



MECCI Engineers

Institute of Engineering Design & Research



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An Engineering Procurement & Construction Based Training Company

Course Outline

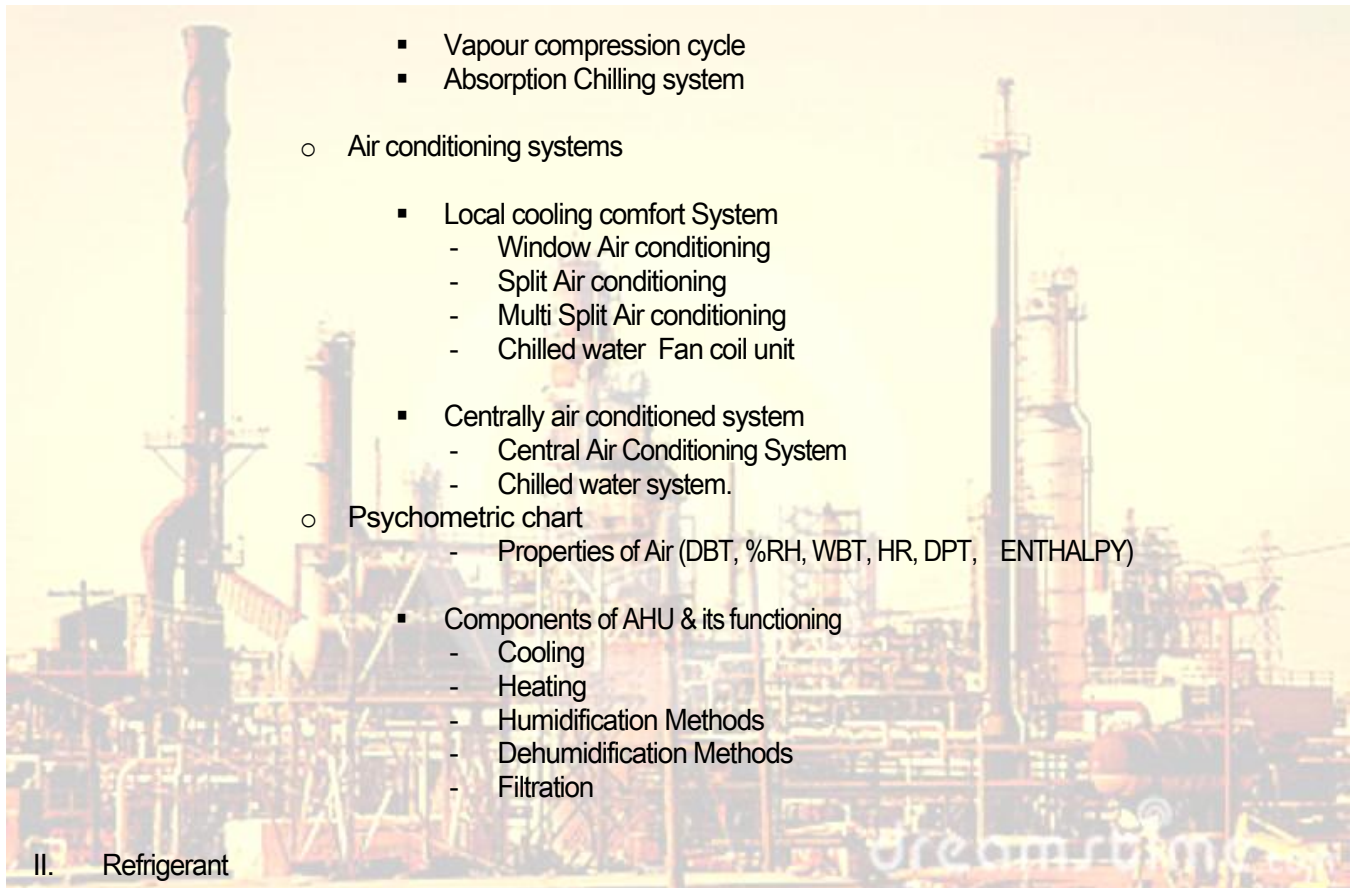
The training program deals with fundamentals, designing, drafting, erection, estimation, maintenance & detail engineering of Central HVAC systems including Central Air Systems & Chilled Water Systems. The dedicated training sessions covers detailed applications & usage of codes & standards ASHRAE, ISHRAE, SMACNA, ASME, ARI, DW 142 and more.

This certificate program introduces the candidates to the following modules:

- Introduction to HVAC
- Documents Approvals
- Refrigerants.
- Project Procurement works
- Cooling Load estimation
- Preparation of Drawings.
- Heating Loss estimation
- Clean Rooms/ Cold Stores
- Air Distribution System.
- Ventilation system.
- Chilled Water system
- Equipment Selection
- Erection of Equipments.
- Maintenance
- Estimation of Projects.

I. Introduction to HVAC

- Scope of HVAC Industry with overview of Consulting & Construction industry.
- Concept of Air conditioning systems.
 - Codes & Standards
 - Principles of air conditioning



- Vapour compression cycle
- Absorption Chilling system
- Air conditioning systems
 - Local cooling comfort System
 - Window Air conditioning
 - Split Air conditioning
 - Multi Split Air conditioning
 - Chilled water Fan coil unit
 - Centrally air conditioned system
 - Central Air Conditioning System
 - Chilled water system.
- Psychrometric chart
 - Properties of Air (DBT, %RH, WBT, HR, DPT, ENTHALPY)
- Components of AHU & its functioning
 - Cooling
 - Heating
 - Humidification Methods
 - Dehumidification Methods
 - Filtration

II. Refrigerant

- Types of refrigerant
- Evaporating & condensing properties of refrigerant.
- Refrigerant Pipe sizing methods

III. Cooling & Heating load estimation.

- Basics of Heat transfer in a building envelop.
- Understanding of Outdoor & Indoor Conditions.
 - Correction to Outdoor temperature & Indoor temperature requirements
 - Exposure of Wall, Latitude of Location, Yearly Range, Daily Range & etc.

- Factors affecting the loads estimate.

- Sources of Heat Gain

- External- Sun Gain through Glass/Window, Sun Gain through Roof/Wall, Partition gain
- Internal - People, Lights, Electrical Equipments, Motors, Kitchen Appliances, Heat gain through Infiltration air, Heat gain through Ventilation & Bypass air, Heat gain through ducts. Calculating ESHF, GTH, ADP, Dehumidified CFM.

- Heat loss calculations

- Basics of Heat loss in a building envelop.
- Sources of Heat loss -
 - Heat loss through Glass/window
 - Heat loss through Roof/Wall
 - Heat loss through Partition Glass/wall/Floor/slab
 - Heat loss through Infiltration air/Ventilation air & Bypass air
 - Heat loss through slab on Grade

IV. Design of Air Distribution System.

- Components of Air distribution system.

- Types of Ducts, Duct Fittings, Dampers, Types of Diffusers, RAG, Flexible Duct, Flexible Connector, End Cap, Sound Attenuator etc.
- Duct Elbows selections (Long radius, Short radius- No throat, Throat elbows, with heel radius, throat radius & radius of elbow).
- Vanes location & number of vanes required
- Duct Material Calculation- GI sheet, Total sheet required in kgs. Gauge of duct & Thickness of Gauge. Hanger Spacing, Hanger Rod Diameter and Angle support Size.
- Duct designing methods.
 - Velocity reduction method.
 - Equal friction Method.
 - Static regain method.
- Fan selection & Static pressure calculation.
- Supply & Return Duct configuration, Assigning Velocity of Air (FPM) to each Section of Supply and Return Duct Low Velocity system, Medium Velocity System and High Velocity System.
- Components of Air Distribution System, Supply and Return Duct configurations (Extended Plenum Systems, Radial System, Trunk and Branch system)
- Stair Well Pressurization System Designing

V. Design of Ventilation system.

- Introduction to Ventilation system,
 - Components of Ventilation system.

- Restaurant and Residence Kitchen Ventilation System Design
 - Sizing of Hood, Number of filters required & Duct designing.

VI. Chilled Water system design.

- Introduction to Chilled water system, Hot water system.
- Classification of chillers
 - As per Evaporator.
 - As per Condenser.
 - As per compressor.

- Chiller arrangements, Cooling tower arrangement, Types of cooling tower & Expansion tank connections.
- Pumps required in Chilled water system
 - Production Pumps
 - Distribution Pumps
 - Pump Classifications.

- Chilled water system pipe designing
 - Piping fundamentals
 - Pipe designators, piping standards.
 - Piping fittings and its Components.
 - Valves used in Chilled water system
 - Chilled water and Hot water GPM calculation.
 - Calculation of Water Velocity FPS on Suction and Discharge side of Pump.
 - Hydraulic Design for Sizing the Pipe for Amount of Flow. (Open & Closed Piping Systems).
 - District Cooling System.
 - Friction loss calculation for the piping system
 - Friction loss in straight pipes.
 - Friction Loss in Fittings.
 - Valves used in Chilled Water System.
 - Friction Loss in Valves & Special components.
 - Calculating TDH for Pump (Open Piping System and Closed Piping System).
 - Pipe Sizing Manual Method Hazen-Williams Equation for Calculating Friction Loss.
 - Pump Cavitations & NPSH Calculation for Pump.

VII. Equipment Selection

- AHU & FCU classification and selection.
- Package Unit Selection DX- Chiller Selection.
- Condenser Selection (Air cooled, Water Cooled, Evaporative).
- Cooling Tower Selection Mixed Air Temperature Calculation.
- HRF for Open and Closed Compressor.
- Expansion Tank Selection

VIII. Erection of Equipments

- Detailing & Installation of Chillers
- Detailing & Installation of Air handling units.
- Detailing & Installation of Package units.
- Detailing & Installation of Fan coil units.
- Detailing & Installation of Condensing units

IX. Estimation of Project

- Understanding the tendering requirements
- Quantity take off
- Preparing Inquiry for Suppliers & Finalizing the suppliers.
- Final Billing & Quotations finalization

X. Documents Approvals

- Preparation of Material submittals,
- Shop drawing submittals,
- Types of approval.
- Preparation of BOQ and design documents,
- Specifications.

XI. Project Procurement works

- identifying the critical equipments
- preparation of purchase orders
- Letter of Intent
- Letter of credit
- Minutes of meeting

XII. Drafting of HVAC Systems-

- Introduction to Drafting,
- Types of Drawings used in the industry
- Study & Preparation of
 - Floor Drawings,
 - Roof Drawings,
 - Sectional Drawings
 - Builders Work Drawings
 - Co- ordination Drawings & Riser Diagram
 - Abbreviations & Symbols used.



Training also includes following features:

- Exclusive Study Material and documents
- 2 years free Membership
- AutoCAD Program for 2D and 3D
- Resume Updating
- PDP Classes
- Projects and assignments

International Standard Accredited By:



Training Partner also Indian Government Skill Program:-



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