

€ TRAINING

HVAC Air Conditioning and Refrigeration





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Introduction:

This training program provides participants with a comprehensive understanding of the principles, design, and maintenance of HVAC systems. It empowers them to enhance system reliability, ensure regulatory compliance, and improve energy efficiency.

Program Objectives:

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

- Understand the fundamental principles of HVAC systems.
- Design efficient air conditioning and refrigeration systems.
- Perform routine maintenance and troubleshooting of HVAC systems.
- Implement energy-saving techniques and practices.
- Ensure compliance with relevant standards and regulations.

Targeted Audience:

- HVAC Engineers.
- Maintenance Technicians.
- Facility Managers.
- Energy Managers.
- HVAC System Designers.

Program Outline:

Unit 1:

Fundamentals of HVAC Systems:

- Overview of HVAC principles and components.
- Types of HVAC systems and their applications.
- Thermodynamics and heat transfer in HVAC systems.

- Understanding psychrometrics and air properties.
- Basic calculations and sizing of HVAC equipment.

Unit 2:

Air Conditioning Systems:

- Types of air conditioning systems: central, split, and packaged.
- Components of air conditioning systems: compressors, condensers, evaporators, and expansion devices.
- Principles of refrigeration cycles and refrigerants.
- Installation and commissioning of air conditioning systems.
- Case studies on air conditioning system design.

Unit 3:

Refrigeration Systems:

- Basics of refrigeration and cooling cycles.
- Types of refrigeration systems: mechanical, absorption, and evaporative.
- Components of refrigeration systems: compressors, condensers, evaporators, and expansion valves.
- Common refrigerants and their environmental impact.
- Case studies on refrigeration system applications.

Unit 4:

HVAC System Design:

- Load calculation and system sizing.
- Ductwork design and air distribution.
- Selection of HVAC equipment.
- Integration of HVAC systems in building design.
- Case studies on HVAC system design projects.

Unit 5:

Installation and Commissioning:

- Best practices for HVAC system installation.
- Commissioning procedures and checklists.
- Balancing air and water systems.
- Testing and adjusting HVAC systems.
- Case studies on successful HVAC system commissioning.

Unit 6:

Controls and Automation:

- Introduction to HVAC control systems.
- Types of HVAC controls: thermostats, sensors, and actuators.
- Building Management Systems BMS and their role in HVAC.
- Programming and configuring HVAC controls.
- Case studies on HVAC automation and control systems.

Unit 7:

Maintenance and Troubleshooting:

- Routine maintenance practices for HVAC systems.
- Diagnostic tools and techniques for troubleshooting.
- Common issues in HVAC systems and their solutions.
- Predictive maintenance and condition monitoring.
- Case studies on HVAC system maintenance.

Unit 8:

Energy Efficiency and Sustainability:

- Energy-saving techniques for HVAC systems.
- Design considerations for energy-efficient HVAC systems.
- Implementing green building practices in HVAC design.

- Renewable energy integration with HVAC systems.
- Case studies on energy-efficient HVAC projects.

Unit 9:

Indoor Air Quality IAQ:

- Importance of indoor air quality in HVAC design.
- Sources and control of indoor air pollutants.
- Ventilation strategies for improved IAQ.
- Filtration and air cleaning technologies.
- Case studies on IAQ improvements in HVAC systems.

Unit 10:

Regulatory Compliance and Standards:

- Overview of HVAC industry standards and codes.
- Compliance requirements for HVAC systems.
- Health and safety regulations in HVAC design and operation.
- Environmental regulations and refrigerant management.
- Case studies on regulatory compliance in HVAC projects.