DEPARTMENT OF MECHANICAL ENGINEERING

A Five Day

KARYASHALA

(High-End International Workshop)

on

Thermal Energy Storage for Building Applications

(Through Virtual Mode)

January 25 - 29, 2021

NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA

SPONSORED BY

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NIT ROURKELA

National Institute of Technology (NIT), Rourkela was founded as Regional Engineering College, Rourkela in 1961. It is an Institute of national importance created under the act of parliament. It is a prestigious institute with a reputation for excellence at both undergraduate and post graduate levels , close interaction with industry and a strong emphasis on research, both basic and applied. The institute provides quality education in a diverse and multicultural environment. The mission of the institute is to become an internationally acclaimed institution of higher learning that will serve as a source of knowledge and expertise for the society and be a preferred destination for undergraduate and post graduate studies. The institute is offering undergraduate, post graduate and PhD programme in 21 branches of Engineering. The institute research centres are engaged in consultancy and research activities of several government bodies such as DST, DAE, CSIR, DRODO, BARC, ISRO and private industries.

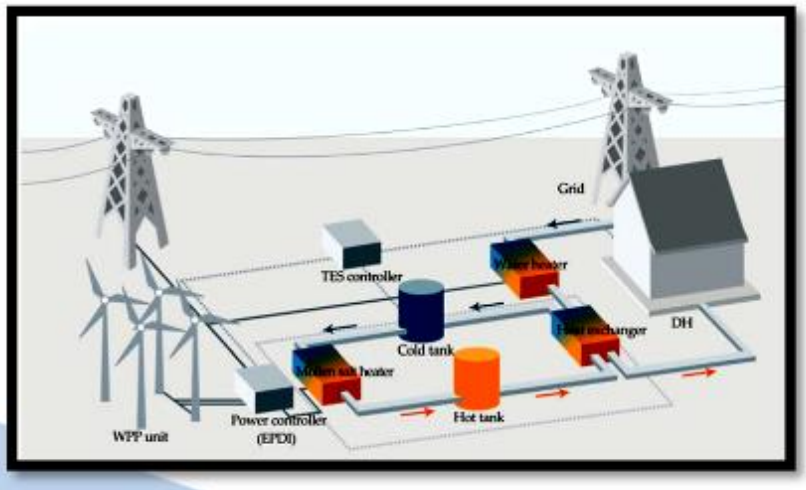
nirf NATIONAL INSTITUTIONAL RANKING FRAMEWORK	16
THE WORLD UNIVERSITY RANKINGS	601-800
QS ASIAN UNIVERSITY RANKINGS	225
QS UNIVERSITY RANKINGS BRICS	121

DEPARTMENT OF MECHANICAL ENGINEERING

The Mechanical Engineering of NIT Rourkela comprises three divisions namely design, manufacturing and thermal engineering. The department is known for research in variety of fields that include mechanical vibration, robotics, heat transfer, CAD/CAM, precision engineering, metal forming, manufacturing, CFD, industrial refrigeration and cryogenics. The academic programmes of the department reflect not only the core areas of Mechanical Engineering; but also the research specialization of the faculty. The department at present has over one hundred research scholars pursuing the research on diverse fields. All the groups are working in close co-operation while retaining individual identities. Many Research and Development projects being pursued by the faculty are sponsored by Government agencies and private industries. The major sponsors among these projects are BRNS, DST, ARDB, BRFST and HBL Power Systems.

ABOUT THE COURSE

The use of Thermal Energy Storage (TES) in buildings in combination with space heating, domestic hot water and space cooling has recently received much attention. A variety of TES techniques have developed over the past decades, including building thermal mass utilization, Phase Change Materials (PCM), Underground Thermal Energy Storage, and energy storage tanks. In this course, a review of the different concepts for building or on-site integrated TES is carried out. The aim is to provide the basis for development of new intelligent TES possibilities in buildings.



COURSE CONTENT

The course will cover the following major topics;

- Introduction to various energy storage systems
- Thermal energy storage system - types and practical issues
- State of art on thermal energy storage for building heating and cooling
- Indirect storage of electricity generated from solar and wind power stations
- Thermochemical energy storage - Absorption and adsorption systems
- Complex structures for fluid flow across TES
- Building thermal energy storage - concepts and applications
- Renewable energy systems in buildings

TRAINING SESSION

Training session will cover the following topics;

- Machine learning tools, statistical techniques for developing experimental correlations and CFD simulations on HPC systems based on thermal energy storage systems
- Remote sensing applications to weather forecast
- Communicating Scientific Information to Public

WORKSHOP SPEAKERS

DR. MAJID BAHRAMI

Professor, SFU Canada

Research Area/ Topic: Mobile Thermal Energy Storage for Building Application.

DR. SAMEER KHANDEKAR

Professor, IIT Kanpur

Research Area/ Topic: Thermal Energy Storage for large building.

DR. M. P. MAIYA

Professor, IIT Madras

Research Area/ Topic: Ventilation System.

DR. P. MUTHUKUMAR

Professor, IIT Guwahati

Research Area/ Topic: Latent Thermal Energy Storage for Building Application.

DR. M. V. RANE

Professor, IIT Bombay

Research Area/ Topic: Renewable Energy Driven Heating and Cooling System.

DR. JYOTIRMAY MATHUR

Professor, MNIT JAIPUR

Research Area/ Topic: Energy Efficiency and thermal comfort.

DR. SAJJAD BIGHAM

Professor, Michigan Tech University, USA

Research Area/ Topic: Building Energy Efficiency.

DR. R. VELRAJ

Professor , Anna University

Research Area/ Topic: Thermal Storage Study for Energy Application.

DR. LALTU CHANDRA

Associate Professor, IIT BHU

Research Area/ Topic: An integrated concentrated solar thermal technology based process heating system.

DR. DIBAKAR RAKSHIT

Associate Professor, IIT Delhi

Research Area/ Topic: Green Building Concept.

DR. E.ANIL KUMAR

Associate Professor, IIT Tirupati

Research Area/ Topic: Thermochemical Energy Storage for Building Application

DR. CLAIRE MCCAGUE

Research Associate, SFU Canada

Research Area/ Topic: Mobile Thermal Energy Storage

DR. B. SATYA SEKHAR

Assistant Professor, IIT Jammu

Research Area/ Topic: Hydro energy Storage.

DR. HESAM BAHREHMAND

Research Engineer, SFU Canada

Research Area/ Topic: Adsorption Based Thermal Energy Storage

DR. D. AMARANATHA REDDY

DST INSPIRE, Faculty

Research Area/ Topic: New photocatalytic nanostructures for Renewable Energy Applications.

ELIGIBILITY

The course is open to faculty members, research scholars and students from universities and educational institutions, and scientists and engineers from research organizations and industries. There is no registration fee for the course.

IMPORTANT DATES

The last date for the receipt of applications by email: scanned copy is 21/01/21. Intimation of selection: 23/01/21.

Registration Link: Karyashala on Thermal Energy Storage for Building Applications

TARGET AUDIENCE

Maximum number of applicants is limited to 60. The selected applicants will be provided a secured meeting code of the web platform one day before the commencement of course.

NOTE: Certificates will be issued to only those participants who will have a minimum of 90% attendance.

