Understanding of Power System Relays & Partial Discharge Analysis Training Course



14 - 18 Dec 2026

Cape town

4600 € (Per Person)

Ref: #ERE9525_265452

Course Introduction / Overview:

The comprehensive "Understanding of Power System Relays & Partial Discharge Analysis" training course is offered by BIG BEN Training Center. It provides a deep dive into two critical areas of electrical engineering, power system protection and partial discharge analysis. Power system protection is a cornerstone of modern electrical grids, and a key textbook, "Protective Relaying: Principles and Applications" by J. Lewis Blackburn, provides foundational insights into its principles. This course bridges theoretical knowledge with practical application, focusing on the latest advancements in protective relays and their settings. Participants will master a range of topics, including relay coordination, fault analysis, and the use of various relay types, from traditional electromechanical to modern digital relays. Simultaneously, the course explores the vital field of partial discharge (PD) analysis, a crucial technique for assessing insulation quality in high-voltage equipment like transformers, switchgear, and cables. By integrating these two fields, this course ensures a holistic understanding of how to maintain grid reliability and asset health. Participants will learn about online and offline PD measurement techniques, data interpretation, and how PD analysis informs maintenance strategies to prevent catastrophic failures. This dual focus provides a unique and powerful skill set, addressing the twin needs of protecting power systems from faults and ensuring the long-term integrity of their components. This comprehensive approach is essential for any professional working to secure and optimize electrical infrastructure in today's complex power networks.

Target Audience / This training course is suitable for:

- Electrical engineers and power system engineers.
- Maintenance and reliability engineers.
- Utility and substation technicians.
- Power plant operators and supervisors.
- Consultants specializing in power systems.
- Government agencies and regulatory personnel.
- Professionals involved in electrical asset management.
- Researchers and academics in the power sector.

Target Sectors and Industries:

- Power generation, transmission, and distribution companies.
- Oil and gas industry.
- Manufacturing and heavy industries.
- Renewable energy sector, including wind and solar farms.
- Telecommunications.
- Government agencies and public utilities.
- Transportation and railway systems.
- Mining industry.

Target Organizations Departments:

- Electrical and power systems engineering departments.
- Maintenance and reliability departments.
- Operations departments.
- Asset management departments.
- Safety and risk management departments.
- Research and development departments.
- Regulatory and compliance departments.
- Technical services departments.

Course Offerings:

By the end of this course, the participants will have able to:

- Master the principles of power system protection.
- Analyze different types of electrical faults and their impact on a power grid.
- Understand the functionality and application of various protective relays.
- Perform relay coordination studies for different system configurations.
- Implement settings for overcurrent, differential, and distance relays.
- Interpret partial discharge measurement data and patterns.
- Assess insulation quality and predict potential equipment failure.
- Apply advanced diagnostics for high-voltage equipment.
- Integrate protection and condition monitoring for enhanced system reliability.
- Develop a comprehensive approach to power system asset management.

Course Methodology:

This training course uses a dynamic and practical approach to ensure a deep understanding of the material. The methodology combines theoretical instruction with hands-on, practical application, reinforcing key concepts. The course includes interactive lectures and presentations, where participants can engage in discussions and ask questions. A major component involves case studies and real-world examples, allowing learners to apply their knowledge to solve complex power system challenges. These case studies will cover diverse scenarios, from relay coordination issues to interpreting partial discharge data in real high-voltage equipment. Teamwork and group exercises will be encouraged, fostering collaboration and allowing participants to learn from each other's experiences. The course also incorporates simulation software to model different fault conditions and test relay settings in a controlled environment. Practical demonstrations of partial discharge testing equipment will provide participants with hands-on experience in measurement techniques. Continuous feedback and a question-and-answer format will be integrated throughout the course, ensuring all participants can grasp the material effectively. This approach, offered by BIG BEN Training Center, ensures participants not only acquire theoretical knowledge but also develop the practical skills needed to excel in their roles.

Course Agenda (Course Units):

Unit One: Fundamentals of Power System Protection and Relays

- Introduction to power system protection principles.
- Types of faults in power systems.
- Basic relay characteristics and operation.
- Introduction to overcurrent and earth fault protection.
- Understanding time-current curves and coordination.
- Applications of IDMT and definite time relays.
- Setting and testing of overcurrent relays.

Unit Two: Advanced Protective Relaying Schemes

- Principles of differential protection.
- Busbar and transformer protection schemes.
- Feeder and line protection using distance relays.
- Motor and generator protection.
- Recloser and sectionalizer operation.
- Pilot protection schemes.
- Digital relays versus traditional relays.

Unit Three: Partial Discharge Analysis Fundamentals

- Introduction to partial discharge (PD) and its significance.
- Causes and types of partial discharge.
- Physical phenomena of PD.
- PD measurement techniques and equipment.
- Interpreting PD patterns from various defects.
- Online and offline PD testing.
- Acoustic and ultra-high frequency (UHF) PD detection.

Unit Four: PD Testing and Data Interpretation

- PD testing of transformers and switchgear.
- Cable partial discharge detection and localization.
- Corona versus internal discharge.
- Sources of noise and interference in PD measurements.
- Advanced data analysis and diagnostic tools.
- PD data trending and condition assessment.
- Case studies in PD analysis.

Unit Five: Integrated Asset Management and System Reliability

- Integrating protection and condition monitoring.
- Developing a comprehensive maintenance strategy.
- Fault analysis and root cause investigation.
- Predictive maintenance using PD and relay data.
- Safety protocols for working with high-voltage equipment.
- Future trends in power system protection and diagnostics.
- Overall system reliability and asset lifecycle management.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

In an increasingly decentralized power grid, how will the integration of renewable energy sources and microgrids fundamentally change the strategies and requirements for protective relay coordination and partial discharge analysis?

What unique qualities does this course offer compared to other courses?

This training course stands out by merging two critical and often separate fields, power system protection and partial discharge analysis. Unlike many courses that focus on one area, this program provides a holistic perspective on maintaining and protecting electrical assets. The course moves beyond theoretical concepts by incorporating practical case studies that challenge participants to solve real-world problems, such as relay mis operation or unusual partial discharge reading. It gives participants the skills to not only understand how to protect a system from immediate faults but also how to predict and prevent future failures by analyzing insulation health. The curriculum is meticulously designed to cover both foundational principles and the latest technological advancements, including modern digital relays and advanced PD diagnostic tools. This integrated approach allows for a deeper understanding of the interaction between system faults and equipment health. By the end of the course, participants will be equipped with dual skills set that is highly sought after in the energy sector, enabling them to make more informed decisions about asset management and operational reliability. This comprehensive, dual-focused training gives professionals a clear advantage in a field that demands both reactive protection and proactive maintenance strategies.