

DAY 1

Pumps

- **Centrifugal Pumps**
 - Theory of Operation
 - Types of Pumps Types and Classifications
 - API Standard Pumps Design
 - Selection and Sizing of Centrifugal Pump
 - Main Elements and its functions of Centrifugal Pump
 - Centrifugal Pump Installation Requirements
 - Pump Performance Curve & Head Loss
 - Pump Cavitation, NPSH and Water Hammering
 - Multistage Pumps and Operation Arrangement Requirement
 - Pump Failure Analysis

- **Positive Displacement Pumps**
 - Positive Displacement Pumps PDP: Reciprocating and Rotary
 - Reciprocating Pump Components Function
 - PDP Pumps Application Requirements
 - Rotary Pumps Types and Applications
 - Guidelines for Pump Installation and Operation
 - Pump Inspection, Control, and Performance Testing
 - PDP Troubleshooting

DAY 2

Centrifugal Compressors

- Gas Laws and Theory of Operation
- Characteristics of Centrifugal and Axial Flow Compressor
- Overview of the Main Features of Various Types of Compressors
- Main Components and its Function
- Analysis and performance characteristics of Centrifugal Compressor Efficiency
- Surging, choking, bleed valves, variable stator vanes, inlet guide vanes
- Troubleshooting and Failure Modes
- Guidelines for Trouble-free Centrifugal Compressor Operation

DAY 3

Positive Displacement Compressors

- Positive Displacement Compressors: Reciprocating and Rotary
- Piston and Diaphragm Compressors
- Rotary compressors, rotary screw compressor, lobe type air compressor, sliding vane compressors, liquid ring compressors
- Essential Criteria for Selecting the Compressor
- Compressor Capacity: Loadings and Speeds
- Compressor Safety Control Noise Control and Protection
- Guidelines for Compressor Installation and Operation
- Compressor inspection, maintenance, control, performance testing, and troubleshooting

DAY 4

Industrial Gas Turbines

- Gas Turbine Sections and Components
- Types and Classification of Gas Turbines: (Radial and Axial-flow- impulse / reaction)
- Combustor Performance
 - Types of Fuels
 - Combustion
 - Pollution Control
- Gas Turbines: starting system, exhaust system, cooling, and control system
- Condition Monitoring: Mechanical Vibrations - Monitoring, Measurements, Diagnostics, and Analysis
- Turbine Inspection
 - Combustion Inspection
 - Hot Gas Path inspection
 - Borescope Inspections Troubleshooting of Gas Turbines

DAY 5

Rotating Equipment

- **Auxiliary System**
 - Lubrication System
 - Rotating Equipment Bearings
 - Rotating Equipment Different type of Seals
 - Different Design for Cooling System
 - Control and Protection System
 - Hydraulic Balancing Devices, Balancing Drums and Balancing Disks
 - Filtration System
 - Variable Speed Drive

- **Maintenance**
 - Coupling and Alignment
 - Balancing
 - Vibration Analysis
 - Condition Monitoring