



23

24



DIPLOMA IN HVAC
DESIGNING, DRAFTING,
ESTIMATION &
INSTALLATION
WITH PROJECT

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COURSE SYLLABUS

DIPLOMA IN HVAC DESIGNING, DRAFTING, ESTIMATION & INSTALLATION WITH PROJECT



HVAC (heating, ventilating, and air conditioning) is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality. HVAC system design is a sub discipline of mechanical engineering, based on the principles of thermodynamics, fluid mechanics, and heat transfer. Refrigeration is sometimes added to the field's abbreviation as HVAC, (heating, ventilating and air-conditioning).

HVAC is important in the design of medium to large industrial and office buildings such as skyscrapers, onboard vessels, and in marine environments such as aquariums, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

SOFTWARE INCLUDED	PROJECT INCLUDED	SPECIAL FEATURES
<ul style="list-style-type: none">• HAP 4.9 latest version• Autodesk Design Review• AutoCAD• Zamil E-selector Machine Selection• McQuay Duct• SizerMcQuay• Pipe Sizer• Pump XL Program• Fan static Pressure XI Program• PDF Extender• ASHRAE Climatic Data• Carrier Psychrometry• Air Terminal Selection Software• BOQ XL Program	<ul style="list-style-type: none">• Villa Type A• Villa Type D• School Project• Tower Project• Hotel Project	<ul style="list-style-type: none">• PROJECTS• CLASSROOM TRAINING• LIVE ONLINE TRAINING• INTERNATIONAL EXPERIENCE FACULTY• DIGITAL CLASSROOM• BASIC TO ADVANCE LEVEL• CONCEPT BASED TRAINING• MANUAL CALCULATIONS• SOFTWARE CALCULATION• INTERACTIVE SESSIONS• UPDATED SYLLABUS• MOTIVATION• JOB ASSISTANCE

HVAC DESIGNING

MODULE 1 HVAC BASICS



M O D U L E 1

CHAPTER - 1

INTRODUCTION TO MEP

- Difference B/W MEP & HVAC
- HVAC Abbreviation
- Definition of Air Conditioning
- HVAC Application
- Standard Societies
- ASHRAE, ISHRAE, SMACNA

CHAPTER - 2

HOW HVAC PROJECT EXECUTES

- Types Of Drawing
- Overview Of HVAC Design
- Roles & Responsibilities Of Design Engineers
- Overview Of HVAC Installation
- Roles And Responsibilities Of Installation Engineers

HVAC DESIGNING

MODULE 1 HVAC BASICS



M O D U L E 1

CHAPTER - 3

PHYSIC USED IN HVAC

- Heat
- British thermal unit
- Modes of heat transfer
- Unit of refrigeration
- Temperature & Temperature Scales
- Enthalpy
- Sensible and Latent heat
- Vapor Compression refrigeration cycle
- Unit
- System of units
- Conversions

HVAC DESIGNING

MODULE 1 HVAC BASICS



M O D U L E 1

CHAPTER - 4

PSYCHOMETRIC

- Introduction
- Properties of Air
- Dry bulb Temperature
- Wet Bulb Temperature
- Dew Point Temperature
- Relative Humidity
- Humidity Ratio
- Manual Psychometric Chart
- Psychometric Software
- Psychometric Analysis
- Humidification
- Dehumidification
- Sensible Heat ratio
- By Pass Factor
- Contact Factor

HVAC DESIGNING

MODULE 1 HVAC BASICS



M O D U L E 1

CHAPTER – 5

AIR CONDITIONING SYSTEM

- Direct expansion System
- Window Air Conditioning
- Split Air Conditioning
- High Wall
- Cassette Air Conditioning
- Floor Stand
- Cube Air Conditioning
- Ductable Split Air Conditioning
- Package Air Conditioning
- Chilled Water System
- Air Cool Chiller
- Water Cool Chiller
- Advance System
- VRF System
- Radiant Cooling
- Chilled Beams
- District Cooling System
- Air System
- FCU (Fan Coil Unit)
- AHU (Air Handling Unit)
- HRU (Heat Recovery Unit)

HVAC DESIGNING

MODULE 1 HVAC BASICS



M O D U L E 1

CHAPTER - 5

AIR CONDITIONING SYSTEM

- Exhaust Fans
- Side Wall Exhaust Fan
- Exhaust Blower
- Inline Exhaust Fan
- Car Parking Exhaust Fan
- Kitchen Exhaust Fan
- CAV System (Constant Air Volume System)
- VAV System (Variable Air Volume System)
- Desert Cooler
- Air Curtain

HVAC DESIGNING

LOAD CALCULATION



MODULE 2

CHAPTER - 1

BUILDING SURVEY

- Introduction
- Types of Architecture Drawing
- Structural
- Psychometric Conditions
- Latitude
- Longitude
- Orientation Of Building
- Elevation Of City
- Levels (Section Heights)
- Construction Materials
- Terminology of Building Structure
- Surrounding Conditions
- Window (Glass)
- Doors
- People
- Lighting
- Appliances
- Thermal Storage
- Location Air Conditioning Machine
- Available Spaces
- Power Services
- Water Services
- Applications
- Drain Location

HVAC DESIGNING

LOAD CALCULATION



M O D U L E 2

CHAPTER - 2

MANUAL LOAD CALCULATIONS

- Cooling Load Calculation
- Heating Load Calculation
- Sources of Heat
- External Sources
- Heat Gain Through Glass
- Heat Gain Through Skylight
- Heat Gain Through Wall
- Heat Gain Through Door
- Heat Gain Through Roof
- Heat Gain Through Partitions
- Heat Gain Through Floor
- Heat Gain Through Ceiling
- Heat Gain Through Ventilation
- Heat Gain Through Infiltration
- Internal Sources
- Heat Gain Through People
- Heat Gain Through Lighting
- Heat Gain Through Appliances
- Villa Project
- Project Data Extraction
- Input File
- Finding U-Values
- Manual Load Calculation
- E-20 Excel Calculation

HVAC DESIGNING

LOAD CALCULATION



M O D U L E 2

CHAPTER - 3

SOFTWARE LOAD CALCULATION (HAP4.5)

- Villa Project
- School Project
- Optional Project for Practice

CHAPTER - 4

MACHINE SELECTION

- Factor Effecting Machine Selection
- Window Air Conditioning
- Split Air Conditioning
- Ductable Air Conditioning
- Package Air Conditioning
- VRF (Project Pending)
- Chiller
- Air Cooled Selection
- Water Cooled Selection
- AHU Selection (Zamil Software)

HVAC DESIGNING

MODULE-3 DUCT DESIGNING



M O D U L E 3

CHAPTER - 1

DUCTS

- Introduction to Ducting
- SMACNA Standard

CHAPTER - 2

- Classification Of Duct
 - Duct Material
 - Duct Gauging
 - Duct Fitting
1. Duct Accessories

CHAPTER - 3

DUCT DESIGNING

- Duct Aspect Ratio
- Velocity for Ducting
- Duct Designing Method
- Equal Friction Method
- Velocity Reduction Method
- Static Regain Method
- Project

HVAC DESIGNING

MODULE-3 DUCT DESIGNING



M O D U L E 3

CHAPTER - 4

AIR DISTRIBUTION

- Comfort Zone
- Occupied Zone
- Primary Air, Total Air, Room Air
- Throw, Drop & Spread
- Convection Currents
- Returns

CHAPTER - 5

AIR TERMINAL SELECTION

- Types of Air Terminal
- Selection Fundamental
- Performance Factor
- Design Factor
- Standard Sizes of Air Terminal
- Low Size Planning

HVAC DESIGNING

MODULE-3 DUCT DESIGNING



M O D U L E 3

CHAPTER – 6

FAN SELECTION

- Introduction
- Types of fan
- Fan laws
- Fan performance characteristics
- Fan selection requirements
- Loss coefficient
- Air volume in CFM
- Static pressure
- Sound characteristics
- Fan selection

CHAPTER – 7

BUILDING EXHAUST SYSTEM

- Toilet Exhaust System
- Kitchen Exhaust System
- Car Parking Exhaust System

HVAC DESIGNING

MODULE-4 CHILLED WATER PIPE DESIGNING



M O D U L E 4

CHAPTER - 1

INTRODUCTION

- Types of Pipe
- Pipe Material
- Pipe Class
- Classification of Pipe
- Types Of Pipe Arrangements
- Direct Return Systems
- Reversed Return System

CHAPTER - 2

PIPE DESIGNING

- Pipe Designing Method
- Velocity Method
- Velocity + Fraction Combine Method
- Manal Pipe Designing
- Software Pipe Designing
- Project

