SAN MEP SOLUTIONS

DATA CENTER COURSE

330 MW Data Center

Syllabus / Topics

4 COURSE TRACKS · 28 MODULES

COURSE TRACKS

TRACK 01

HVAC

10 MODULES

TRACK 02

FIRE FIGHTING

7 MODULES

TRACK 03

PLUMBING

5 MODULES

TRACK 04

ELECTRICAL

6 MODULES

Course Syllabus

4 COURSE TRACKS · 28 MODULES

TRACK 01

HVAC

10 MODULES

1. Basics of HVAC
2. Basics of Data Center
3. Codes and Standards of Data Center
4. Cooling Technologies Used in Data Center
5. Data Center Project
6. Additional Calculations Related to Data Center HVAC
7. Smoke Management System
8. CAD Drawing
9. HAP Software
10. General Sessions

TRACK 02

FIRE FIGHTING

7 MODULES

1. Basics of Fire Fighting
2. Codes and Standards Used in Data Center
3. Fire Pre Action System Design for Data Center
4. Gas Suppression System
5. Mist System
6. 20 MW Project
7. General Sessions

TRACK 03

PLUMBING

5 MODULES

1. Basics of Plumbing
2. Plumbing Design for Campus Level Data Center
3. Plumbing System Adopted in Data Center
4. 20 MW Project
5. General Sessions

TRACK 04

ELECTRICAL

6 MODULES

1. Design Basis & Risk Assessment
2. Electrical Load & Equipment Sizing
3. Electrical Distribution & Switchgear Design
4. Electrical Layout & Lighting Design
5. ETAP Modelling & Simulation
6. Fire Alarm, Standards & Design Documentation

HVAC Topics

MODULE 01

BASICS OF HVAC

COURSE CONTENT

1. HVAC Basics – Terminologies and Understanding of HVAC System
2. Basics of Ducting & Piping Used in HVAC
3. Types of AC System Used in Building and Data Center
4. Understanding Psychometry and Refrigeration in HVAC
5. Chilled Water Scheme Used in Buildings

MODULE 02

BASICS OF DATA CENTER

COURSE CONTENT

1. Basics of Data Center
2. Types of Data Center
3. Understanding the Terminologies in Data Center
4. Different Types of Cooling System Used in Data Center

MODULE 03

CODES AND STANDARDS OF DATA CENTER

COURSE CONTENT

1. Data Center Codes – ASHRAE Datacom Series Discussion
2. TIA Code Discussion
3. BICSI Code Discussion

MODULE 04

COOLING TECHNOLOGIES USED IN DATA CENTER

COURSE CONTENT

1. Understanding Liquid Cooling System
2. Understanding Hybrid Cooling System in Data Center

HVAC Topics

MODULE 05

DATA CENTER PROJECT

COURSE CONTENT

1. Introduction to Project Understanding
2. Understanding the Importance of Building Envelope
3. Heat Load Calculation – Methods Used in Data Center
4. Step by Step Heat Laod Calculation for 40 MW Data Center Building
5. Heat Load Calculation – One Example for Traditional Data Center
6. Heat Load Calculation – One Example for Hybrid Data Center
7. Liquid Cooling System Calculations
8. HVAC Schematic Used in Data Center for Traditional and Hybrid Data Center
9. Equipment Selection in Data Center
10. One Example on Static Pressure Loss Calculation – General
11. One Example on Static Pump Head Calculation – General
12. High Side Piping Arrangement – Dual Pipe System Used in Data Center

MODULE 06

ADDITIONAL CALCULATIONS RELATED TO DATA CENTER HVAC

COURSE CONTENT

1. Understanding Adiabatic Topic for Data Center
2. Free Cooling & Economizer Understanding
3. Case Studies – HVAC Design from Manufacturers Perspective
4. Cooling Coil Configuration
5. Cooling Tower Calculations
6. Adiabatic Calculations

HVAC Topics

MODULE 07

SMOKE MANAGEMENT SYSTEM

COURSE CONTENT

1. Smoke Management System
2. Understanding Ventilation System
3. Purge Exhaust & Fresh Air System Understanding
4. Ventilation Schematic Used in Data Center

MODULE 08

CAD DRAWING

COURSE CONTENT

1. Project – 20 MW Example
2. Space Planning in AutoCAD
3. Equipment Placement
4. Piping Arrangement
5. Ventilation & Exhaust Ducting

MODULE 09

HAP SOFTWARE

COURSE CONTENT

1. One Live Example on HAP Software
2. Performing Step by Step Calculation on HAP
3. Chiller and Cooling Tower Selection in HAP
4. Datacom Method
5. Campus Calculation Performed on HAP
6. Campus Cooling Philosophy Understanding
7. Adopting Trigeneration for Data Center

MODULE 10

GENERAL SESSIONS

COURSE CONTENT

1. Interview Q&A & Tips
2. DBR Report for HVAC
3. Practice Project Inputs

Fire Fighting Topics

MODULE 01

BASICS OF FIRE FIGHTING

COURSE CONTENT

1. Basics of Fire Fighting
2. Understanding Codes NFPA 13, 14 & 20
3. Sprinklers and Hydrant Basics
4. Fire Pump Basics

MODULE 02

CODES AND STANDARDS USED IN DATA CENTER

COURSE CONTENT

1. NFPA 75 & 76
2. Datacom Codes Used for Fire Fighting
3. TIA Code Used for Fire Fighting
4. BICSI Code Used for Fire Fighting

