OVERVIEW

There is a growing interest for advanced thermal and energy systems in recent years due to industrial development and economic growth in many countries. In the present course, the advances in fossil fuel based thermal and power generation systems will be discussed. The Fluidized Bed Combustion (FBC) Technology; Integrated Coal Gasification Power Generation (IGCC) Systems; Experimental Investigations, Measurement Techniques and Numerical Modelling of Heat Transfer in Fluidized Bed Gasifier will be presented. Biomass co-firing with coal and natural gas is also receiving attention to reduce greenhouse gas emissions. The biomass co-fired power generation systems, their analysis and advances will also be discussed along with the developments in solar, biomass and natural gas hybrid power generation and integrated thermal systems.

The second law of thermodynamics is receiving lot attention for the analysis of power generation and thermal systems. In the course, the second law analysis of natural gas, coal and biomass power generation systems will be presented. The exergy analysis for thermal and power generation systems and the role of exergy analysis in the design and development of advanced thermal and power generation systems will be discussed. The Exergy, Cost, Energy and Mass (EXCEM) analysis will also presented. Exergy economics approach vs. energy economics approach for thermal and power generation systems will be discussed (state of the art and research status in exergy economics area; contributions of exergy economics to climate change and sustainability side; implications for policy formulation). Exergy analysis for thermal energy storage systems and district energy systems will also be discussed. Future research directions in exergy area will also be presented. Attending this course will be of great benefit to the participants by familiarizing themselves with the state of the art in energy technologies and planning long-term research programmes.

OBJECTIVES

The prime objective of this course is to educate the participants with recent Advances in Thermal Systems by the principles of Energy, Exergy and Economic Analysis (Exergoeconomic Analysis). In order to achieve this, the following objectives of the present course have been laid out:

- Expose the Participants to Thermal and Energy Systems, recent Advances and Environmental issues, Global Warming and the need for Advanced Thermal and Power Generation Systems
- Advances in Coal, Natural Gas, Biomass based Power Generation and Thermal Systems and Solar based Hybrid Power Generation and Integrated Thermal Systems
- Exergy Analysis and its role in the Performance Analysis and Improvement of Thermal and Power Generation Systems
- The role of Exergy Analysis to reduce Emissions, develop Improved Design of Thermal Systems and in Sustainability and the details on Exergy, Cost, Energy and Mass (EXCEM) Analysis

WHO SHOULD ATTEND?

- PG / Ph.D. Students, Faculty Members with research focus in Thermal and Energy Systems Area (Mechanical Engineering, Chemical Engineering, Energy Engineering)
- Consulting Engineers working in Thermal and Energy Area
- Pre-Final / Final Year Undergraduate Students (Mechanical Engineering, Chemical Engineering, Energy Engineering)

GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

Government of India
Ministry of Human Resource Development

One -Week GIAN Course
on

Advanced Thermal Systems: Energy, Exergy and Economic Approach

MECHANICAL ENGINEERING DEPARTMENT

NATIONAL INSTITUTE OF TECHNOLOGY MIZORAM

AIZAWL, MIZORAM-796012

COURSE CONTENTS

Module A**

- Energy and environmental issues and global warming
- Gasification and its present state of art along with Integrated Coal Gasification Combined Cycle (IGCC) power generation systems
- Experimental investigations in fluidized bed combustors/ gasifiers and measurement techniques; numerical modelling
- Advances in natural gas combined cycle power generation and thermodynamic analysis; biomass co-fired coal and natural gas thermal and power generation systems
- Solar, biomass and natural gas hybrid power generation systems and developments
- Cogeneration systems, types and analysis; developments in integrated and multi-generation thermal systems

Module B**

- First and second law of thermodynamics; entropy and exergy; exergy in policy development and education
- Exergy analysis and its role in the performance improvement of thermal and power generation systems sustainability; future research directions in exergy area
- Exergy analysis of coal, biomass, natural gas and solar based power generation and thermal systems
- Exergy analysis of cogeneration and district energy systems; exergy analysis of thermal energy storage systems
- Exergy economics approach vs. energy economics approach for thermal and power generation systems
- Exergy, Cost, Energy and Mass (EXCEM) analysis for thermal systems (state of the art and research status in exergy-economics area; contributions of exergy-economics to climate change and sustainability side; implications for policy formulation)

