COURSE OVERVIEW EE1130
Generator Excitation Systems & AVR
Selection, Commissioning, Operation, AC Generator Maintenance & Troubleshooting including AVR Adjustments

Course Title
Generator Excitation Systems & AVR: *Selection, Commissioning, Operation, AC Generator Maintenance and Troubleshooting including AVR Adjustments*

Course Date/Venue
September 08-12, 2025/Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE1130

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description


This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Generator Excitation Systems & AVR: Selection, Commissioning, Operation, AC Generator Maintenance and Troubleshooting including AVR Adjustments. It covers the generator excitation systems, types of excitation systems and automatic voltage regulators (AVRs); the synchronous generator basics, control systems and reading and interpreting diagrams; the criteria for system selection and AVR selection parameters; and the commissioning procedures, safety and compliance and integration with power systems.

Further, the course will also discuss the operational parameters, monitoring techniques and performance optimization; troubleshooting operational issues by identifying abnormal readings, diagnosing faults, implementing corrective actions and preventing recurrence; and the the maintenance scheduling, training and skill development, preventive maintenance practices and testing procedures.

During this interactive course, participants will learn the calibration techniques, fault diagnosis, spare parts management and documentation and reporting; the advanced troubleshooting techniques covering signal tracing, oscilloscope usage, software diagnostics and intermittent fault detection; the AVR adjustments and upgrades including integration with renewable energy sources; the future trends in excitation systems comprising of digitalization and automation, remote monitoring capabilities, AI and machine learning applications and sustainability initiatives; and the emergency response planning covering contingency procedures, disaster recovery plans, communication protocols and training and drills.

Course Objectives

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

- Apply and gain an in-depth knowledge on the selection, commissioning, operation, AC generator maintenance and troubleshooting including AVR adjustments of generator excitation systems and AVR
- Discuss generator excitation systems, types of excitation systems and automatic voltage regulators (AVRs)
- Interpret synchronous generator basics, control systems and reading and interpreting diagrams
- Identify the criteria for system selection and AVR selection parameters as well as carryout commissioning procedures, safety and compliance and integration with power systems
- Apply operational parameters, monitoring techniques and performance optimization
- Troubleshoot operational issues by identifying abnormal readings, diagnosing faults, implementing corrective actions and preventing recurrence
- Employ maintenance scheduling, training and skill development, preventive maintenance practices and testing procedures
- Apply calibration techniques, fault diagnosis, spare parts management and documentation and reporting
- Implement advanced troubleshooting techniques covering signal tracing, oscilloscope usage, software diagnostics and intermittent fault detection
- Apply AVR adjustments and upgrades including integration with renewable energy sources
- Discuss the future trends in excitation systems comprising of digitalization and automation, remote monitoring capabilities, AI and machine learning applications and sustainability initiatives
- Apply emergency response planning covering contingency procedures, disaster recovery plans, communication protocols and training and drills

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 provides an overview of all significant aspects and considerations on the selection, commissioning, operation, AC generator maintenance and troubleshooting including AVR adjustments of generator excitation systems and AVR for electrical engineers, maintenance engineers and technicians, power plant operators, instrumentation and control engineers, utility and industrial electrical personnel, project engineers, technical managers and supervisors and those who are involved in the operation, maintenance, design, and commissioning of generators and their associated control systems.

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 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.

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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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 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. Steve Mark, PE, MSc (on-going), BSc, is a **Senior Electrical & Telecommunications Engineer** with over **20 years** of extensive experience within the **Oil & Gas**, **Petrochemical** and **Power** industries specializing in **Certified Electrical Safety Compliance Professional**, **Overhead Power Line Maintenance Patrolling & Washing**, **AVR** Maintenance & Troubleshooting, **AVR** Selection Parameters, **AVR** Adjustments & Upgrades, **Synchronous Generator** Basics, Operation of **Generator Excitation Systems**, Integration with **Power Systems**, **Preventive Maintenance** Practices, **Energy Transmission & Distribution**, **Transmission Line** Structures, **Insulators & Accessories**, **Transmission Line Construction & Maintenance**, **Insulated Power Cables**, **High Voltage Applications**, **Transmission Line Parameters**, **Sag & Tension of Conductor**, **Geomagnetic Disturbances**, **Reactive Power Compensation**, **Overhead Line Troubleshooting**, **Patrolling**, **Troubleshooting Safety**, **HV/LV Equipment**, **High Voltage Electrical Safety**, **LV & HV Electrical System**, **HV Equipments Inspection & Maintenance**, **HV Switchgear Operation & Maintenance**, **LV Distribution Switchgear & Equipment**, Basic **Electricity**, **Electrical & Special Hazards**, **Personnel Protection**, **Motor Controllers**, **Electrical Switching Practices**, **Emergency Planning**, **Safety Management**, **Earthing & Bonding Installation**, **Energized & De-Energized Work**, **Protection Relays**, **Testing & Commissioning**, **Lock & Tag Out**, **Circuit Breakers & Switchgears**, Portable **Cables**, **Transformers**, **Surge Arrestors**, **Isolators & Fuses**, **Capacitor Banks**, Earth & Shunt Reactors, Gas Insulated Substations (**GIS**), **HV Substation Inspection & Reporting**, **HV Cable Design**, **HV Electrical System Commissioning**, **HV Equipments Inspection & Maintenance**, **UPS & Generators**, Electrical Installations Design & Construction, **Electrical Mechanical Installations**, **GIS Substations**, **GE Turbine Power Plant** and **Steam Power Plants**. Further, he is also well-versed in **Network & System Administration**, Data/Voice Networking, Network Capacity Calculations, VPN Connection Implementation, Structured Cabling Constructions, Engineering Design, Security Installations Design & Implementation, Logistics Management, IT Analysis, Business Continuity Plan Design, Disaster Recovery Simulations, Supply Chain System Design, Barcode Marking & RFID Applications. He is currently the **Lead Electrical Engineer** of Public Power Corporation S.A wherein he is responsible for site manufacturing supervision of works and electrical maintenance support for the existing Steam Electrical Power Plant.

