IPEBS

Energizing Engineering - Empowering Engineers

AIAO-BAR ACCREDITED

ISO 9001 : 2008

Institute of Piping Engineering & Building Services

P. G. DIPLOMA CERTIFICATE - ONLINE TRAINING COURSE



HVAC DESIGN & CONSTRUCTION – ASHRAE / SMACNA

Course Co-Ordinator:

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International Course Speaker

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ABOUT IPEBS

IPEBS was established with a vision to offer proactive training & consulting services for design, construction, Inspection, Operation & Maintenance of Process Plants & Building Services including

a) Process Plant Engineering: Plant 3d-Modelling, Process Equipment, Piping Engineering, Pipeline Engineering, Valves, Rotating Equipments, Piping QA/QC & Inspection.

b) Electro-Mechanical Building Services (MEP 3d Modeling, HVAC, Plumbing, Fire Protection & Electrical Systems)

IPEBS - CONSULTING

IPEBS team comprises of engineers and designers having extensive real time experience in the design, construction, inspection, Operation & Maintenance of Process Plant Engineering and Building Services.

IPEBS - TRAINING

Thousands of Engineers, Designers, Draftsman and Technicians have attended **IPEBS** training programs. On a national basis, **IPEBS** is now unquestionably the number one professional Plant Engineering, Piping Engineering & MEP course provider.

ABOUT TRAINING PROGRAM

The training program deals with HVAC fundamentals/systems/components, system design, HVAC drawings & drafting, equipment erection, project estimation, equipment maintenance & detail engineering of Central HVAC systems including DX Air Systems, Chilled Water Systems, ventilation & staircare pressurization systems with dedicated training sessions covering detailed applications & usage of codes & standards like ASHRAE, ISHRAE, SMACNA, ASME, ARI, DW 142, BS, & CIBSE. In addition, the course covers Carrier HAP software training which is widely used in industry for load calculations.

PROGRAM FEATURES

- ✓ In-depth course content for easy understanding.
- ✓ Blended Learning: Online contact with faculty.
- ✓ Accessibility to Course Faculty & Counseling Services.
- ✓ Job oriented training program.
- ✓ Student will be job ready, after the course.
- ✓ Student will acquire skills and knowledge similar to working professional.

WHO SHOULD ATTEND

- **Graduating College Students in the following disciplines**

  - ✓ Mechanical Engineers
  - ✓ Electrical Engineers
  - ✓ Production Engineers
  - ✓ Diploma / ITI

- **Working Professionals**

  - ✓ HVAC Engineers
  - ✓ MEP Engineers
  - ✓ Project Engineers
  - ✓ Maintenance Engineers
  - ✓ HVAC Draftsman
  - ✓ MEP Draftsman
  - ✓ MEP coordinator
  - ✓ Duct Fabrication Engineers
  - ✓ HVAC Site Supervisors
  - ✓ HVAC Technician's
  - ✓ HVAC QA / QC Engineers

- **Corporate / Organizations**

  - ✓ MEP Consulting Companies
  - ✓ HVAC Equipment Manufacturing Companies
  - ✓ HVAC Consultants
  - ✓ Duct Contractors
  - ✓ Ship Building / Marine Industry

COURSE MODULES:

- ✓ **Introduction To HVAC**
- ✓ **Refrigerant**
- ✓ **Principles Of Air Conditioning**
- ✓ **Air Conditioning Systems**
- ✓ **Psychometric Chart**
- ✓ **Components Of AHU & Its Functioning**
- ✓ **Cooling & Heating Load Estimation**
- ✓ **Design Of Air Distribution System**
- ✓ **Design Of Ventilation System**
- ✓ **Chilled Water System Design**
- ✓ **Equipment Selection**
- ✓ **Estimation Of Project**
- ✓ **Drafting Of HVAC Systems**
- ✓ **HVAC Software's**

Detailed Course Content:

Introduction to HVAC

- Scope of HVAC Industry with overview of Consulting & Construction industry.
- Concepts of Air conditioning systems.
- Codes & Standards

Refrigerant

- Types of refrigerant, Codes & Cylinder colors
- Evaporating & condensing properties of refrigerant.
- Refrigerant Pipe sizing methods
- Darcy-Weisbach Method of Pipe sizing

Principles of air conditioning

- Components of Vapor compression cycle
- Functioning of Vapor compression cycle
- Sub cooling & Super Heating Modes
- Understanding of Suction Line, Discharge Line & Liquid Line
- Understanding of Absorption Chilling system

Air conditioning systems

a) Local cooling comfort System

- Window Air conditioning
- Split Air conditioning
- Multi Split Air conditioning- VRF/VRV systems
- Chilled water Fan coil unit

b) Centrally air conditioned system

- Central Air Conditioning System/All Air System
- Chilled water system/ All Water System

