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Competency Certificate in HVAC Design & Drafting

Course Outline

1. Introduction to HVAC system

2. Working of an air conditioner

a. Reverse adiabatic cycle
b. Evaporator
c. Compressor
d. Condenser
e. Expansion valves or capillary tubes
f. Thermostat

3. Types of compressors used in HVAC

a. Reciprocating Air Conditioner Compressor
b. Scroll AC Compressor
c. Screw AC Compressor
d. Rotary Air Conditioning Compressor
e. Centrifugal Air Conditioning Compressor

4. Refrigerants used in Heating and Cooling system

a. Basics of Thermodynamics
b. Heat transfer
c. Sensible heat
d. Latent heat
e. Psychrometric chart
f. Dry bulb temperature
g. Wet bulb temperature
h. Relative humidity
i. Humidity ratio
j. Dew point

5. Heating and Air Conditioning Load calculation

I. Using E-20 form:

a. Solar gain
b. Transmission gain
c. Equivalent temperature difference
d. U values
e. Bypass factor
f. Ballast factor
g. Infiltration
h. Fresh air requirement calculation using ASHRAE 62.1 standards(10min)
i. Tons of refrigerant
j. CFM

II.Using HAP software

a. Introduction to HAP Software
b. To create weather properties
c. Space creation in HAP
d. System creation in HAP
   i. Cav
   ii.Vav
e. Zone creation
f. To create schedules for various application
g. Occupant density calculation from ASHRAE 62.1standard
h. Duplicating the spaces
i. Editing the spaces

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6. Equipment selection

Types of Heating and Air Conditioning systems

a. DX system
b. VRF/VRV System
c. Package units
d. Roof top units
   i. Chiller system
   ii. Air cooled chillers
   iii. Water cooled chillers

7. Air distribution system

i. Air terminals
ii. Introduction to air terminals
iii. Manual calculation for diffusers
iv. Manual calculation for grills
v. Software calculation for air terminals
vi. Selection of collar dampers

a. Ducting

i. Introduction to Ducting system
ii. Standards used for duct design
iii. Duct sizing methodology
iv. Duct types
v. Duct sizing criteria
vi. Manual calculation for duct sizing
vii. Software calculation for duct sizing
viii. Selection of sheet metal gauge using SMACNA standards
ix. Calculating the overall duct weight
x. Static pressure calculation in ducting system

b. Damper selection

i. Need for dampers in HVAC system
ii. Damper sizing
iii. VCD
iv. Fire damper

c. Duct supports
d. Insulation

i. Thermal insulation
ii. Acoustic insulation
iii. Under deck insulation

8. Variable Refrigerant Flow

a. Introduction to VRF system
b. Difference between single compressor and dual compressor system
c. Piping design for VRF system

9. Hydronic Heating and Cooling

a. Open loop system design

i. Water requirement
ii. Pipe sizing
iii. Finding the critical path
iv. Friction loss or head loss calculation
v. Pump capacity

b. Closed loop system Design

i. Water requirement
ii. Pipe sizing
iii. Friction loss or head loss calculation
iv. Pump capacity

10. District Heating and Cooling

a. Introduction to district heating and cooling
b. Why district heating and cooling

I. General components
II. Centrifugal Pumps
III. Motors, Motor Controls,
IV. Variable-Frequency Drives
V. Pipes, Tubes, and Fittings
VI. Valves
VII. Heat Exchangers

11. Cold storage design

12. Ventilation design

a. Need for ventilation
b. Types of ventilation

13. Toilet ventilation

a. Residential
b. Commercial buildings
c. Public bathrooms
d. Exhaust air calculation
e. Fresh air calculation

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14. Commercial kitchen ventilation

a. Hood types from ASHRAE 154
b. Hood design from ASHRAE 154
c. Exhaust air calculation
d. Fresh air calculation

15. Car parking ventilation

a. Exhaust air calculation
b. Fresh air calculation
c. Car parking smoke ventilation

16. Stair Case pressurization

17. Green HVAC

18. HVAC Designer check list

19. Preparing bill of quantity