**Tutorials, problems, discussions and case studies on the above-mentioned topics will also be presented.

TEACHING FACULTY

Dr. Bale V. Reddy is Professor in Department of Automotive, Mechanical and Manufacturing Engineering in Faculty of Engineering and Applied Science, University of Ontario Institute of Technology (UOIT), Oshawa, Ontario, Canada. Prior to this Dr. Reddy also worked as an Associate Professor in Mechanical Engineering Department, University of New Brunswick (UNB), Fredericton, Canada. Dr. Reddy received his M.Tech. and Ph.D. Degrees in Mechanical Engineering from IIT Kharagpur, India under the guidance Prof. P.K. Nag. Dr. Reddy has 20 years of teaching and research experience in Mechanical Engineering with focus on Thermal and Energy Systems, Heat Transfer and Energy Management. Dr. Reddy has published 200 papers in refereed Journals and refereed Conference Proceedings. He has delivered key note and invited presentations in many International Conferences in various Countries. Dr. Reddy has also received Best Professor Award for teaching excellence five times both in India (VIT, Vellore) and in Canada (UNB, Fredericton; UOIT, Oshawa).

COURSE COORDINATOR

Dr. Abhijit Sinha has completed his Ph.D. in Mechanical Engineering from National Institute of Technology (NIT) Silchar, Assam, India in the year 2014. He did his M.Tech. from the same Institution in Thermal Engineering in the year 2011 and B.Tech. in Mechanical Engineering from National Institute of Technology (NIT) Agartala, Tripura, India in the year 2009. He has published various National and International Journals/ Conferences and participated in different Workshops. His research area includes Thermodynamics, Energy and Exergy Analysis, Thermal Design and Optimization, Renewable and Sustainable Energy and CFD.

REGISTRATION FEE

Participants from Abroad: US$500
Industry/ Research Organizations: Rs. 5000/-
Faculty Members: Rs. 3000/-
Students (Pursuing PhD / Master/ Bachelor): Rs. 2000/-
NIT Mizoram: Free (Faculty / Student / Researcher)

IMPORTANT DATES

Last Date of Registration: 13th October, 2017
Course Duration: 21st -26th October, 2017

TRAVEL & ACCOMMODATION

Aizawl can be reached by Air via Kolkata /Guwahati. The NIT Mizoram is approximately 35 km far from Lengpui (Aizawl) Airport. Silchar is the nearest railway station to Aizawl. The journey (by road) from Silchar to Aizawl may take approx. 5 hrs. Private Buses (Network, Capital, etc.) are available from Guwahati. The journey from Guwahati to Aizawl by Bus is approx. 24 hrs. Hotels and Guest Houses are also available within 3 km radius of the Institute. Accommodation may be arranged based on request and on payment basis for limited participants.

CONTACT INFORMATION

For more information regarding eligibility, fee payment and other queries contact course coordinator via E-mail or Phone.

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Assistant Professor
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Phone: +91-9678847689

A

One Week GIAN Course

on

ADVANCED THERMAL SYSTEMS: ENERGY, EXERGY AND ECONOMIC APPROACH

(Under the Aegis of MHRD- Global Initiative of Academic Networks)

October 21 - October 26, 2017 at NIT Mizoram

Registration Form

GIAN Portal Application Number:

1. Name of the Candidate:
2. Category: Academic / Industry /Student
3. Category of Registration: SC/ ST/ General & OBC
4. Organization:
5. Address:

6. Mobile Number:
7. E-mail:
8. Highest Academic Qualification:
9. Demand Draft Details:

Bank Draft Number: Date:

Amount: Drawn on:

Signature of the Candidate Signature of the Head of the Dept. /Institution

Important Points:

- First **Register** in GIAN portal, http://www.gian.iitkgp.ac.in/GREGN/index. Get Application Number.
- Fill in this Registration Form. Take a print out of it. Get it signed by Corresponding Authority.
- Draw DD (amount specified in brochure) in favor of "**Director NIT Mizoram**" payable at SBI Bawngkawn, Aizawl – 796012 and send the hard copy of this Registration Form with DD to**: Dr. Abhijit Sinha, Assistant Professor, Department of Mechanical Engineering, National Institute of Technology Mizoram, Chaltlang, Aizawl, Mizoram-796012**, Contact: +91-9678847689, E-mail: abhinit05@gmail.com.