During his career life, Mr. Mark has gained his expertise and thorough practical experience through handling challenging positions such as being the **IT & Telecommunications Manager**, **IT & Organization Manager**, **Logistics Manager**, **Electrical Engineer**, **Safety Engineer**, **Public Works Contractor**, **IT Support Analyst**, **Project Supervisor**, **Systems & Network Administrator**, **Data Protection Officer**, Shop Auditor and Amateur Radio Operator for various multi-national companies and institutes.

Mr. Mark is a **Registered Professional Engineer**, has a Bachelor degree in **Electrical Engineering** from the **Technical University of Halkida**, **Euboea**, **Greece** and currently enrolled for **Master** degree in **Quality Management** from the **Hellenic Open University**. Further, he is a **Certified Instructor/Trainer**, a **Certified Safety Engineer** and a **Certified Data Protection Officer** (**DPO**). Moreover, he is a member of Scientific Society of Technological Education of Engineers (EETEM) and has delivered numerous trainings, courses, seminars, 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: ***Monday, 08th of September 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Generator Excitation Systems*** *Role in Generator Performance • Importance in Voltage Regulation • Impact on System Stability • Overview of Excitation System Types*
0930 – 0945	*Break*
0945 – 1045	***Types of Excitation Systems*** *Static Excitation Systems • Brushless Excitation Systems • Rotating DC Exciters • Hybrid Systems*
1045 – 1145	***Automatic Voltage Regulators (AVRs)*** *Basic Principles of Operation • Types of AVRs (Electromechanical, Analog, Digital) • Key Components & Their Functions • Integration with Excitation Systems*
1145 – 1230	***Synchronous Generator Basics*** *Construction & Operation • Stator & Rotor Components • Magnetic Field Interactions • Power Generation Principles*
1230 – 1245	*Break*
1245 – 1330	***Control Systems Overview*** *Role of Governors • Interaction with Excitation Systems • Load Sharing & Frequency Control • Protection Mechanisms*
1330 – 1420	***Reading & Interpreting Diagrams*** *Single-Line Diagrams • Control Schematics • Wiring Diagrams • Symbols & Notations*
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: ***Tuesday, 09th of September 2025***

0730 – 0830	***Criteria for System Selection*** *Load Requirements • Environmental Considerations • Compatibility with Existing Systems • Cost-Benefit Analysis*
0830 – 0930	***AVR Selection Parameters*** *Voltage & Current Ratings • Response Time & Accuracy • Stability & Reliability • Manufacturer Specifications*
0930 – 0945	*Break*
0945 – 1100	***Commissioning Procedures*** *Pre-Commissioning Checks • Functional Testing • Calibration Processes • Documentation & Reporting*
1100 – 1230	***Safety & Compliance*** *Adherence to Standards (e.g., IEEE, IEC) • Risk Assessment & Mitigation • Personal Protective Equipment (PPE) • Emergency Procedures*

1230 – 1245	*Break*
1245 – 1330	***Integration with Power Systems*** *Synchronization with the Grid • Load Sharing Among Generators • Reactive Power Management • Communication Protocols*
1330 – 1420	***Case Studies*** *Real-World Commissioning Scenarios • Challenges Faced & Solutions Implemented • Lessons Learned • Best Practices*
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: Wednesday, 10th of September 2025

