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

<table>
<thead>
<tr>
<th>Module 1</th>
<th>Steam Generation</th>
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</thead>
<tbody>
<tr>
<td>Fundamentals of steam, Steam Generation, Saturated &amp; Superheated steam, Steam properties, Enthalpy, Pressure-Enthalpy diagram, Applications of steam in Industry, Boiling &amp; Condensation, flash steam. Introduction of combustion-fuels (solid, liquids &amp; gaseous), Fuel analysis, combustion reaction, heating values-GCV/NCV, Gasification, Boilers, Boiler types &amp; selection, fans, Forced &amp; Induced draft, Introduction to Economizer, air preheater, superheaters, &amp; types, Feed water tank &amp; deaeration, Feed water treatment, Oxygen scavenging, Importance of Steam &amp; Water chemistry monitoring &amp; sampling system, Boiler blow down, Excess air, Direct &amp; Indirect efficiency, Boiler efficiency monitoring devices, Factors improving the boiler efficiency, Automatic blow down control system, Accessories &amp; Mountings, Burner types, Modern controls for Boiler &amp; Burner, Case studies of coal/biomass/FO/NG fired Boiler efficiency improvement.</td>
<td></td>
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</tbody>
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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


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.
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
REGISTRATION FORM

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): ______________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Designation: ________________________________________________________________
Organisation: ________________________________________________________________
Mailing Address: _____________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Pin ____________________________
Telephone: _____________________ (O) _____________________ (R )
Fax: __________________________ Mobile: ________________________________
Email: __________________________
Qualifications: __________________ Experience: ______ yrs

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:

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)