€TRAINING

Modern Power Generation Technologies

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Introduction:

This program provides a detailed understanding of steam power plants, gas turbines, co-generation, combined-cycle plants, wind and solar power generating plants. Through theoretical learning, this program equips individuals with the skills needed to address the complexities of modern power generation and contribute to sustainable energy solutions.

Program Objectives:

At the end of this program, participants will be able to:

- Understand the diverse components and subsystems in gas turbines, steam power plants, co-generation, combined-cycle plants, wind turbines, and solar power generation.
- Evaluate the benefits, performance, and economics of co-generation, combined-cycle plants, wind turbines, and solar power generation.
- Explore equipment such as compressors, turbines, governing systems, and generators, alongside maintenance strategies for efficient operation.
- Learn environmental monitoring and control techniques.
- Study instrumentation and control systems for gas turbines and combined cycles.
- Gain insights into predictive and preventive maintenance practices.
- Enhance understanding of selection considerations and applications for various power generation methods.

Targeted Audience:

- Power station operators, technicians, engineers, and managers.
- Electrical and mechanical engineers of different competency levels.
- Project engineers and project managers.
- Power station maintenance crew.

Program Outlines:

Unit 1:

Gas Turbines

- Introduction to gas turbine technology and principles of operation.
- Components of a gas turbine system: compressor, combustion chamber, turbine.
- Understanding performance characteristics and efficiency metrics of gas turbines.
- Maintenance and troubleshooting techniques for gas turbine systems.
- Case studies illustrating the application of gas turbines in power generation.

Unit 2:

Co-Generation

- Overview of co-generation systems and their advantages in energy efficiency.
- Types of co-generation systems: combined heat and power CHP, trigeneration.
- Design considerations and optimization strategies for co-generation plants.
- Integration of co-generation systems with existing infrastructure and processes.
- Economic and environmental benefits of co-generation compared to traditional power generation methods.

Unit 3:

Combined Cycle Plants

- Principles of combined cycle power generation and operation.
- Configuration and components of combined cycle plants: gas turbines, steam turbines, heat recovery steam generators HRSG.
- Performance optimization techniques for combined cycle plants.
- Analysis of efficiency gains and environmental benefits of combined cycle technology.
- Case studies showcasing successful implementation of combined cycle plants worldwide.

Unit 4:

Wind Power Generation

- Introduction to wind energy and wind turbine technology.
- Types of wind turbines: horizontal-axis and vertical-axis.
- Site selection and wind resource assessment for wind power projects.

- Design considerations and engineering challenges in wind turbine installation.
- Integration of wind power into the electrical grid and energy storage solutions.

Unit 5:

Solar Power

- Overview of solar energy and photovoltaic PV technology.
- Types of solar power systems: grid-connected, off-grid, hybrid.
- Design and installation considerations for solar PV systems.
- Performance monitoring and maintenance of solar power installations.
- Economic viability and regulatory aspects of solar power generation.