MEP / HVAC Curriculum

Part I -HVAC

MODULE 1: FUNDAMENTALS

- Introduction to HVAC.
- Scope of HVAC Engineering.
- Standards and codes used in HVAC.
- Modes of heat transfer.
- Basic Laws for HVAC designing.
- Heat & Types of Heat
- Study on psychrometric charts {manual and software).
- Psychrometric properties

MODULE 2 : REFRIGERATION SYSTEM

- Fundamentals of Refrigeration
- Refrigerants & Cylinder codes
- Selection of refrigerants
- Types of refrigeration cycles.
- Refrigerant Piping
- Vapor absorption refrigeration system.
- Vapor compression refrigeration (VCR) system.
- VCR components
- Compressors
- Evaporators

- Condensers
- Expansion Valve

MODULE 3 : AIR CONDITIONING MACHINES

- Air conditioning & Processes
- Non Centralized Air conditioning
- Window air conditioners
- Split Air Conditioners
- Cassette Air Conditioners
- Vertical Air Conditioners
- Selection of Non Centralized Machines
- Centralized Air conditioning
- Ductable split (DSA) Air Conditioners
- Ductable Packaged (DPAC) Air Conditioners
- Roof Top Units (RTU)
- Selection of Centralized Machines
- Precision Air conditioning
- Cooling Towers
- VRF/VRV systems
- Selection of VRF/VRV Machines
- CAV & VAV Systems
- Chillers
- Installation of Non Centralized Machines
- Installation of Centralized Machines

MODULE 4 : CHILLERS & AHU's

- Introduction to Chiller systems

- Classification of Chillers
- Air cooled Chiller
- Water Cooled Chiller
- Selection of Chillers
- Installation of Chiller
- Chiller Plant Layout
- Chiller Accessories
- Chiller Valves and Fittings
- Introduction to Air Handling Units
- Classification of AHU
- AHU processes
- AHU accessories
- CSU & FCU
- Fresh Air AHU
- AHU Room Design

MODULE 5 : HEAT LOAD CALCULATION

- Methods for Heat Load Calculation
- Manual Heat Load Calculation
- Building Survey
- Material Survey
- U factors
- Tonnage Calculation
- Dehumidified flow rate
- Hourly Analysis Program (HAP)
- E20 sheet Calculation

MODULE 6 : HVAC DUCTING

- Introduction to Duct Family

- Classification of Ducts
- Duct Materials
- Selection of Duct materials
- Installation of Ducts
- Flexible Duct
- Acoustic Insulation
- Thermal Insulation
- Duct Joining Methods
- Duct Leak Tests

MODULE 7 : DUCT DESIGING

- Introduction to Duct Design
- Manual Duct Design
- McQuay Duct Sizer
- Constant Friction method
- Velocity Reduction Method
- Thumb Rule
- Sheet Metal Calculation

MODULE 8 : AIR TERMINALS

- Diffusers
- Grills
- Air Terminal Selection
- Air Masters Diffuser Selection
- BETA Program
- Introduction to Dampers
- Non Return Dampers
- Fire Dampers
- VCD's

- Butterfly Damper
- Plenum Box Design
- Spill Box

MODULE 9: PIPING

- Introduction to HVAC Piping
- Refrigerant Piping
- Piping Insulation
- Piping Accessories
- Chiller Water Piping
- Piping Materials
- Condenser Water Piping
- Drain Piping
- Pipe Testings
- Installation of Pipes
- ASHRAE Pipe Sizing Chart
- Pipe Sizing
- McQuay Pipe Sizing

MODULE 10 : PUMPS & FANS

- Chiller Pumps
- Pump Accessories
- Selection of Pumps
- Pump Head Calculation
- Classification of Fans
- Static pressure Calculation
- ASHRAE Duct Fittings Database
- Selection of Fans

MODULE 11 : VENTILATION SYSTEM

- Introduction to ventilation system.
- Components of Ventilation system.
- Kitchen Ventilation
- Kitchen Hood Designing
- Toilet Ventilation
- Car Parking Ventilation
- Factory Ventilation

MODULE 12 : 2D DRAFTING

- Introduction to AutoCAD
- Getting Started with AutoCAD
- AutoCAD Commands & Short keys
- Sketching of Mechanical Block Diagram
- Drawing Civil Layout Diagram
- Creating Blocks
- Drawing Line Diagram of HVAC project
- Machine Placing in AutoCAD
- Duct Routing in AutoCAD
- Making Insulations in AutoCAD
- Make complete HVAC Project on AutoCAD

MODULE 13 : 3D DRAFTING

- Introduction to Revit
- Revit Civil Layout
- Starting a HVAC project
- Link CAD projects

- Insert Mechanical Systems
- Space and Zones
- Energy Analysis using Revit
- Duct Work Layout
- Duct Sizing
- Placing Mechanical Equipment
- Revit Families
- Complete HVAC project on Revit

MODULE 14 :ESTIMATION

- Prepare Estimation for HVAC equipment
- Prepare Estimation for Materials
- Prepare Project Quotations
- Prepare Bill of Quantity (BOQ)

MODULE 15 :PROJECT

- Analyze Civil Layout
- Heat Load Calculation
- Machine Selection
- Duct Sizing
- Pipe Sizing
- Pump Selection
- Fan Selection
- Prepare AutoCAD 2D design
- Prepare Revit 3D design
- Prepare BOQ
- Estimation of Project

