

**Indian Institute of Technology Kharagpur (WB) 721 302, INDIA**



## **Cryogenic Engineering Centre**

### ***Announces***

***A 6-day 42-hour Training Programme for Engineers***

## **CRYOGENIC AIR SEPARATION – 2013**

**February 19 – 24 , 2013 (Tuesday - Sunday)**

IIT Kharagpur has been holding the training programs on Cryogenic Air Separation for the last 20 years. The course faculty has wide experience in research, teaching and industry-interaction in this special field of engineering.

### **Course Outline:**

**Cryogenic Air Separation topics:** 1. Introduction to Air Separation, 2. Properties of solids and fluids at Cryogenic temperatures (with reference to Cryogenic safety, wherever applicable). Use of Tables and Charts, 3. Cryogenic Insulations, Storage and transport vessels & vacuum insulated piping, 4. Oxygen Cylinder filling calculations, 5. Cryogenic and Air Separation Plant Safety, 6. Psychrometric Processes: Water separation on compression, Moisture Load on mol Sieves, Design and operation of WN<sub>2</sub>-Water tower and Cooling Tower, 7. Fluid Flow and Pressure Drop: relationship with viscosity, velocity, diameter etc., 8. Heat Transfer Concepts and Equations, Heat Exchangers, Intercoolers, Aftercoolers, Oil-coolers, Cryogenic Heat Exchangers (PFHE): performance evaluation, operation, and protection, 9. Compression Process, Positive Displacement and Centrifugal Compressors and their characteristics, 10. Conventional Refrigeration Processes: Ammonia, R-22 and R-11, 11. Removal of CO<sub>2</sub>, moisture and hydrocarbons: Mol-Sieve Adsorption, 12. Cryogenic Liquefaction Cycles : Linde Cycle, Claude Cycle and their derivatives, 13. Cryogenic Distillation, 14. Air Separation Plant Configurations, 15. Intricacies of Argon separation, Effect of excess liquid or excess gas draw on product purity, packed column versus sieve trays, 16. Mass Balance and Energy Balance in an Air Separation Plant.

### **Faculty:**

Dr. Kanchan Chowdhury, Professor of Cryogenic Engineering Centre at Indian Institute of Technology, Kharagpur will serve as the course faculty.

### **Eligibility:**

Engineers with degrees in any branch of engineering are eligible. Experience in industry or R&D laboratory is not essential for engineers. B. Sc., M. Sc. or Diploma holders with relevant experience may be allowed.

### **Venue of Lectures:**

Visveswaraya Guest House Lecture Room, Indian Institute of Technology, Kharagpur 721302

### **Registration:**

Intending participants are requested to send the required information for registration to the Course Coordinator latest by January 31, 2013, along with the course fee in the form of draft drawn on any bank at Kharagpur or at par cheque in favour of 'CEP-STC, IIT Kharagpur' in full. The course fee is INR 40,000 (Indian Rupees Forty Thousand only) plus Government of India service tax of 12.36% (Total comes to Indian Rupees 44,944) or US\$ 1,000.00 (US Dollar One Thousand only) for foreign participants paying in dollars. Drafts or cheques drawn on a bank located outside India would not be accepted. Bank transfer would be accepted for all participants: both from within and outside India. A scanned copy of the bank transfer document may be sent as proof of payment.

Bank details: (a) Name of Bank : Syndicate Bank, IIT-SRIC Extension, Kharagpur 721302, India; (b) In favour of (Account Name): CEP-STC, IIT Kharagpur; (c) Address of Beneficiary: Indian Institute of Technology, Kharagpur, PIN: 721 302, West Bengal, India; (d) Account Number: 9556 220 000 2955; (e) IFSC/RTGS Code : SYNB 0009556 (f) Bank Swift Code: SYNBINBB 120. All Bank charges are to be borne by the company.

Charges for the boarding and lodging should be paid by the participants directly to Guest House. The Course fee includes bound lecture notes, working lunch and tea/coffee provided during the course.

**Accommodation:**

Rooms will be booked at the New Technology Guest House. Single occupancy in a double-bedded room (AC) (INR 800 / person per day), Double occupancy in a double-bedded room (AC) (INR 600 / person per day) and Suites (AC, with a large bed in one room, sofa set and fridge in another) (INR 1,500 plus 12.36% service tax / room per day) are available. All rooms have TV and internet facility. Please specify the type of room to be booked.

Charges for the boarding and lodging should be paid by the participants directly to the Guest House.

**Dates:** February 19 – 24, 2013 (Tuesday to Sunday).

**Timing :** Classes will begin at 9-00 AM sharp. There will be breaks for lunch and coffee. Classes will end at 5-30 PM everyday. There will be net 7 hour interaction each day. Course is a 42-hour program.

**General Information:**

IIT is located about 6 km from the Kharagpur Railway Station. Kharagpur is conveniently connected to Howrah (Calcutta) by many local trains every hour and also by express trains (116 km away). Kharagpur has direct rail links to most major cities in India. Those travelling by air may hire a taxi from Kolkata airport, which would bring you to IIT Campus at Kharagpur (150 km one way) within 2.5 hours. The minimum charge is about INR 3,000. Sending a car from Kharagpur for airport pick-up or hiring one from Airport costs the same, as they charge for both-ways anyway. Rickshaws (INR 80), Autorickshaws (INR 100) and Taxis (INR 120) are available to come from the Kharagpur Railway Station to IIT campus. Weather at Kharagpur would be pleasant during end-February. Contact Mr. Arjun Saha of J K Travels (+91 9434193014/ +91 99325 73310) for travel-related help.

Please inform the candidate that he/she should bring a scientific calculator to the classroom without fail.

**Information Required for Registration:**

Name, Designation/Responsibility in the company, Name and Address of Company, Phone (Off), Phone (Res), Phone (Mobile), Fax, E-mail, Date of Birth, Highest Academic Qualification, Demand Draft details and Amount, Requirement for Guest House bed.

**Additional Information Required for Registration of Participants holding Foreign Passports:**

Name, Fathers name, Nationality, Date of Birth, Place of birth, Number, Date and Place of Issue of Passport, Current Residential Address, Permanent Residential Address, Profession, Place of Employment, Academic Credentials. Please use separate pages for each participant.

**Please Fax/Mail/ E-mail the information to:**

Professor Kanchan Chowdhury

Cryogenic Engineering Centre

Indian Institute of Technology

Kharagpur 721 302, West Bengal, India

Phone (Off) : (03222) 283582; Phone (Res): (03222) 283583; Country Code for India: 91

Mobile : 94340 10442; Fax : (03222) 255303 / 282258

e-mail : cryogenic.engineering.centre@gmail.com; Copy to: chowdhury.kanchan@gmail.com

**LAST DATE OF APPLICATION: January 31, 2013**