Psychometric chart

- Properties of Air (DBT, RH, WBT, HR, DPT, ENTHALPY)

Components of AHU & its functioning

- Cooling
- Heating
- Humidification Methods
- Dehumidification Methods
- Filtration
- Types of Fans, Arrangement of Fans
- Arrangements of Components of AHU

Cooling & Heating load estimation

- Basics of Heat transfer in a building envelop.
- Understanding of Outdoor & Indoor Conditions.
- Indoor Conditions requirements
- Exposure of Wall, Latitude of Location, Daily Range etc
- Factors affecting the loads estimate.

a) Heat Gain Calculation/Cooling Load Calculation

- Sources of Heat Gain
- External- Sun Gain through Glass/Window, Sun Gain 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 ESHF, GTH, ADP, Dehumidified CFM.

b) 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.
- Heat loss through slab on Grade
- **Note: Cooling & Heating Load calculation on Project (Commercial/Residential)**

<u>Design of Air Distribution System</u>

- Understanding the need of Air Distribution System Design

a) Components of Air Distribution System

- Types of Ducts, Duct Plenum, Flexible Connector, Sound Attenuator,
- Duct Fittings- 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 Offset & Transition fittings site measurements methods
- Dampers, Types of Diffusers, RAG, Flexible Duct, Flexible Connector, End Cap, Sound Attenuator etc.
- Duct Material Calculation- GI sheet, Total sheet required in kg's. Gauge of duct & Thickness of Gauge. Hanger Spacing, Hanger Rod Diameter and Angle support Size.
- Supply & Return Duct configuration, Assigning Velocity of Air (FPM) to each Section of Supply and Return Duct Low Velocity system, Medium Velocity System and High Velocity System.
- Supply and Return Duct configurations & Routing methods- Extended Plenum Systems, Radial System, Trunk and Branch system

b) Duct designing methods

- Velocity reduction method.
- Equal friction Method.
- Static regain method.
- Fan selection & Static pressure calculation
- Constant Flow & Variable Flow Air distribution system
- Selection & Installation of VAV's, Diffusers, Sound Attenuator, Flexible ducts & other ducting components
- **Note: Air Distribution System Design on Project (Commercial/Residential)**

<u>Design of Ventilation system</u>

- Types of Ventilation System (Supply, Extract & Balanced)
- Components of Ventilation system.
- Design of Extract System for Toilets, Garbage Rooms, Warehouse Etc.
- Design of Car Park Ventilation System.
- Negative & Positive pressure requirements.

- Restaurant and Residence Kitchen Ventilation System Design
- Sizing of Hood, Number of filters required & Duct designing.
- **Note: Ventilation System Design on Project (Commercial/Residential)**

<u>Chilled Water System Design</u>

- Introduction to Chilled water system, Hot water system.

a) Classification of chillers
- As per Evaporator- DX & Flooded Type
- As per Condenser- Air Cooled, Water Cooled & Evaporative
- As per compressor- Reciprocating, Centrifugal & Rotary/Scroll
- Chiller arrangements, Cooling tower arrangement, Types of cooling tower
- Expansion tank Function, Selection & Installation

b) Pumps
- Pump Types
- Arrangement of Pumps
- Production Pumps.
- Distribution Pumps
- Pump Schemes of Chilled water system

c) Piping fundamentals
- Pipe designators, piping standards.
- Piping fittings- Elbows (Long Radius & Short Radius) Bends (45 Deg & U), Stub in Connections, Reducers, Olets and Components.
- Valves used in Chilled water system – Gate Valve, Globe Valve, Butterfly Valve, Check or NRV Pressure Regulation & Safety, Double Regulation Valve
- Automatic Valves used in Chilled water system- 2-Way & 3-Way
- Piping Arrangement –Closed Loop & Open Loop, 2-Way Piping, 3-Way piping & 4-Way piping.

d) Chilled Water System Design

- Water Demand calculations- Chilled Water GPM/Condenser Water GPM/Hot Water GPM calculations
- Calculation Water velocity- Suction side & Discharge side, assigning velocity to different pipe sections.
- Pipe routing & Pipe Sizing for Chilled water & condenser water piping
- District cooling system design & installation
- Friction loss calculation for the piping system
- 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

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 Calculation
- HRF for Open and Closed Compressor
- Expansion Tank Selection

Estimation of Project

- BOQ preparation
- Understanding the tendering requirements
- Final Billing & Quotations finalization

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

HVAC Software's

- Heat Load Calculation Excel Sheet
- Online Tonnage Calculator
- HAP 4.5(Hourly Analysis Program)
- Duct Sizer/ Pipe Sizer
- BETA Performance
- Toshiba VRF Pipe Sizer

Fee Details:

Course Title	Fee for Indian Participants	Fee for International Participants
HVAC Design & Construction – ASHRAE / SMACNA – Online Training Course	**INR 15,000/-** **(Spl Offer: INR 13,500/-)**	**USD 400/-** **(Spl Offer: USD 350/-)**

For making e – payment for the course fee please find **IPEBS** Bank account details below.

