Introduction:

This **Power Plant Operations and Control Training Course** offers intermediate to advanced knowledge of power plant fundamentals, operation, and maintenance. It provides a comprehensive understanding of fossil-fueled power plants, including thermal, gas, and diesel power stations.

The course focuses on electrical and mechanical engineering principles, such as thermodynamics, electrical machines, drives, and advanced instrumentation techniques. Participants will gain essential skills for managing control devices, valves, sensors, heat exchangers, and compressors, ensuring the efficient operation of power plants.

This training also serves as a step toward professional certification, equipping attendees with the expertise required to meet power plant operator certification standards and advance their careers in power plant operation and maintenance.

Targeted Groups

This course is designed for:

- **Power Station Operators, Technicians, Engineers, and Managers** seeking training and certification.
- **Electrical and Mechanical Engineers** aiming to expand their expertise in power plant operations.
- **Project Engineers, Managers, and Maintenance Crews** pursuing professional development.
- **University Graduates, Site Engineers, and Technical Crews** interested in certifications or degrees in power plant technology.

Course Objectives

By the end of this training, participants will:

1. Understand the intricate operation and maintenance processes of power plants.
2. Analyze process and control diagrams in power plant systems.
3. Develop skills in preventive and corrective maintenance, troubleshooting, and control strategies.
4. Comprehend power plant parameters, disturbances, and control techniques for sustained operation.
5. Identify power plant selection criteria and optimization strategies for maximum efficiency.

Targeted Competencies

Participants will enhance their capabilities in:

- Gaining in-depth knowledge of power generation theory.
- Understanding the features and distinctions of various power plant types.
- Recognizing and applying industrial processes and control measures.
- Operating thermal, gas, and diesel power plants and mastering their selection criteria.
- Building a strong foundation in electric machines, drives, and control device fundamentals.

Course Content

Unit 1: Fundamentals of Mechanical and Electrical Engineering

- Sensors and actuators: types and applications.
- Examination of pumps, compressors, turbines, fans, and blowers.
- Essentials of pneumatics and hydraulics.
- Control valves, cylinders, and electrical actuation techniques.
- Heat transfer analysis principles.
- Overview of electric generators, motors, and drives.

Unit 2: Gas Power Station

- Fundamentals of gas power stations and plant operation.
- Thermodynamics in power plant systems.
- Breakdown of gas turbine components, including lubrication, fuel, and auxiliary systems.
- Protection, control, and instrumentation in gas power stations.
- Installation, operation optimization, and maintenance practices.

Unit 3: Thermal Power Station

- Comprehensive overview of thermal power stations.
- Fuel combustion and steam generation processes.
- Boiler auxiliary plant operations and controls.
- Insights into boilers and power generation techniques.
- Waste heat recovery systems.
- Emission control, maintenance, and troubleshooting techniques.

Unit 4: Diesel Generator (DG) Power Station

- Identification and classification of power plant and engine types.
- Analysis of DG engine technology and characteristics.
- Protection, insulation, and earthing in DG systems.
- Essentials of DG set assemblies and components.
- Optimizing DG plant layouts.
- Best practices for DG operation and maintenance.

Unit 5: Process Instrumentation and Control

- Fundamentals of process control systems.
- Techniques for measuring and controlling pressure, level, flow, and temperature.
- Electronic controllers for efficient plant operations.
- Interpreting Process Flow Diagrams (PFD) and Piping & Instrumentation Diagrams (P&ID).
- Managing open- and closed-loop controllers.
- Introduction to operational amplifiers, analog, and digital controllers.

Conclusion

This **Power Plant Operations and Control Training Course** empowers participants with advanced technical and operational skills to optimize the performance of power plants. By integrating theoretical knowledge with practical applications, the course prepares attendees for certification and career progression in the dynamic field of power plant operations.