Part II - PLUMBING

MODULE 1: FUNDAMENTALS

- Introduction to Plumbing system
- Plumbing Codes
- Plumbing standards
- Water quality problems
- Water purification
- Ground water treatment
- Surface water treatment

MODULE 2: PLUMBING FIXTURES

- Supply water fixtures
- Drainage water fixtures
- Water closet
- Lavatory
- Bidet
- Urinals
- Shower
- Kitchen sink

MODULE 3 :WATER SUPPLY SYSTEM

- Cold water Supply system
- Hot Water supply system

MODULE 4 :PLUMBING DESIGN

- Water demand calculation
- Manhole & Sock pit Design
- Overhead tank sizing
- Plumbing Formulas
- Swimming pool
- Pump head calculation
- Drainage pipe sizing
- Rain water Harvesting

MODULE 5: 2D DESIGN

- Introduction to AutoCAD
- Getting Started with AutoCAD
- AutoCAD Commands & Short keys
- Plumbing Legends
- Study of Civil drawings
- Plumbing system drafting
- Manhole & sock pit design
- Cold water system design
- Hot water system design
- Drainage design

MODULE 6: 3D DESIGN

- Introduction to Revit
- Revit Civil Layout
- Insert Plumbing Fixtures
- Creating Piping Systems
- Cold water piping
- Hot Water Piping
- Plumbing layout
- Bathroom design

MODULE 7: PROJECT

Part III- FIRE FIGHTING

MODULE 1: FUNDAMENTALS

- Introduction to Fire fighting
- Fire Triangle
- Fire Tetrahedron
- NFPA standards
- UL, FM standards
- Classification of fire
- Principles of Extinction
- 3A rule

MODULE 2: FIRE FIGHTING SYSTEMS

- Active Fire Protection Systems
- Water based Fire Protection Systems
- Gas based Fire Protection Systems
- Foam based Fire Protection Systems
- Chemical based Fire Protection Systems
- Passive Fire Fighting Systems

MODULE 3 :MANUAL FIREFIGHTING SYSTEM

- NFPA 10 standards
- Fuel Classification
- Types of Fire Extinguishers
- Portable fire Extinguishers
- How to use Fire Extinguishers
- Fire Hose Reel

- Fire Hose Cabinet

MODULE 4 :SPRINKLERS

- Introduction to Sprinklers
- Sprinkler Head
- Upright sprinkler
- Pendant Sprinkler
- Sidewall Sprinkler
- Quick response Sprinkler
- Standard response sprinkler
- Extended coverage Sprinkler
- Large drop sprinkler
- ESFR Sprinkler
- In-Rack Sprinkler
- Concealed Sprinkler
- Temperature Ratings of Sprinklers
- Color Codes of Sprinkler
- Response Time Index, RTI
- K Factor
- Sprinkler head equation
- Sprinkler head sizes

MODULE 5 : SPRINKLERSYSTEM

- Wet Sprinkler System
- Dry Sprinkler System
- Pre – Action Sprinkler System
- Deluge Sprinkler System
- Hybrid Sprinkler System

- Fire Pumps
- Fire department connection
- Alarm check valve
- Zone control valve
- Inspectors test connection
- Hazard classification

MODULE 6 : SPRINKLER SYSTEM DESIGN

- Introduction to Sprinkler Layout
- Tree Sprinkler Layout
- Loop Sprinkler Layout
- Grid Sprinkler Layout
- Sprinklers Area coverage
- Sprinkler pipe sizing
- Sprinkler Spacing
- Feed main sizing

MODULE 7 :PIPING

- Classification of Piping
- Sprinkler Pipe sizing
- Stand Pipes
- Classes of Stand pipes
- Pipe Schedules
- Pipe fittings

MODULE 8 :HYDRAULIC ANALYSIS

- Pressure Requirements
- Hazen-Williams Friction Equation
- Area – Density Chart
- Fire pump classification
- Pump Head calculation
- Fire Pump Selection
- Fire Water tank sizing
- Elite Fire Software

MODULE 9: FIRE DETECTION SYSTEM

- Fire detection zones
- Alarm Zones
- Smoke detectors
- Heat Detectors
- Ionisation Detector
- Flame detectors
- Beam Detectors
- Fire Alarm
- Fire Alarm control panel

MODULE 10 :SMOKE MANAGEMENT SYSTEM

- Stairwell Pressurization
- Lift Pressurization

MODULE 11 :WATERLESS SYSTEMS

- CO_2System
- FM200 System
- Foam System

MODULE 12 :2D DESIGN

- Introduction to AutoCAD
- Getting Started with AutoCAD
- AutoCAD Commands & Short keys
- Study of Civil drawings
- Firefighting system drafting
- Sprinkler system Design
- Standpipe system Design

MODULE 13 : 3D DESIGN

- Introduction to Revit
- Revit Civil Layout
- Insert Mechanical Systems
- Adding Sprinklers
- Creating Piping Systems
- Fire Protection Wet Systems
- Sprinkler Layout Design

MODULE 14: PROJECT

Part IV – Electrical System fundamentals

Fundamentals of Electricals

Codes & Standards to be followed

Electrical equipments and its application.

Electrical distribution system

Electrical loads and dcalculations