

MECHANICAL ENGINEERING
(Diploma / Post Graduate Diploma Professional Course)

IPEBS

ISO 9001-2008 Certified

Heating Ventilation & Air Conditioning - ASHRAE/ISHRAE/SMACNA/BS/CIBSE
(Design/Drafting/ Construction / Estimation & Maintenance)



Course Date & Venue: STARTS EVERY MONTH 15TH - 2015 – IPEBS, Hyderabad, INDIA.

Note: Download IPEBS Training Calendar for exact course start dates for the year 2015 from www.ipebs.in



"Numerous tips & tricks throughout the course make it very practical to your learning approach."

"The most extensive training topics & course material as per the current codes & standards which covers all Design & Detailing, Erection, Maintenance Standards of HVAC Systems."

"Experience the working atmosphere in the class itself during Project work."

Trainer Synopsis

"LG Certified / Over a Decade Gulf Experienced Trainer"

"SAUDI ARAMCO Certified HVAC QA/QC Engineer - Trainer"

Practising HVAC Consultant for India / Gulf Projects

PROGRAM OVERVIEW

Heating Ventilation & Air Conditioning - ASHRAE/ISHRAE/SMACNA

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** with dedicated training sessions covering detailed applications & usage of codes & standards like ASHRAE, ISHRAE, SMACNA, ASME, ARI, DW 142, BS, & CIBSE.

WHO SHOULD ATTEND

Fresh Mechanical Engineering Graduates, Fresh Electrical Engineering Graduates, MEP Engineers, HVAC Engineers (Project / Design / Estimation / Maintenance), HVAC Draftsmen, MEP Draftsmen, MEP Co-coordinators, HVAC Site Supervisors, HVAC Technicians, HVAC QA/QC engineers, Design & Project Managers.

WHAT YOU WILL LEARN

Upon completion of this course the participant will be able to

- Learn to use codes & standards of HVAC industry.
- Design HVAC Systems - perform calculations, route, select equipments, estimate quantities and create hvac drawings (Detailed & Shop Drawings)
- Perform cooling / heating load calculations for buildings.
- Design the Ventilation, DX Air & Chilled Water Distribution Systems for Residential & Commercial Buildings
- Understand the complete Design (Air Duct , Chilled Water) , Selection & Installation of different components & Systems used in the HVAC Systems

HOW TRAINEE BENEFITS

The participants enrolling for the training program at IPEBS can look forward for a challenging position in Engineering Consulting & Construction Companies for different residential, commercial and industrial projects.

Work in multi - trillion dollar building services construction industry in India & Gulf Countries as

- ✓ Design Engineers,
- ✓ Project/Procurement (Site Engineers),
- ✓ Estimation, Co-ordination Engineers
- ✓ Testing & Commissioning
- ✓ Sales
- ✓ QA/QC
- ✓ Maintenance Engineers.

Walk – in for a Training Demo –
Orientation / Course Overview by
Course Upcoming Start Date.

Training Features:

- Faculty with over a decade of Gulf Experience.
- Individual Attention & Placement Guidance.
- Hundreds of Students working in India & Middle East.
- Excellent Training Material provided including (Training Manual, Demo Software's, Design Data Charts, Drawings & Design of Sample Projects)

COURSE MODULES

Module 1- Introduction to HVAC

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

Module 2 - Refrigerant

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

Module 3 - Principles of air conditioning

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

Module 4 - Air conditioning systems-

Functioning/Installation/Selection/Maintenance

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

Module 5 - Psychometric chart

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

Module 6 - Components of AHU & its functioning

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

Module 7 - Cooling & Heating load estimation

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

COURSE MODULES (contd)

- ✓ Heat gain through Infiltration air, Heat gain through 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)

Module 8 - Design of Air Distribution System.

- Understanding the need of Air Distribution System Design

a) Components of Air distribution system- Function/Selection/Installation/Maintenance

- ✓ 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 kgs. 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)

Module 9 - Design of Ventilation system.

- 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.
- Stair Well Pressurization System Designing

Note: Ventilation System Design on Project (Commercial/Residential)

Module 10 - Chilled Water system design-Function/Selection/Installation/Maintenance

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

PROGRAM DESCRIPTION (contd)

- ✓ 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 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 11 - 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

Module 12 - Estimation of Project-

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

Module 13 - Documents Approvals- Preparation of Material submittals, Shop drawing submittals, Types of approval

Module 14 - Project Procurement- Identifying the critical equipments, preparation of purchase orders, Letter of Intent, Letter of credit, Minutes of meeting

Module 15 - 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.