Account Name	**IPEBS**
Account Number	**03182020005287**
Bank Name	**HDFC**
Branch	**ABIDS**
RTGS / NEFT / IFSC Code	**HDFC0004125**
SWIFT Code	**HDFCINBB**

IPEBS Corporate Training Clients:

Company Name	Location	Company Name	Location
Intergraph Consultants	India	SPPC	Sudan
Port of Sohar	Oman	CFPE Technology Solutions	Malaysia
Uhambiso Consultant	South Africa	Qatar Petroleum Technical Center	Qatar
Newtech Consulting Group	Sudan	Petro Vietnam Marine Shipyard	Vietnam
Yashada Consultant	India	Locus Technologies	India
Telstar Life Science Pvt Ltd	India	RasGas	Qatar
BHEL	India	ICB Technimont	India & Italy
IDC Training House SDN BHD	Malaysia	LG-Digitech	Sudan
Sakhlain Energy	Russia	Infotech Enterprises	India
Aveon Offshore	Nigeria	Petroleum Operating Company	Sudan
BPCL	Bhutan	Dr. Reddy's Labs	India
Saitech Engineers	India	Vasavi Power Services	India
Riyan Architects	Maldives	Siddhi Consulting	India
Oryx GTL	Qatar	Qatar Petroleum	Qatar
WNPOC	Sudan	Centroid Technical Services	Sudan
GNPOC	Sudan	MG – Vowgas Group	Nigeria
Fleming gulf	UAE	DAL Group	Sudan

Terms & conditions:

CANCELLATIONS: IPEBS does not provide refunds for cancellations done after registration & fee payment. However, credit maybe granted to a later program. This credit will be available for up to one year from the date of issuance.

COURSE MATERIAL AGREEMENT: It is the intention of **IPEBS** that the course text and materials supplied to participants at **IPEBS** courses are prepared and issued for the participants' sole use. Codes and standards constantly change and interpretations are issued by the publishing societies. Information contained in **IPEBS** course materials is based on the best available data obtained by **IPEBS** at the time of publication. **IPEBS** is in no way responsible for subsequent use regardless of intention.

PROGRAM CHANGE POLICY: Please note that instructors and topics were confirmed at the time of publishing this document; however, circumstances beyond the control of the training organizers may necessitate substitutions, alterations or cancellations of the instructors and/or topics. As such, **IPEBS** reserves the right to alter or modify the instructors and/or topics if necessary. Any substitutions or alterations will be updated on our web site.

COURSE CANCELLATION BY IPEBS: IPEBS reserves the right to cancel any course due to circumstances beyond our control. All tuition fees will be refunded in the event of cancellation. **IPEBS** liability is limited to only those tuition fees paid in advance.

FORCE MAJEURE: Except for the obligations to make money payments as outlined hereunder, neither party shall be responsible to the other for delay or failure to perform any of the terms and conditions, or other activities, of this agreement if such delay or failure is caused by strike, war, act of God, or force majeure.

Frequently Asked Questions – FAQ's

Duration of the course?

Ans: Course Duration is 30 Days.

Daily Class Duration?

Ans: Daily class will be for up to 02 Hours.

Requirement for the course?

Ans: Computer / Laptop with good internet connection, Camera and Mic.

Support from IPEBS?

Ans: Faculty assigned to all registered participant of the course. Faculty not only helps to clear the participant's queries while doing the course but also monitors the progress of the participant to help in successful completion of the course.

Mode of Payment?

Ans: You can make the payment through electronic transfer or at **IPEBS** office.

Issue of Certificate?

E - Certificate will be issued by **IPEBS** only on successful completion of the course & will be sent via email to the participant.

Training Methodology?

Ans: Online Streaming of lectures, contact with faculty by email or chat groups.

Training Material?

Ans: Printed Material – Course / Class handouts will be provided in printed format and shipped (within India) to the participants.

Soft Copy Material - Data tables, charts, nomographs, drawings, concept theory, design calculations and practice exercise's will be provided in soft copy.

Demonstration software's and excel spread sheets will be provided.

****** International Shipping charges of printed material - course / class handouts to be borne by participants.