0730 – 0830	***Operational Parameters*** *Voltage Regulation • Reactive Power Control • Frequency Stability • Load Variations*
0830 – 0930	***Monitoring Techniques*** *Use of SCADA Systems • Data Logging & Analysis • Alarm Management • Predictive Maintenance Indicators*
0930 – 0945	*Break*
0945 – 1100	***Performance Optimization*** *Fine-Tuning AVR Settings • Load Balancing Strategies • Minimizing Losses • Enhancing System Responsiveness*
1100 – 1230	***Troubleshooting Operational Issues*** *Identifying Abnormal Readings • Diagnosing Faults • Implementing Corrective Actions • Preventing Recurrence*
1230 – 1245	*Break*
1245 – 1330	***Maintenance Scheduling*** *Routine Inspections • Preventive Maintenance Tasks • Condition-Based Maintenance • Maintenance Documentation*
1330 – 1420	***Training & Skill Development*** *Operator Training Programs • Simulation Exercises • Certification Requirements • Continuous Learning Opportunities*
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: Thursday, 11th of September 2025

0730 – 0830	***Preventive Maintenance Practices*** *Visual Inspections • Cleaning & Lubrication • Tightening Connections • Replacing Worn Components*
0830 – 0930	***Testing Procedures*** *Insulation Resistance Testing • Functional Testing of AVRs • Load Testing • Thermal Imaging*
0930 – 0945	*Break*
0945 – 1100	***Calibration Techniques*** *Setting Voltage & Current Limits • Adjusting Response Times • Verifying Accuracy • Recording Calibration Data*

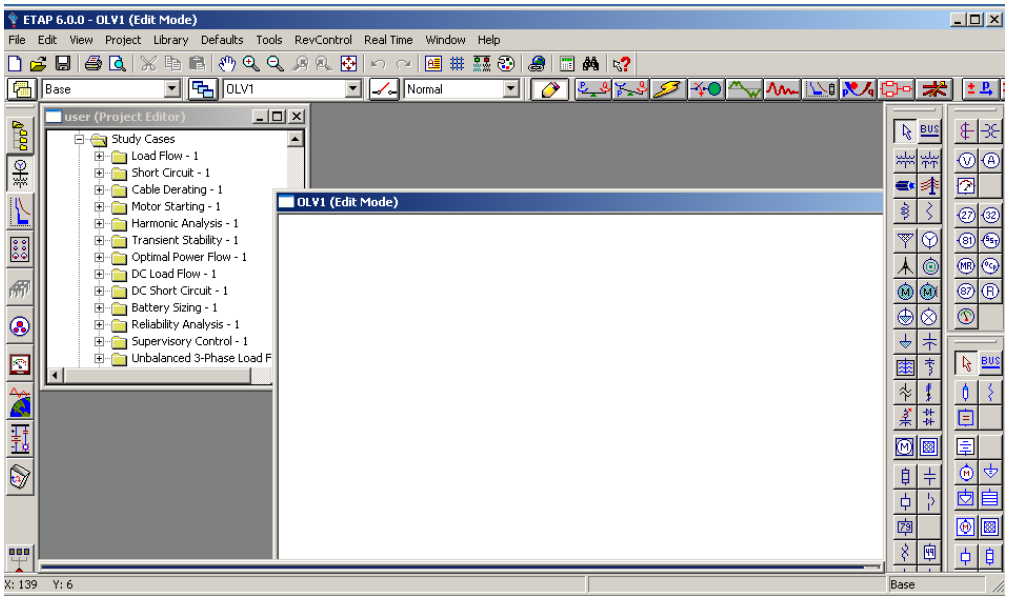
1100 – 1230	***Fault Diagnosis*** *Common Failure Modes • Use of Diagnostic Tools • Interpreting Test Results • Root Cause Analysis*
1230 – 1245	*Break*
1245 – 1330	***Spare Parts Management*** *Inventory Control • Identifying Critical Spares • Supplier Management • Cost Considerations*
1330 – 1420	***Documentation & Reporting*** *Maintenance Logs • Test Reports • Compliance Records • Continuous Improvement Plans*
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: ***Friday, 12th of September 2025***

0730 – 0830	***Advanced Troubleshooting Techniques*** *Signal Tracing • Oscilloscope Usage • Software Diagnostics • Intermittent Fault Detection*
0830 – 0930	***AVR Adjustments & Upgrades*** *Firmware Updates • Parameter Tuning • Integration of New Features • Compatibility Considerations*
0930 – 0945	*Break*
0945 – 1100	***Integration with Renewable Energy Sources*** *Challenges with Variable Inputs • Hybrid System Configurations • Grid Stability Concerns • Regulatory Requirements*
1100 – 1215	***Future Trends in Excitation Systems*** *Digitalization & Automation • Remote Monitoring Capabilities • AI & Machine Learning Applications • Sustainability Initiatives*
1215 – 1230	*Break*
1230 – 1345	***Emergency Response Planning*** *Contingency Procedures • Disaster Recovery Plans • Communication Protocols • Training & Drills*
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*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator "ETAP software".



ETAP Software Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org