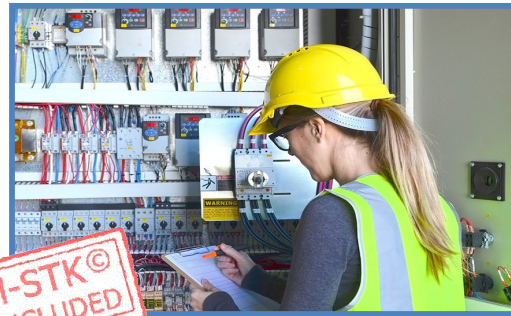


**COURSE OVERVIEW EE0275**  
**Protective Relays**

**Course Title**  
 Protective Relays

**Course Date/Venue**  
 Session 1: July 13-17, 2025/Boardroom 1, Elite  
 Byblos Hotel Al Barsha, Sheikh Zayed  
 Road, Dubai, UAE  
 Session 2: December 15-19, 2025/Fujairah  
 Meeting Room, Grand Millennium Al  
 Wahda Hotel, Abu Dhabi, UAE



**H-STK<sup>©</sup>  
 INCLUDED**

**Course Reference**  
 EE0275



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

**Course Description**

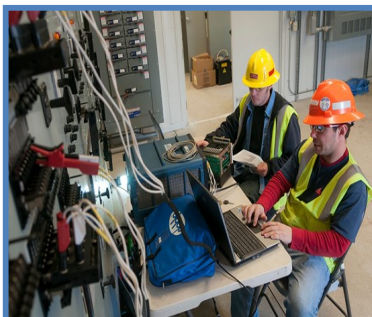


***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***

This course is designed to provide delegates with detailed and up-to-date overview of Protective Relays. It covers the various faults, their effects and calculations including the effect of faults on equipment; and the earthing system and standard requirement.



The course will also discuss the protection devices and technology including history, construction and principles of protection relays; the IED's and fuses; the instrument transformers, current and voltage transformers as well as types, construction, performance, specification and applications; the tripping devices of circuit breakers; the mechanism of electric arc breakdown; and the principles & calculation of settings for grading and protection coordination.



Overhead lines and feeder protection including the common types of faults and causes; the proper procedure for transformer protection related to restricted Buchholz relay, overpressure, oil and winding temperature; the proper procedure for motor protection; various electrical and mechanical faults; the various generator data requirements; the types of faults, excitation fault protection and mechanical fault protection; the miscellaneous protection including voltage and frequency protections, bus bar protection; and the circuit breaker failure protection will also be discussed during the course.

## Course Objectives

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

- Apply and gain systematic techniques in protective relays
- Identify various faults, their effects and calculations including the effect of faults on equipment
- Recognize earthing system and standard requirement
- Explain protection devices and technology including history, construction and principles of protection relays
- Describe IED's and fuses covering the main protection and back-up protection
- Discuss instrument transformers including current and voltage transformers as well as types, construction, performance, specification and applications
- Review tripping devices of circuit breakers and illustrate the mechanism of electric arc breakdown
- Explain the principles & calculation of settings for grading and protection coordination & cite practical examples
- Analyse overhead lines and feeder protection including the common types of faults and causes
- Implement the proper procedure for transformer protection related to restricted Buchholz relay, overpressure, oil and winding temperature
- Apply the proper procedure for motor protection by analyzing motor data requirements as well as identifying various electrical and mechanical faults
- List the various generator data requirements, types of faults, excitation fault protection and mechanical fault protection
- Identify miscellaneous protection including voltage and frequency protections, bus bar protection and circuit breaker failure protection
- Employ protection relay management and practice simulator

## 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 a complete and up-to-date overview of protective relay for engineers and other technical staff who are involved in the protection and relaying of various power systems, equipment and networks.

### 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.

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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.