ADDRESS FOR CORRESPONDENCE

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NIT Rourkela

NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA

Department of Mechanical Engineering

A High-End workshop on

Thermal Energy Storage for Building Applications

January 25th to 29th, 2021

Day	Technical Session Theme	9:15 AM - 10:00 AM	10:15 AM - 11:15 AM	11:30 AM - 12:30 PM	1:45 PM - 2:45 PM	3:00 PM - 4:30 PM	
Day 1 (25-01-2021) Monday	Thermal Energy Storage (TES) for building applications	Inaugural Function	Lecture 1 Prof. Sameer Khandekar Professor, IIT Kanpur	Lecture 2 Dr. Hesam Bahrehmand Research Engineer, SFU Canada	Lecture 3 Dr. D. Amaranatha Reddy DST Inspire Faculty, IIITDM, Kurnool	TS 1 Dr. B. Kiran Naik Assistant Professor, NIT Rourkela	
			10:00 AM – 11:00 AM	11:15 AM – 12:15 PM			
Day 2 (26-01-2021) Tuesday	Sorption thermal storage systems		Lecture 4 Dr. Claire McCague Research Associate, SFU Canada	Lecture 5 Dr. Laltu Chandra Associate Professor, IIT BHU	Lecture 6 Dr. B. Satya Sekhar Assistant Professor, IIT Jammu	TS 2 Dr. K. S. Patel Assistant Professor, NIT Rourkela	
Day 3 (27-01-2021) Wednesday	Polygeneration systems		Lecture 7 Prof. S. Murugan Professor, NIT Rourkela	Lecture 8 Prof. M. V. Rane Professor, IIT Bombay	Lecture 9 Prof. R. Velraj Professor, Anna University	TS 3 Dr. N. Chilukoti Assistant Professor, NIT Rourkela	
Day 4 (28-01-2021) Thursday	Green building concept		Lecture 10 Dr. Dibakar Rakshit Associate Professor, IIT Delhi	Lecture 11 Dr. E. Anil Kumar Associate Professor, IIT Tirupati	1:30 PM – 2:30 PM TS 4 Dr. Mahendra Chinthala Assistant professor, NIT Rourkela	2:45 PM – 3:45 PM TS 5 Dr. Bala Chakravathy Assistant professor, NIT Rourkela	4:00 PM – 5:00 PM TS 6 Dr. Earu Banoth Assistant Professor, NIT Rourkela
Day 5 (29-01-2021) Friday	Latent heat storage for building applications	8:00 AM – 9:00 AM Lecture 12 Prof. Sajjad Bigham Professor, Michigan Tech University, USA	10:00 AM – 12:00 AM Lecture 13 Prof. P. Muthukumar Professor, IIT Guwahati		1:45 PM – 2:45 PM Lecture 14 Prof. M. P. Maiya Professor, IIT Madras	3:00 PM – 4:00 PM Lecture 15 Prof. Jyotirmay Mathur Professor, MNIT Jaipur	4:15 PM -5:00 PM Brainstorming Session and Valedictory function

Training Session (TS)

TS 1 – KNN Machine learning tool for Thermal Energy System Analysis

TS 2 - CFD simulations on HPC systems (Ansys – Fluent)

TS 3 – Weather data Visualisation of different climatic zones using Tableau

TS 4 – Thermal Energy system analysis using Aspen Plus

TS 5 – Microfluidic device fabrication using PDMS/soft lithography

***Inaugural Function* (25-01-2021)**

09:15AM – 10:00AM

Welcome Address
Dr. B. Kiran Naik
Assistant Professor, Mechanical Engineering Department
NIT Rourkela

Inaugural Address
Prof. S. K. Sahoo
HOD, Mechanical Engineering Department
NIT Rourkela

Address by the Director
Prof. Animesh Biswas
Director, NIT Rourkela

Address by the Chief Guest
Prof. Sameer Khandekar
Professor and HOD of Mechanical Engineering Department, IIT Kanpur

Address by the Dean SRICCE
Prof. Ritwik Sarkar
Dean SRICCE, NIT Rourkela

Vote of Thanks
Dr. Kishore Singh Patel
Assistant Professor, Mechanical Engineering Department
NIT Rourkela

LECTURE SERIES

DAY 1 (25-01-2021)

10:15 AM

Lecture 1
Topic: Thermal Energy Storage for Large Buildings

Speaker: Prof. Sameer Khandekar
Professor, IIT Kanpur

11:30 AM

Lecture 2
Topic: Adsorption based Thermal Energy Storage system

Speaker: Dr. Hesam Bahrehmand
Research engineer, SFU Canada

01:45 PM

Lecture 3
Topic: New photocatalytic nanostructures for renewable energy applications

