COURSE OBJECTIVE

Energy efficiency is a key factor in the sustainable development plan of the industry. Significant fraction of process industry uses steam for various purposes and boiler is an integral part of the system. This course will help the industry personnel to understand the generation, distribution, and efficient utilisation of steam. This course will also help them understand the troubleshooting of the boiler, i.e., the steam generation, basics and operation principle of heat exchangers. The course is a blend of the fundamental knowledge of the engineering science and the industrial experience of actual operation as instructors from boiler industry will also be invited.

In addition to the lectures, hands on experiments on the boiler at the Forbes Marshal Energy Efficiency Laboratory will also be performed where the participants will determine the efficiency of the boiler and perform experiments on heat exchangers.

Moreover, one session will be dedicated to discuss the problems relevant to the industry to explore joint projects.

COURSE OUTLINE

Module 1	**Steam Generation**

Fundamentals of steam, Steam Generation, Saturated & Superheated steam, Steam properties, Enthalpy, Pressure-Enthalpy diagram, Applications of steam in Industry, Boiling & Condensation, flash steam. Introduction of combustion-fuels (solid, liquids & gaseous), Fuel analysis, combustion reaction, heating values-GCV/NCV, Gasification, Boilers, Boiler types & selection, fans, Forced & Induced draft, Introduction to Economizer, air preheater, superheaters, & types, Feed water tank & deareation, Feed water treatment, Oxygen scavenging, Importance of Steam & Water chemistry monitoring & sampling system, Boiler blow down, Excess air, Direct & Indirect efficiency, Boiler efficiency monitoring devices, Factors improving the boiler efficiency, Automatic blow down control system, Accessories & Mountings, Burner types, Modern controls for Boiler & Burner, Case studies of coal/biomass/FO/NG fired Boiler efficiency improvement.

Module 2	**Steam Distribution**

Introduction to typical steam & condensate loop, Factors considered while designing ideal/typical steam & condensate loop, Importance/function & construction of Steam ancillaries such as –

- Steam Traps-types, selection criteria
- Flash vessel,
- Condensate Pump-types & selection criteria
- Air vent & Vacuum breakers
- Injectors
- Steam stop / Piston valve
- Safety valve (SV11, Spring loaded flange type)
- Pressure reducing valve – Spring loaded & pilot operated, Electro-pneumatic (PID) based
- Steam flow measuring devices – vortex flow meter, Orifice flow meter
- Steam leakage, steam Trap failure types & identification methodology

Module 3	**Steam Utilisation**

Introduction & Importance of Heat exchangers, Types of Heat exchangers, Applications, Design consideration for designing / selection of heat transfer, LMTD, Effectiveness of heat exchanger, Fouling phenomenon & its types, Modern control system for steam to liquid/gas/air Heat exchangers. Thermal designing of heat exchangers, Nusselt, Prandtl no, Dittus boelter co-relation, Introduction of Modern processes in Process industry utilizing steam directly or indirectly.

WHO MAY BENEFIT?

This course is recommended for Utility managers, Boiler house managers, Boiler supervisors, Maintenance managers, Faculty interested in thermal systems, Combustion professionals.

COURSE VENUE

The programme will be held at the Conference Hall (Ground Floor), Jal Vihar Guest House, IIT Bombay.

IIT Bombay is a small township in itself. The campus has a green cover, rich in natural flora and fauna. The campus extends over 220 hectares amidst picturesque surroundings with Vihar and Powai lakes on either side.

COURSE FEE

The fee for the entire course is ₹ 23,600/-
(inclusive of GST @ 18%) (Industry)

The demand draft should be drawn in favour of **"The Registrar, IIT Bombay-CEP Account"** payable at Mumbai.

For on-line payment, Bank details are as follows:

- Bank Name: State Bank of India, IIT Bombay Powai branch
- Account No.: 10725729128
- Account Type: CURRENT
- MICR Code: 400002034
- IFSC Code SBIN0001109
- SWIFT Code: SBININBB519
- Beneficiary: Registrar, Indian Institute of Technology Bombay
- Purpose / Reference: CEP course
- PAN Number: AAATI14446A
- Email ID: cep@iitb.ac.in

No income tax is to be deducted at source from the course fee, as IIT Bombay is exempt from the same. The course fee includes course material, lunch and coffee/tea; it does not include the cost of boarding and lodging for the participants.

REGISTRATION

The participants should send registration forms duly filled along with the demand draft for the course fee to address given below on or before **8 September 2017**.

ADDRESS FOR CORRESPONDENCE

Prof. Manaswita Bose
Course Co-ordinator
Forbes Marshall Energy Efficiency Research Laboratory
Department of Energy Science & Engineering
Indian Institute of Technology Bombay
Powai, Mumbai – 400 076
Tel. : +91-22-2576 7847 / 2576 7890
Email : manaswita.bose@iitb.ac.in

Two Day CEP Course

Efficient Steam Handling

September 14 - 15, 2017

Co-ordinator

Prof. Manaswita Bose
Forbes Marshall Energy Efficiency Research Laboratory
Department of Energy Science and Engineering

Offered through
Continuing Education & Quality Improvement Programmes

Indian Institute of Technology Bombay
Powai, Mumbai – 400 076

R E G IS T R A T I O N F O R M

Two day CEP Course

Efficient Steam Handling

Forbes Marshal Energy Efficiency Laboratory
Department of Energy Science & Engg., IIT Bombay

September 14 - 15, 2017

Name(print): _____

_____ Gender: M / F

Designation: _____

Organisation: _____

Mailing Address: _____

_____

_____ Pin _____

Telephone:_____ (O) _____ (R)

Fax: _____ Mobile: _____

Email: _____

Qualifications: _____ Experience: _____ yrs

Payment: DD.No. _____ Dt. _____ Rs. _____

[Demand draft should be drawn in favour of "The Registrar, IIT Bombay (CEP A/c)"]

Date: _____ Signature of Applicant: _____

(PHOTOCOPY ADDITIONAL COPIES OF THIS FORM, IF NEEDED)

On-line Payment Transaction Details

Kindly arrange to provide the following transaction details, if the course fee is paid on-line

1. Name of the Course Participant:
2. Transaction No:
3. Date of transaction:
4. Amount:
5. Bank & Branch Name from where transfer is done: