



AMCDEI

HVAC DESIGN ENGINEERING



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ADVANCE GROUP OF INSTITUTIONS

(Registered under MSME & An ISO
9001:2008 CERTIFIED)

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ABOUT US

Advance Electrical Design & Engineering Institute (AEDEI) , **Registered under MSME , An ISO 9001:2008** Certified Institute of Electrical Design & Engineering training programs for Dedicated to Electrical Engineers . AEDEI is latest venture for providing the quality education in the best possible facilities is a key aim of Skill developments for various verticals in Electrical Engineering design.

OUR MISSION

Our Technical Institute offers a full range of training in electrical ,Electronics &Communication and mechanical design courses full fill requirement of current industries ,

These courses which encompass all aspects of core electricity from fundamentals to in-depth of design knowledge are based on several value adding pillars.

Our trainers share their know-how and design experience through demonstrations on dedicated equipment on industries. Courses include training dedicated documents and the possibility of follow-up with regular /internship /e-learning modules. Over one to 45 days depending on the topic, trainees get in-depth, hands-on instruction and the opportunity to practice their acquired know-how.

We cover all the range of engineering industries skills disciplines:

- **Electrical System Design**
- **Solar Power Plant Design**
- **Heat Ventilation and Air Conditioning (HVAC)**
- **Solar Structure Design**
- **Hydro Power Plant Design**
- **Technical Transformer Design**
- **QA/QC Electrical Engineer**
- **Power System Software**

OBJECTIVES OF TRAINING

- To make the Engineers expertise in Various engineering design field by experience faculty
- Engineers Job oriented programs.
- Develop the key skill in designing for employments.
- To familiarize with industries norms (BIS Code, NEC Code,IEC Code, IEEE Code , NFPA Code etc)
- To share experiences of various best practices.
- To clarify their doubts in the execution process.

KEY FEATURES OF TRAINING

- ✓ First Certified institute for electrical ,Electronics ,Mechanical and Civil Engineers.
- ✓ Employment opportunities - EPC Companies, thermal power plant and Solar .
- ✓ Government sector (Contract Basis), Manufacturing, construction (Electrical Work).
- ✓ **Placement Partner with 10+companies in India.**
- ✓ Expert Faculty from Industries experience more than 7 year and Electrical Consultants.
- ✓ Hands on training facility on live projects(Power Sector and Infra sector)
- ✓ **Available Latest software for Designing(STAAD PRO,AutoCad,Google SketchUp,HelioScope).**
- ✓ study materials provide by AEDEI
- ✓ **Individual Candidates provided projects for designing.**
- ✓ **Certified by Design Engineer -Structure .**

SYLLABUS OF HVAC DESIGN

Module-1: Introduction to HVAC

- Scope of HVAC Industry with overview of Consulting & Construction industry
- Concepts of Air conditioning systems
- Principles of air conditioning
- Refrigerant cycle
- Chilling system
- Cooling
- Heating
- Humidification Methods
- Dehumidification Methods
- Filtration
- Air-conditioning systems
- Local cooling comfort System
- Window Air conditioning
- Split Air conditioning
- VRV- Air conditioning
- Chilled water Fan coil unit
- Central Air Conditioning System
- Chilled water system
- Psychometric chart
- Properties of Air (DBT, %RH, WBT, , DPT, ENTHALPY.)
- Refrigerant
- Types of Refrigerant
- Evaporating & Condensing properties of refrigerant
- Refrigerant Pipe sizing methods

Module-1: Heat Load Estimation

- Basics of Heat transfer in a building envelop
- Understanding of Outdoor & Indoor Conditions
- Correction to Outdoor temperature & Indoor temperature requirements
- Exposure of Wall, Latitude of Location, Yearly Range, Daily Range etc
- Factors effecting the loads estimate

- Sources of Heat Gain
- External- Sun Gain through Glass/Window, SunGain through Roof/Wall, Partition gain
- Internal - People, Lights, Electrical Equipments, Motors, Kitchen Appliances, Heat gain through Infiltration air, Heat gain thorough Ventilation & By-pass air, Heat gain through ducts. Calculating RSH, RLH,OASH,OALH, GTH, ESHF, ADP, Dehumidified CFM
- Heat loss calculations
- Basics of Heat loss in a building envelop
- Sources of Heat loss
- Heat loss through Glass/window, Heat loss through Roof/Wall
- Heat loss through Partition Glass/wall/Floor/slab
- Heat loss through Infiltration air/Ventilation air & Bypass air
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- Heat loss through slab on Grade