### 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 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. Saber Mohamed, MSc, BSc**, is a **Senior Electrical Engineer** with extensive experience within the **years** of experience within the **Oil, Gas, Petrochemical, Refinery** and **Power** industries. His field of expertise includes **Electrical Safety, Power System Equipment, Power Quality Distribution, Power & Instruments Transformers, Power Plant & Substation Start-up, Commissioning & Troubleshooting, Power Generation, Electrical Equipment, Electrical Power System Operation, Electrical Installation & Maintenance, LV & HV Electrical System, Switchgear and Transformers, HV Switchgear Operation & Maintenance, Distribution Switchgear & Equipment, Hydrocarbon Plant Equipment & Tools, Power & Control Circuits, Circuit Breakers, UPS, VFDs maintenance and troubleshooting, Motors, Generators, Cable Splicing, Jointing, Inspection & Termination, Electrical Drawings & Schematic Diagrams, Lighting System, LV Earthing and Power Saving**. Further, he is also well-versed in **CMMS, RCM, Offshore** maintenance activities, **gas turbo generators** maintenance and troubleshooting as well as **gas plant shutdown** activities planning. He is currently the **Senior Electrical Instructor** wherein he is responsible in conducting trainings and tutorials to provide exemplary levels of electrical engineering skills.

During his career life, Mr. Saber has been actively involved in different power system activities, power generation, power cabling and many more. His vast industrial experience honed greatly when he joined as the **Senior Electrical Maintenance Engineer, Electrical Maintenance Engineer, Power Station Section Head, Electrical Site Engineer, Electrical Maintenance Department Manager** and **OJT & Training Coordinator** for various international and national companies such as the **OXY-OMAN, Belayem Petroleum Company, PETROBEL, UGDC, RASHPITCO, and New Valley Phosphate Mining Company**, just to name a few.

Mr. Saber has a **Master's** degree in **Electrical Engineering** from **Baytown University, USA** and a **Bachelor's** degree in **Electrical Engineering Power** from **Suez Canal University**, respectively. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings and workshops internationally.

### 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**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 - 0930	<b>Basic Concepts</b> Introduction to the Topic • Main Electric Parameters & Laws • Standards & Regulations • Standard Voltages
0930 - 0945	Break
0945 – 1100	<b>Faults, Their Effects &amp; Calculations</b> Types of Faults & Causes • Lightning, Switching Overvoltage & Use of Surge Arresters • Safety, Safety Distances & the Dangers of Faults • Short-circuit Faults (Phase & Earth Faults)
1115 - 1230	<b>Faults, Their Effects &amp; Calculations (cont'd)</b> The Effect of Faults On Equipment (Thermal & Electromechanical Stress) • Short-circuit Calculations • Examples & Exercises
1230 - 1245	Break
1245 - 1420	<b>Earthing System &amp; Standard Requirement</b> Solid, Impedance & Ungrounded Systems • The Implications of Various Grounding Techniques on System Performance • Earth Grid & Calculations • Touch & Step Potentials • Examples & Exercises
1420 - 1430	<b>Recap</b> 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 – 0830	<b>Protection Devices &amp; Technology</b> Introduction to Protection • Simple Protection Devices • Protection Relays (History; Construction & Principles of Operation; Modern Technology) • Classification of Protection Relays & Codes
0830 - 0930	<b>Relays</b> Thermal Overload • Induction Type & Microprocessors Relays • Earth Fault • Over Current • Reverse Power • Field Failure • Shunt Trip, • Earth Leakage Relays
0930 – 0945	Break
0945 – 1045	<b>IED's &amp; Fuses</b> Main Protection & Back-up Protection • Intelligent Electronic Devices (IED's) • Fuses (Characteristics, Applications & Special Cares) • Examples & Exercises
1045 – 1115	<b>Instrument Transformers</b> Current & Voltage Transformers • Types, Construction, Performance, Specification & Applications
1115 - 1200	<b>Instrument Transformers (cont'd)</b> Magnetisation Curve & Characteristics (Ratio, Accuracy & Burden Power) • Testing • Examples