HVAC DESIGNING

MODULE-4 CHILLED WATER PIPE DESIGNING



M O D U L E 4

CHAPTER – 3

FITTING & ACCESSORIES

- Pipe Fitting
- Pipe Accessories
- Pump Hookup
- Chiller Hookup
- AHU Hook Up
- Valves Selection

CHAPTER – 4

PUMP SELECTION

- Introduction
- Pump laws
- Types of pump
 - Primary pump
 - Secondary pump
 - Tertiary pump
- Head loss
- Pump selection

CHAPTER – 5

OVERVIEW OF BMS

HVAC DRAFTING

MODULE 1-AUTOCAD(COMPLEMENTARY)



M O D U L E 1

CHAPTER – 1: CREATING A SIMPLE DRAWING

- Getting Started with AutoCAD
- Starting AutoCAD
- AutoCAD's Screen Layout
- Working with Commands
- Opening an Existing Drawing File
- Saving Your Work
- AutoCAD's Cartesian Workspace
 - Absolute Coordinate System
 - Relative Coordinate System
 - Polar Coordinate System

CHAPTER – 2: Basic Drawing & Editing Commands

- Drawing Lines
- Erasing Objects
- Drawing Lines with Polar Tracking
- Drawing Rectangles
- Drawing Circles
- Viewing Your Drawing
- Undoing and Redoing Actions

HVAC DRAFTING

MODULE 1-AUTOCAD(COMPLEMENTARY)



M O D U L E 1

CHAPTER – 3: MAKING YOUR DRAWINGS MORE PRECISE

- Drawing Precision in AutoCAD
- Using Object Snap
- Object Snap Overrides
- Polar Tracking Settings
- Object Snap Tracking
- Drawing with SNAP and GRID
- Making Changes in Your Drawing
- Selecting Objects for Editing
- Moving Objects
- Copying Objects
- Rotating Objects
- Scaling Objects
- Mirroring Objects

HVAC DRAFTING

MODULE 1-AUTOCAD(COMPLEMENTARY)



M O D U L E 1

CHAPTER – 4: DRAWING ORGANIZATION AND INFORMATION

- Using the Function Keys [Status tool bar]
- Purpose of F1 – F12 Keyword keys
- Organizing Your Drawing with Layers
- Creating New Drawings With Templates
- What are Layers?
- Layer Properties
- Changing an Object's Layer
- Advanced Object Types
- Drawing Arcs
- Drawing Polylines
- Editing Polylines
- Drawing Polygons
- Drawing Ellipses

HVAC DRAFTING

MODULE 1-AUTOCAD(COMPLEMENTARY)



M O D U L E 1

CHAPTER – 5: CREATING MORE COMPLEX OBJECTS

- Advanced Editing Commands
- Trimming and Extending
- Stretching Objects
- Creating Fillets and Chamfers
- Offsetting Objects
- Creating Arrays of Objects
- Inserting Blocks
- What Are Blocks?
- Inserting Blocks from Tool Palettes
- Inserting Blocks using Insert

CHAPTER – 6: PREPARING TO PRINT

- Setting Up a Layout
- Printing Concepts
- Creating Viewports
- Setting up Layouts
- Guidelines for Layouts
- Printing Your Drawing
- Printing Layouts

HVAC DRAFTING

MODULE 1-AUTOCAD(COMPLEMENTARY)



M O D U L E 1

CHAPTER – 7: ANNOTATING YOUR DRAWING

- Text
- Working with Annotations
- Adding Text in a Drawing
- Modifying Multiline Text
- Formatting Multiline Text
- Hatching
- Adding Dimensions
- Dimensioning Concepts
- Adding Linear Dimensions
- Adding Radial and Angular Dimensions
- Editing Dimensions
- Adding Notes to Your Drawing

HVAC DRAFTING

MODULE 1-AUTOCAD(COMPLEMENTARY)



M O D U L E 1

CHAPTER – 8: EXERCISES

- Simple Geometrical figure exercise'
 - Rectangle
 - Circle
 - Arc
- Co-ordinate systems based exercises
- Complex Exercises
 - Exercise 1 – Cover Creation
 - Exercise 2 – Suspension Jack
 - Exercise 3 – Rocker Creation
 - Exercise 4 – Bracket
 - Exercise 5 – Housing Design
 - Exercise 6 – Cover Support
 - Exercise 7 – Upright
 - Exercise 8 – Regulator
 - Exercise 9 – Lever Drawing
 - Exercise 10 – Socket