Speaker: Dr. D. Amaranatha Reddy
DST Inspire Faculty, IIITDM Kurnool

03:00 PM **Training Session 1**

DAY 2 (26-01-2021)

10:00 AM

Lecture 4
Topic: Sorbents and Labscale sorption thermal storage system

Speakers: Dr. Claire McCague
Research associate,SFU Canada

11:15 AM

Lecture 5
Topic: An integrated concentrated solar thermal technology-based process heating system

Speaker: Dr. Laltu Chandra
Associate professor, IIT BHU

01:45 PM

Lecture 6
Topic: H_2: A future energy carrier

Speaker: Dr. B. Satya Sekhar
Assistant Professor, IIT Jammu

03:00 PM

Training Session 2

DAY 3 (27-01-2021)

10:00 AM

Lecture 7
Topic: Polygeneration system for building applications

Speaker: Prof. S. Murugan
Professor, NIT Rourkela

11:15 AM

Lecture 8
Topic: Renewable energy driven heating and cooling system

Speaker: Prof. M. V. Rane
Professor, IIT Bombay

01:45 PM

Lecture 9
Topic: Thermal energy storage for passive architecture

Speaker: Prof. R. Velraj
Professor, Anna University

03:00 PM

Training Session 3

DAY 4 (28-01-2021)

10:00 AM

Lecture 10
Topic: Assessment of PCMs for thermal management of buildings

Speakers: Dr. Dibakar Rakshit
Associate professor, IIT Delhi

11:15 AM

Lecture 11
Topic: Metal Hydrides for energy conversion and storage

Speaker: Dr. E. Anil Kumar
Associate professor, IIT Tirupati

01:30 PM — **Training Session 4**

02:45 PM — **Training Session 5**

04:00 PM — **Training Session 6**

DAY 5 (29-01-2021)

08:00 AM

Lecture 12
Topic: Thermochemical materials for Building Energy Improvement

Speakers: Prof. Sajjad Bigham
Professor, Michigan Tech University, USA

10:00 AM

Lecture 13
Topic: Latent thermal energy storage for Building Applications

Speaker: Prof. P. Muthukumar
Professor, IIT Guwahati

01:45 PM

Lecture 14
Topic: Cool storage for Refrigeration and Air conditioning

Speaker: Prof. M. P. Maiya
Professor, IIT Madras

03:00 PM

Lecture 15
Topic: Significance of operating conditions and scheduling of thermal storage on energy savings in air conditioning

Speaker: Prof. Jyotirmay Mathur
Professor, MNIT Jaipur

04:15 PM — **Brainstorming and Valedictory Function**

TRAINING SESSIONS

DAY 1
(25-01-2021)

03:00 PM

Training Session 1

Topic: KNN machine learning tool for Thermal Energy System analysis

Speaker: Dr. B. Kiran Naik
Assistant professor, NIT Rourkela

DAY 2
(26-01-2021)

03:00 PM

Training Session 2

Topic: CFD simulations on HPC systems (Ansys-Fluent)

Speaker: Dr. K. S. Patel
Assistant professor, NIT Rourkela

DAY 3
(27-01-2021)

03:00 PM

Training Session 3

Topic: Weather dataVisualisation of different climatic zones using Tableau

Speaker: Dr. N. Chilukoti
Assistant professor, NIT Rourkela

DAY 4
(28-01-2021)

01:30 PM

Training Session 4

Topic: Thermal Energy system analysis using Aspen Plus

Speaker: Dr. Mahendra Chinthala
Assistant Professor, NIT Rourkela

DAY 4
(28-01-2021)

02:45 PM

Training Session 5

Topic: Implementation of deep learning tool for thermal screening

Speaker: Dr. Bala Chakravarthy Neelapu
Assistant Professor, NIT Rourkela

DAY 4
(29-01-2021)

04:00 PM

Training Session 6

Topic: Microfluidic device fabrication using PDMS/soft lithography for energy storage application

Speaker: Dr. Earu Banoth
Assistant Professor, NIT Rourkela

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