1200 - 1230	<b>Tripping Devices – Circuit Breakers</b> The Mechanism of Electric Arc Breakdown • Types of Circuit Breakers & Applications (LV, MV & HV)
1230 - 1245	Break
1245 - 1420	<b>Tripping Devices – Circuit Breakers (cont'd)</b> Main Characteristics • Operating Mechanism, Tripping Circuits & Control Systems • Examples
1420 - 1430	<b>Recap</b> 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	<b>Grading &amp; Protection Co-ordination</b> Principles • Analysis in HV, MV and LV Networks (Transmission & Distribution Networks; Users' Networks) • Calculation of Settings • LV Approach (Typical Time-Current Curves & Selectivity of LV Circuit Breakers) • Practical Examples
0930 – 0945	Break
0945 – 1115	<b>Overhead Lines &amp; Feeder Protection</b> Analysis in HV, MV & LV Networks (Transmission & Distribution Networks) – Common Types of Faults & Causes • Distance Protection (Principle & Application) • Line Differential Protection (Principle & Application) • Overcurrent Protection • Temporary Faults & Auto-Reclosing
1115 - 1200	<b>Overhead Lines Protection (cont'd)</b> Practical Examples
1200 - 1230	<b>Cable Protection</b> Common Types of Faults & Causes • Differential Protection • Overcurrent Protection (Thermal & Short-circuit)
1230 - 1245	Break
1245 - 1420	<b>Transformer Protection</b> Basic Theory of Transformers • Types of Transformers & Applications
1420 - 1430	<b>Recap</b> 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	<b>Transformer Protection (cont'd)</b> Main Electric Characteristics & Vector Group • Built-on Protections (Buchholz Relay, Overpressure, Oil & Winding Temperature) • Transformer Differential Protection (Principle & Application) • Overcurrent Protection • Practical Examples
0930 – 0945	Break
0945 - 1130	<b>Motor Protection</b> Motor Data Requirements • Common Types of Faults (Electrical & Mechanical) • Motor Controllers & Starters • Overcurrent (Phase-to Earth & Phase-to-Phase Short-circuit) & Thermal Overload Protection

1130 - 1230	<b>Motor Protection (cont'd)</b> Negative Phase Sequence, Phase Unbalance & Phase Reversal Protections • Bearing Temperature, Winding Temperature, Vibration & Blocked Rotor Protections • Practical Examples & Exercises
1230 - 1245	Break
1245 - 1420	<b>Generator Protection</b> Generator Data Requirements & Basic Theory • Common Types of Faults (Electrical & Mechanical)
1420 - 1430	<b>Recap</b> 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 - 0830	<b>Generator Protection (cont'd)</b> Rotor & Stator Electric Faults Protection • Excitation Fault Protection • Voltage and Power (Reverse Power) Protections • Overfrequency & Overspeed Protections • Mechanical Faults Protection
0830 - 0930	<b>Generator Protection (cont'd)</b> Practical Examples & Exercises
0930 - 0945	Break
0945 - 1100	<b>Miscellaneous Protections</b> Voltage & Frequency Protections • Bus Bar Protection • Circuit Breaker Failure Protection • Testing
1100 - 1230	<b>Miscellaneous Protections (cont'd)</b> Single Phase Distribution Protections • Three Phase Distribution Protections • Circuit Diagrams for Protection Relays • Protection Coordination Curves & Grading • Testing of Relays • Causes of Termination Heating & Preventive Measure • Cause & Effect of Overload, Over Current, Short Circuit & Preventive Measures
1230 - 1245	Break
1245 - 1345	<b>Protection Relay Management &amp; Practice Simulator</b> Scheme Design • SAT & FAT • Commissioning • Maintenance & Testing
1345 - 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 - 1415	<b>POST-TEST</b>
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 simulators “GE Multilin Relay 469” and “GE Multilin Relay 750”.



**GE Multilin Relay 469 Simulator**



**GE Multilin Relay 750 Simulator**

**Course Coordinator**

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