HVAC DRAFTING

MODULE-2HVAC DRAFTING



M O D U L E 2

1. Introduction To HVAC Drafting
2. How A Drafting Project Executes
3. Legends And Abbreviations
4. Types Of Layouts
 - Architectural layout
 - Structural layout
 - Electrical layout
 - Mechanical layout
 - HVAC layout
 - Firefighting layout
5. Type Of False Ceiling
 - Plain false ceiling
 - Tiles or grid false ceiling
 - Step false ceiling
6. Creating Layers
7. Air Terminals (SAD, RAD, SCD, RCD)
8. Duct Fittings
 - Reducers
 - Trouser piece
 - Elbow
 - Mouth piece
 - Canvas cloth
 - Flexible ducts etc.
9. Conversion of Civil Multicolor Drawing to Single Color
10. X-Ref File, Scaling Of a Drawing

HVAC DRAFTING

MODULE-2HVAC DRAFTING



M O D U L E 2

11. Single Line Drawing in Ducting
 - Placement of Indoor Unit
 - Placement of Air Terminals
 - Single line ducting
 - Accessories (VAV, VCD, FD, Sand trap Lower ETC)
 12. Double Line Drawing In Ducting
 - Placement of Indoor Unit
 - Placement of Air Terminals
 - Double line ducting
 - Accessories placement
 13. Insulation
 - Acoustic insulation
 - Thermal Insulation
 14. Single Line Piping
 - Rooting of piping
 - Sizing (using chart and pipe sizer)
 - Valves fitting
 15. Double Line Piping
 - Conversion of single line piping to double line pipe
 - Pipe fitting
 - Elbow
 - Tee
 - Reducer
- Labeling
- SECTION**
16. Section for a particular complicated area
 17. Printing and plotting techniques

HVAC INSTALLATION



I N S T A L L A T I O N

CHAPTER-1: INTRODUCTION

- Responsibilities of Site Engineer
- How to Read Shop Drawing

CHAPTER-2: INSTALLATION

- Sequence of Operation
- Chiller Installation
- AHU Installation
- FCU Installation
- Duct Installation
- Fan Installation
- Pipe Installation
- Pump Installation

CHAPTER-3: INSULATING

- Duct Insulation
- Pipe Insulation

ADDITIONAL NOTES

(For Self Study) (COMPLIMENTARY)

- Tab Work
- Maintenance
- Filters
- Installation Safety
- HVAC Sale

HVAC ESTIMATION



ESTIMATION

1. Introduction Of Estimation
2. Department In Estimation
 - Tender Department
 - Job In Hand Department
3. Tree Diagram For Estimation
4. Units & Conversions
 - Length
 - Area
 - Tonnage
5. Legends And Abbreviation
 - General Abbreviation
 - Ducting Abbreviation
 - Air Terminal Abbreviation
 - Accessories Abbreviation
6. Equipments
 - Air Side Equipments
 - Water Side Equipments
 - Refrigerant Side Equipments
7. Documents Extraction
 - Air Side Extraction
 - Water Side Extraction
8. Step To Start The Services
9. Division Of Services
 - Division 21
 - Division 22
 - Division 23
 - Division 24
10. B.O.Q
- 11) Float (Or) Preparing Enquiry To Supplier
12. Finalizing The Suppliers

HVAC ESTIMATION



ESTIMATION

13. Quantity Take Off With Software Autodesk Design Review

Ducting Side

- Supply Air Duct
- Return Air Duct
- Flexible Duct
- Fresh Air Duct
- Exhaust Air Duct
- Kitchen Air Duct

Piping Side

- Chilled Water Supply
- Chilled Water Return
- Pump
- Chillers

Accessories

- Fire Damper
- Volume Control Damper
- Variable Air Volume
- Butterfly Damper
- Motorized Volume Control Damper
- Motorized Fire Damper
- Non Return Damper
- Sound Attenuators

Valves

- Gate Valve
- Globe Valve
- Strainer
- Non Return Valve

14. Negotiation Matrix

15. B.O.Q Comparison

16. Final Billing & Quotation Finalization



ABOUT THE COMPANY

WHO WE ARE

We are one of the few companies providing such facilities to develop future workforces for the societies. We focus on individual software programs and skill development training. Please visit to www.consac.com to find more related information.

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