



DEPARTMENT OF MECHANICAL ENGINEERING

One Week online Faculty Development Programme on

“Emerging Trends in Thermal and Renewable Energy Systems”

from 28th June 2021 to 2nd July 2021 ; Timings 5PM to 7PM.

The online Faculty program was conducted through Microsoft Teams Platform. The registrations for the online FDP was opened on 23-6-2021 at 5.00pm and closed on 26-6-2021 at 5.00pm. There was a good response from the faculty and research scholars and a total 266 registrations from the participants across the country and overseas. There was 1 faculty member from Saudi Arabia. The total number of participants were limited to 250 members in Microsoft Teams after short listing process is done based on first cum first serve.

Registration link: <https://forms.gle/tN7yC3WGaJaQGCWE9>

Registration Fee: Free

Registration Deadline: 26-06-2021

Details of Resource Persons:

DEPARTMENT OF MECHANICAL ENGINEERING

One Week online Faculty Development Programme on

“Emerging Trends in Thermal and Renewable Energy Systems”

from 28th June 2021 to 2nd July 2021 ; Timings 5PM to 7PM.

Name of the Resource Person	Designation and Institute
Dr.M.V.Rane	Professor and In-charge Heat Pump Laboratory, Department of Mechanical Engineering Indian Institute of Technology, Bombay
Dr. S.V.Kota Reddy	Vice-Chancellor and Professor Department of Mechanical Engineering Vellore Institute of Technology, Amaravati Campus, A.P
Dr. E.Anil Kumar	Professor and Dean Consultancy Department of Mechanical Engineering Indian Institute of Technology, Tirupati
Dr. T.Srinivas	Associate Professor Department of Mechanical Engineering National Institute of Technology, Jalandhar
Dr. M.Pulla Rao	Assistant Professor Department of Mechanical Engineering Indian Institute of Information Technology Design and Manufacturing, Kurnool
Dr. B.Ashok	Associate Professor Department of Mechanical Engineering Vellore Institute of Technology, Vellore

Inauguration Function: The inauguration function of the FDP started on 28-06-2021 at 5PM, with the welcome address by the Convener, Dr.S.Pichi Reddy, Professor & HoD, Department of Mechanical Engineering followed by the key note address by the distinguished guest and resource person, Dr.M.V.Rane, Professor, Department of Mechanical Engineering, Indian Institute of Technology, Bombay. The inaugural function concluded at 5.20PM. The session on day-1 started with Dr.M.V.Rane on Multi utility heat pumps. There were total 6 sessions conducted and the details are as given below.

Table 1: Details of Resource Persons and topic delivered

Dates	Name of the Resource Person	Topic Covered
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28.6.2021	Prof.M.V.Rane, