



**Heating, Ventilation & Air Conditioning
(HVAC) Design using HAP & Drafting Course using
AutoCAD
Instructor-Led Online Training
Course Curriculum (Duration: 60 Hrs)**

Chapter 1: Introduction to HVAC

- What is HVAC?
- Understanding Sensible Heat, Latent Heat and Enthalpy
- Standards and codes used in HVAC

Chapter 2: Modes of Heat Transfer

- Conduction
- Convection
- Radiation

Chapter 3: Refrigeration Cycles

- Basic Refrigeration System or Vapor Compression Cycle
- Types of Compressors, Condenser, Expansion Valve & Evaporator Coil,
- Temperature TON of Refrigeration
- Commonly used metrics, units and conversions

Chapter 4: Psychometrics

- Psychometrics definition
- Dry Bulb Temperature
- Wet Bulb Temperature
- Dew point Temperature
- Relative Humidity
- Humidity Ratio
- Processes
- Heating
- Cooling
- Cooling and Dehumidification
- Heating and Humidification
- Finding Values Using the Chart (Manually and using software)

Chapter 5 : Types Air-Conditioning System and Equipment

- Window A/C
- Split A/C
- Ductable Split A/C
- Variable Refrigerant Volume (VRV)/Variable Refrigerant Flow (VRF)
- Ductable Package A/C
- Package Roof Top Units
- Central Plant Chilled Water System

Chapter 6: Comfort Conditions and Cooling Load Calculations

- Comfort Parameters
- Understanding Indoor & Outdoor Design Conditions
- Cooling load calculation methods
- Calculation of U values
- Sources of Heat Gain
- External :
 - Heat Gain through Glass/Window
 - Heat Gain through Roof/Wall/ Wall Partition gain
- Internal:
 - Heat Gain through People, Lights, Electrical Equipments, Motors, Kitchen Appliances
 - Heat gain through Infiltration air
 - Heat gain through Ventilation
- ESHF, ADP & Air Flow Rate(CFM) Calculation
- Cooling load calculation manually using E-20 form
- Cooling load calculation using HAP (Hourly Analysis Program)

Chapter 7: Air Distribution System- Ducting and Air Terminals

- Duct-Definition & Terminology
- Types of Ducts, Duct fittings, Dampers, Flexible ducts
- Classification of Duct(Low, Medium & High pressure)
- Selection of Duct Gauges & thickness
- Comparison between different shapes of duct, Duct Fabrication, Insulation & Installation procedure
- Type of Duct Materials, Calculation of total sheet required for Duct Fabrication & Estimating duct weight in kgs
- Ducts-Sizing
- Selection of Grills and Diffusers
- Duct designing methods (Manually)
 - Velocity reduction method.
 - Equal friction Method.
 - Static regain method
- Fan selection & ESP calculation.
- Components of Air Distribution System
- Concept of CAV & VAV

Chapter 8: Design of Ventilation system

- Fresh Air Handling Unit Designing as per ASHRAE 62.1
- Restaurant/Residence kitchen ventilation system designing as per ASHRAE 90.1
- Non Central and Central Toilet Exhaust Calculations as per ASHRAE 62.1
- Car Parking Ventilation system Designing

Chapter 9: Refrigerants

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

Chapter 10: Chilled Water Distribution System

- Chilled water system components
- Various types of Chillers
- Chilled water pipe sizing as per ASHRAE standards
- Typical Installation of Chilled water FCU and AHU
- Valves and accessories used in Chilled water system
- District cooling system

Chapter 11: Pumps Design

- Pump classifications
- Selection of Pump
- Pump Head Calculation

Chapter 12: Cooling Tower

- Types of cooling tower
- Cooling tower water losses
- Cycles of concentration
- Cooling tower selection

Chapter 13: Estimation and Costing

- Understanding the tendering requirements
- Quantity take off and BOQ preparation
- Preparing Inquiry for Suppliers, RFQs & Finalizing the suppliers.
- Final Billing & Quotations

Chapter 14: Documents Approvals

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

Chapter 15: Engineering Drafting

- Study of Overseas Drawings
- Representation of Concepts Design Drawing,
- Design Drawing & Shop Drawing
- Preparation of Detail Shop Drawing of Air-Conditioning & Ventilation Ducts, Chilled
- Water Pipes & Duct Fittings-Elbows, TEE's, WYE, "
- Duct Routing - Preparation of single line diagram (SLD)
- Preparation of Layouts (Double line Diagram - DLD) as per SMACNA rules
- Legends and symbols used in the HVAC Industry
- Study & Preparation of floor plan drawings
- Study & Preparation of roof plan drawings
- Study & Preparation of sectional drawings
- Study & Preparation Builders Work Drawings

Chapter 16: SOFTWARES

- Auto CAD software for drafting
- Load calculation using Hourly Analysis Program (HAP)
- Calculation of duct sizes by McQuay Duct sizer
- Calculation of Chilled water pipe sizes by McQuay pipe sizer Software
- Psychometry Software
- Air terminal (Grills, Diffusers, Registers, LBG-Linear Bar Grills, SLSD-Supply Linear Slot Diffuser) selection by using BETA Program

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