, Equipment Troubleshooting, System Grounding, Circuit Breakers, Protection Devices & Technology, Protection Relay, Solid State Relay, Instrument Transformers, Grading & Protection Coordination, Electrical System & Equipment, Generators, Gas Turbine, Diesel Generators, Power Transformers, AC & DC Motors, Substations, Switchgears & Distribution, Power System Analysis, Electrical Equipment Control Systems, Cables & Domestic Wiring, Overhead Transmission Lines, Electrical Safety, Electrical Protection, Batteries, Chargers & UPS, Electrical Projects Handling, Electrical Measurements, Medium Voltage Switchgears (MVSG), Motor Control Centers (MCC), Electrical Submersible Pumps (ESP). He is also well-versed in Preventive Maintenance, Health, Safety & Environmental Management System (HSEMS), On-Shore & Off-Shore Electrical Installations, Engineering Studies, Water Desalination Units, Induction Motors, Power Supply Substations, Electro-mechanical Protection Relays, Engineering Drawings, Industrial Power System Coordination, Machinery Vibration, Dynamic Balancing Analysis, Material & Equipment Standard & Code System, Hazardous Area Classification, Safety Management System, Emergency Response, Permit to Work & Issuing Authority, Defensive Driving and Task Risk Assessment.

During Mr. Sherif's career life, he has occupied various key positions in several companies such as the **Electrical Maintenance Engineer, Senior Electrical Support Engineer, Lead Maintenance Electrical Engineer, Maintenance Electrical Engineer, Specialist Electrical Engineer in Abu Dhabi Company for Onshore Oil Operations (ADCO), Gulf of Suez Petroleum Company (GUPCO) and West Desert Petroleum Company (WEPCO).**

Mr. Sherif has a **Bachelor** degree in **Electrical Power Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous courses, trainings, workshops, seminars and conferences internationally.

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.

Accommodation

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

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.

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: Sunday, 08th of December 2024

0730 – 0800	<i>Registration, Coffee</i>
0800-0815	<i>Welcome & Introduction</i>
0815– 0830	PRE-TEST
0830-0915	Major Generator Set Components
0915-0945	Generator Power Sources
0930-0945	<i>Break</i>
0945-1030	Anatomy of a Steam Turbine
1030-1130	Generator Construction
1130-1230	Ancillary Equipment
1230-1245	<i>Break</i>
1245-1345	Governor Systems
1345-1420	Excitation Systems
1420-1430	Recap
1430	<i>Lunch & End of Day One</i>

Day 2: Monday, 09th of December 2024

0730-0800	Generator Protection
0800-0830	Exciter Operation
0830-0930	Anatomy of an Excitation System
0930-0945	<i>Break</i>
0945-1045	Excitation Configuration
1045-1145	AVR Steady State Operation
1145-1230	Excitation Protection



1230-1245	Break
1245-1345	Excitation System Performance
1345-1420	Hardware Configurations
1420-1430	Recap
1430	Lunch & End of Day Two

Day 3: Tuesday, 10th of December 2024

0730-0830	Generator Dynamics
0830-0930	AVR Dynamics
0930-0945	Break
0945-1030	Dynamic & Transient Stability
1030-1130	Hardware Configuration
1130-1230	Overview to Hardware
1230-1245	Break
1245-1345	Control Electronics
1345-1420	Basics of Static Converters
1420-1430	Recap
1430	Lunch & End of Day Three

Day 4: Wednesday, 11th of December 2024

0730-0830	Converters
0830-0930	Crowbar, Field Circuit Breaker & Field Discharge Resistor
0930-0945	Break
0945-1030	Dual Systems - Auto/Manual
1030-1130	Software Functions
1130-1230	Software Description
1230-1245	Break
1245-1315	Structures - Parameters & Signals
1315-1420	Software Documentation
1420-1430	Recap
1430	Lunch & End of Day Four

Day 5: Thursday, 12th of December 2024

0730-0830	AVR Communications Systems
0830-0930	Interface - Hardware & Software
0930-0945	Break
0945-1030	Operation of AVR Systems
1030-1130	Commissioning of AVR Systems
1130-1230	Troubleshooting of AVR Systems
1230-1245	Break
1245-1400	Maintenance of AVR Systems
1400-1415	Course Conclusion
1415-1430	POST-TEST
1430	Lunch & End of Course





Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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