MODULE 03

FIRE PRE ACTION SYSTEM DESIGN FOR DATA CENTER

COURSE CONTENT

1. Hydraulic Calculation Using Elite Software
2. Understanding Pre Action System
3. Sprinkler and Hydrant Pipe Sizing Using NFPA 13 & 14
4. Selection of Sprinkler System & Hydrant System
5. Equipment Selection for Fire Pump

Fire Fighting Topics

MODULE 04

GAS SUPPRESSION SYSTEM

COURSE CONTENT

1. Understanding Gas Suppression System
2. Gas Suppression System Schematic and Calculation

MODULE 05

MIST SYSTEM

COURSE CONTENT

1. Understanding Mist System and Adopting in Data Center
2. Difference Between Mist and Pre Action System

MODULE 06

20 MW PROJECT

COURSE CONTENT

1. Fire Fighting Design for 20 MW Project
2. Step by Step Calculation for Fire Fighting
3. AutoCAD Layout for Fire Fighting in Data Center

MODULE 07

GENERAL SESSIONS

COURSE CONTENT

1. Interview Q&A & Tips
2. DBR Report for Fire Fighting
3. Practice Project Inputs

Plumbing Topics

MODULE 01

BASICS OF PLUMBING

COURSE CONTENT

1. Basics of Plumbing Terminologies
2. Understanding Valves and Pipe Fittings in Plumbing
3. Building Codes Like IPC, NBCS, UPC, CIBSE Understanding
4. Different Methods Adopted in Water Supply and Drainage System
5. Basic Schematic Explained for Buildings

MODULE 02

PLUMBING DESIGN FOR CAMPUS LEVEL DATA CENTER

COURSE CONTENT

1. UGT and OHT Tank Calculation and Selection
2. OWC Calculations
3. Water Demand Calculations
4. Pipe Sizing
5. Gravity Design & Hydropneumatic System Adopted

Plumbing Topics

MODULE 03

PLUMBING SYSTEM ADOPTED IN DATA CENTER

COURSE CONTENT

1. Grey Water System Design for Data Center
2. Water Leak Detection System Importance and Understanding
3. Datacom, TIA Codes Adopted for Plumbing System

MODULE 04

20 MW PROJECT

COURSE CONTENT

1. Plumbing Design Adopted for 20 MW Project
2. AutoCAD Layout for Plumbing in Data Center

MODULE 05

GENERAL SESSIONS

COURSE CONTENT

1. Interview Q&A & Tips
2. DBR Report for Plumbing
3. Practice Project Inputs

Electrical Topics

MODULE 01

DESIGN BASIS & RISK ASSESSMENT

COURSE CONTENT

1. LPS Risk Assessment Calculation & Sample Report with Layout
2. Earthing Types & Earth Grid Calculation with Layout
3. Lightning Protection System – Layout & Down Conductor Design
4. Data Center Tier I, II, III & IV Topologies
5. Electrical Load Classification – Critical, Essential, Non-Essential & Mechanical Loads
6. Redundancy Philosophy – N, N+1, N+2, 2N, 2N+1 & 3N/2
7. FMEA, SPOF & Failure Analysis

MODULE 02

ELECTRICAL LOAD & EQUIPMENT SIZING

COURSE CONTENT

1. Live Electrical Load Estimation
2. Transformer Selection & Sizing
3. DG Set Selection & Sizing
4. DG Set HSD Yard Calculation with Layout
5. DG Synchronization, Load Sharing & Paralleling System
6. UPS Selection & Calculation Along with Battery Sizing
7. UPS Topologies – Online, Modular, Distributed Redundant & Rotary UPS
8. Battery Room Design, Ventilation & Safety Requirements
9. STS, ATS & Static Bypass Selection and Coordination
10. PDU, RPP & Busway Selection and Sizing
11. NGR Calculation
12. Power Grid X/R Ratio Calculation

Electrical Topics

MODULE 03

ELECTRICAL DISTRIBUTION & SWITCHGEAR DESIGN

COURSE CONTENT

1. EHV, HV, MV & LV Switchgear Selection
2. AIS & GIS – Selection, Comparison & Application
3. Forms of Internal Separation as per IEC 61439
4. CT, PT, Relay & Isolation Transformer Selection
5. Single Line Diagram (SLD) Development
6. Electrical Interlocking & Control Philosophy
7. Cable Selection & Voltage Drop Calculation
8. Short Circuit Calculation
9. Harmonic Analysis & Power Quality Study

MODULE 04

ELECTRICAL LAYOUT & LIGHTING DESIGN

COURSE CONTENT

1. DIALux Calculation & Simulation
2. Lighting Layout Design
3. Power Layout Design
4. Containment Layout Design
5. Electrical Space Planning & Equipment Clearance
6. Battery Room & DG Electrical Layouts

Electrical Topics

MODULE 05

ETAP MODELLING & SIMULATION

COURSE CONTENT

1. ETAP SLD Modelling
2. Load Flow Analysis & Simulation
3. Short Circuit Analysis & Simulation

MODULE 06

FIRE ALARM, STANDARDS & DESIGN DOCUMENTATION

COURSE CONTENT

1. Fire Alarm System Design – EN 54 & UL Standards
2. Fire Alarm Cause & Effect (C&E) Matrix – Development and Design
3. Fire Alarm Device Layout – Detectors, MCPs, Sounders, Modules & Control Panels
4. Data Center Electrical Standards – IEC, IS, NBC, CEA, NFPA & IEEE
5. Energy Efficiency – PUE, WUE & Electrical Losses Calculation
6. Electrical Equipment Specifications, BOQ & Technical Submittals

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