SELECTED CLIENTS



GENERAL INFORMATION:

- Participants are expected to be present each day and during all training periods. Participants who do not fulfill the attendance requirement will not be certified. Please remember this when making your travel arrangements.
- Course fee includes Printed Training Materials (Manual, Hand outs etc.), & Participants will be awarded with Diploma / Post Graduate Diploma Certificate (*QMS Accredited to *AIAO – BAR).
- Venue for the Diploma Courses will be IPEBS facility, Hyderabad.
- The course is restricted to registered participants only. Visitors are not permitted.
- Use of mobile phones, Personal Data Assistants (PDA, Blackberry) and pagers is not permitted during training periods. Same applies for use of laptop, tablet, and computer for any purpose (E-mail, games etc.) other than course training.
- Participants are expected to maintain a professional standard of appearance and behavior. Any participant wearing inappropriate attire or behaving in an unprofessional manner will be given a verbal warning. Further incidents may result in the participant being asked to leave the class without refunding their fee.
- Failure to meet or comply with these requirements will result in non-certification.
- Accommodation can be arranged on request for the participants near to the training facility. (Accommodation is not included in the course fee).
- **International participants registering for the diploma courses, please contact IPEBS by email to info@ipebs.in for further course details & visa assistance.**

NOTE: 1) QMS – Quality Management System (ISO 9001 -2008).

2) AIAO – BAR – American International Accreditation Organization, California, USA.

WHY TRAIN WITH IPEBS

IPEBS team develops the training programs based on the practical consulting and site construction expertise that has been built up over the years in various specialist areas.

We set out to teach top-quality engineering skills training courses and we have achieved this—we constantly strive to make them as good as it's possible to – but over the years we have also refined our methods, adding several enhancements to the construction stages of course description, design of the courses and assessment.

We believe that these are important to our training participants; it's easy to see what the courses consist of, what value they will gain from attending them and how they can apply their new knowledge and skills in their workplace in a structured, evidence-rich way.

INSTRUCTOR PROFILE

- ❖ Mechanical Engineering Graduate from JNTU, Hyderabad.
- ❖ L.G Certified Trainer.
- ❖ HVAC/Plumbing/Fire Protection systems specialist.
- ❖ Over 10 years of Gulf experience in HVAC & MEP Services including Design, Installation & Maintenance.
- ❖ Worked in Gulf Countries including Kingdom of Saudi Arabia, UAE & India as Senior Mechanical Engineer & MEP Projects Manager.
- ❖ Worked on different projects including Industrial Plants, 5 Star Hotels, Residential & Commercial Buildings, and School & Telecom Projects.
- ❖ Expertise in Designing of HVAC Systems including DX Systems Central Air Conditioning, Chilled Water Systems, Plumbing & Fire Fighting Systems.
- ❖ Expertise in Various Codes & Standards including ASHRAE, SMACNA, CIBSE, NFPA & IPC design standards and Coordination MEP Services.
- ❖ Practicing HVAC & MEP Consultant for Gulf & Indian Building Services Projects.
- ❖ Successfully trained more than One Thousand Mechanical Engineers.
- ❖ International Course Speaker.
- ❖ Saudi Aramco Certified HVAC QA / QC Engineer.

DIPLOMA COURSE	DURATION	TIMING
Heating Ventilation Air Conditioning – ASHRAE/ISHRAE/SMACNA (Design/Drafting/Construction / Estimation & Maintenance) <i>*For course fee details please contact , E-mail: info@ipebs.in Phone: +91-40-30623249, Mobile: +91-9885946711</i>	30 Days (Inclusive of Public Holidays)	10:00am to 1:30pm
<p>Can't take 4-6 Weeks for training? Attend the Accelerated Training Workshop - A 5-Day Version of our Highly Acclaimed Diploma Courses. For Further details about Workshops, please visit our website www.ipebs.in</p>		
<p>Interested In Onsite training , For further Information on Onsite Trainings please contact , E-mail: corptrain@ipebs.in Phone: +91-40-30623249, Mobile: +91-9885946711</p>		

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.

REGISTRATION FORM

Please visit www.ipebs.in for details on courses we offer and more updated information.

You can register online.

Or

For applications by E-mail, please fill the form below and send to info@ipebs.in

**COURSE TITLE: Heating Ventilation & Air Conditioning -ASHRAE/ISHRAE/SMACNA
(Design/Drafting/Construction/Estimation & Maintenance)**

COURSE DATE: _____ COURSE LOCATION: _____

NAME: _____ NATIONALITY: _____

QUALIFICATION: _____ WORK EXPERIENCE (if any): _____

JOB TITLE: _____ COMPANY: _____

ADDRESS: _____

CITY: _____ STATE: _____ POSTAL CODE: _____ COUNTRY: _____

PHONE: _____ FAX: _____ EMAIL: _____

In case of Emergency, contact

NAME: _____ PHONE: _____

ADDRESS: _____

EMAIL: _____

NOTE: Training Fee can be paid at the time of Joining the Course.

I, acknowledge to the terms & conditions of the organizer.

Date: _____

Signature: _____

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