Module-2: Design of Air Distribution System

- Components of Air distribution system
- Types of Ducts, Duct Fittings, Dampers, Types of Diffusers, Return Air Grill, Flexible Duct, Flexible Connector, End Cap, Sound Attenuator etc
- Duct Elbows selections (Long radius, Short radius-No throat, Throat elbows, with heel radius, throat radius & radius of elbow)
- Vanes location & number of vanes required
- Duct Material Calculation- GI sheet, Total sheet required in kgs. Gauge of duct & Thickness of Gauge. Hanger Spacing, Hanger Rod Diameter and Angle support Size
- Duct designing methods
- Fixed Velocity method
- Equal friction Method
- Static regain method
- Fan selection
- Static pressure calculation
- Supply & Return Duct configuration, Assigning Velocity of Air (FPM) to each Section of Supply and Return Duct
- Low Velocity system
- Medium Velocity System
- High Velocity System

- Components of Air Distribution (Duct) System, Supply and Return Duct configurations (Extended Plenum Systems, Radial System, Trunk and Branch system)
- Stair Well Pressurization System Designing Design of Ventilation system.
- Introduction to Ventilation system
- Types Of Ventilation
- Components of Ventilation system
- Restaurant Kitchen Ventilation
- Residence Kitchen Ventilation
- Basement parking Ventilation
- Basement Ventilation In case of Fire
- DG ,GG & GT Exhaust System

Module-3: Chilled Water system design

- Introduction to Chilled water system, Hot water system
- Classification of chillers
- As per Evaporator
- As per Condenser
- As per compressor
- Chiller arrangements, Cooling tower arrangement, Types of cooling tower & Expansion tank connections
- Pumps required in Chilled water system
- Production Pumps
- Distribution Pumps
- Pump Classifications
- Chilled water system pipe designing
- Pipe designators, Piping standards
- Piping fittings and Components
- Valves used in Chilled water system
- Chilled water and Hot water GPM calculation
- Calculation of Water Velocity FPS on Suction and Discharge side of Pump
- District Cooling System
- Friction loss calculation for the piping system
- Friction Loss in Straight Pipes

- Friction Loss in Straight Pipes
- Friction Loss in Fittings
- Valves used in Chilled Water System
- Friction Loss in Valves & Special components
- Calculating TDH for Pump (Open Piping System and Closed Piping System)
- Pipe Sizing Manual Method Hazen-Williams Equation for Calculating Friction Loss
- Pump Cavitations & NPSH Calculation for Pump

Module-4: Equipment Selection

- AHU&FCU classification and selection
- Package Unit Selection DX- Chiller Selection
- Condenser Selection (Air cooled, Water Cooled, Evaporative)
- Cooling Tower Selection Mixed Air Temperature HRF for Open and Closed Compressor
- Expansion Tank Selection

Module-5: Erection of Equipments

- Detailing& Installation of Chillers
- Detailing& Installation of Air handling units
- Detailing& Installation of Package units
- Detailing& Installation of Fan coil units
- Detailing& Installation of Condensing units

Module-6: Estimation of Project

- Understanding the tendering requirements Take Off Sheet
- Preparing Inquiry for Suppliers
- Preparing Rate of Analysis
- Finalizing the suppliers
- Final Billing & Quotations finalization

Module-7: Documents Approvals

- Preparation of Material submittals
- Shop drawing submittals
- Approval Drawings
- Tender Drawings
- Working Drawings

- Co-ordination Drawings
- As Built Drawings
- Preparation of BOQ and design documents
- Technical Specifications

Module-8: Project Procurement works

- Identifying the critical equipments
- Preparation of purchase orders
- Letter of Intent
- Letter of credit
- Minutes of meeting

Module-9: Drafting of HVAC Systems

- Introduction to Drafting
- Types of Drawings used in the industry
- Study & Preparation of Floor Drawings
- Roof Drawings
- Sectional Drawings
- Builders Work Drawings
- Co-ordination Drawings & Riser Diagram
- Abbreviations & Symbols used