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## INTRODUCTION

IIT Kharagpur is the first of its kind in the country and has been providing trained manpower for different Industries/Research organizations through B.Tech, M.Tech and Ph.D programs. Specialized courses and workshops are also being organized under Continuing Education Programme (CEP) to train personnel from Industries/Universities. The institute has established a sophisticated **Vacuum Teaching Laboratory** in Cryogenic Engineering Centre under Indo-German Collaboration Programme, to train technicians, engineers, scientists and teachers working in the field of vacuum and its related areas. This laboratory houses several advanced vacuum equipment for production/measurement of vacuum and trouble shooting/application of vacuum systems. In addition, the institute has several high vacuum systems applied for metallurgical processes, MBE growth of thin films, microelectronic devices, Surface studies and Chemical analysis. Expertise/Facilities also exist on application of vacuum in chemical Engineering, food/pharmaceutical technology and biotechnology. These facilities are routinely used to solve technical problems faced by vacuum and related industries.

## OBJECTIVES

Vacuum Technology has diversified applications in different areas of science and Engineering. These include the major fields like Electronics, Metallurgical/ Chemical Processing, Food Processing, Space-Simulation, Nuclear Engineering, Electrical Engineering and Cryogenic systems. This has resulted in rapid development of many sophisticated vacuum instruments, pushing the range of vacuum to  $10^{-12}$  Torr. To keep pace with this advancement in vacuum technology, it is absolutely necessary for the engineers/scientists/teachers of our country to get a first hand exposure to these modern vacuum equipment and their applications. Keeping this objective in mind, present course on ***Vacuum Technology and Process Applications*** is undertaken. The uniqueness of this course is that, in addition to classroom lectures, emphasis is given to the *practical training* in designing, handling and trouble shooting of variety of modern vacuum pumps, components, measuring systems, residual gas analyzers,

leak detectors, vacuum furnaces, coating units, vacuum dryers and other applications.

## COURSE OUTLINE

- (1) Introduction to basic concepts of vacuum.
- (2) Application of vacuum in different processes. (Metallurgical, electronic, chemical, electrical, space, nuclear, pharmaceutical, food and cryogenics)
- (3) Production of medium and high vacuum by Rotary, Piston, Roots, Diffusion, steam jet ejectors, Water-ring, Dry membrane and Sorption pumps - their assembling and maintenance, pump-down characteristics.
- (4) Ultra-high vacuum pumps and their pumping characteristics, Handling and maintenance of Turbo-molecular, Ion and Cryopumps.
- (5) Pressure measurement in vacuum systems using different primary and secondary gauges. Calibration/maintenance of vacuum gauges.
- (6) Residual gas analysis in vacuum systems.
- (7) Design and Fabrication of vacuum chambers, flanges, couplings, and components for different applications.
- (8) Gas flow in vacuum systems, conductance calculations and measurements on vacuum piping networks. Design of vacuum piping in process industries.
- (9) Leak detection/trouble shooting/maintenance of vacuum systems, handling of mass spectrometric leak detectors, degassing procedures.
- (10) Handling of vacuum based furnaces/coating units/driers and other process-systems.

**Participants will also receive extensive practical training on above topics in the laboratories.**

## FACULTY

Professors and experts working in the field of vacuum technology and its related areas from different departments of the Institute will deliver the lectures and help in practical sessions.

## APPLICATION FORM

*SHORT TERM COURSE ON*

**VACUUM TECHNOLOGY**

**AND**

**PROCESS APPLICATIONS**

**(22<sup>nd</sup> Oct. – 2<sup>nd</sup> Nov. 2010)**

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1. Name:
  2. Date of Birth:
  3. Designation:
  4. Qualification:
  5. Nature of work:
  6. Address:
  7. Details of Draft:
  8. Mobile No:
  9. Choice of Accommodation: Single/Double  
(Tick your choice) Non A.C / A.C  
(Details of subsidized charges given overleaf)
- 
10. Signature of the applicant with date:

For more than one-application from an Institution,  
Xerox copies of this may be used.

Please mail the completed form along with D.D. to:

Prof. V. Vasudeva Rao  
Co-ordinator

**Vacuum Technology Laboratory,**  
Cryogenic Engineering Centre,  
I.I.T, Kharagpur 721 302  
West Bengal.

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Mobile: 09933078577

Fax: (03222) - 282258

IIT Kharagpur



**LAST DATE FOR APPLICATION**  
**15<sup>th</sup> October 2010**

### **ELIGIBILITY:**

All practicing engineers/technicians working in private, public, government organizations/industries; scientists/engineers from R&D establishments, college teachers are eligible to apply for participation.

### **REGISTRATION FEE/COURSE MATERIALS/CERTIFICATE:**

Participants are required to pay Rs. 15,000/- per participant as the registration fee for this two-week course. The fee is to be paid in advance by a demand draft in favor of "CEP-STC, IIT, Kharagpur". Payable at Kharagpur.

Each registered participant will be provided with a detailed lecture notes on "VACUUM TECHNOLOGY & PROCESS APPLICATIONS" and registration materials/stationary. At the end of the course, the institute will issue a certificate.

### **BOARDING AND LODGING:**

Accommodation will be provided in our CEP guest house on payment basis at the following rates.

<b>Guest house</b>	<b>Non A/C</b>	<b>A/C</b>
Single (per head/day)	100/-	200/-
Twin Sharing (per head/day)	150/-	150/-
Dormitory(per head/day)	60/-	N/A

Lunch and refreshments will be served by us during the session period. Breakfast/Dinner on payment is available in the guest house. Also there are several restaurants and cafeteria on campus.

## **IIT Kharagpur Presents**

**A TWO-WEEK COURSE ON**

**VACUUM TECHNOLOGY  
AND  
PROCESS APPLICATIONS**

**(22<sup>th</sup> Oct. – 2<sup>nd</sup> Nov. 2010)**



**VACUUM TECHNOLOGY LABORATORY  
CRYOGENIC ENGINEERING CENTRE  
INDIAN INSTITUTE OF TECHNOLOGY  
KHARAGPUR - 721 302**

**Co-ordinator**  
**Prof. V. Vasudeva Rao**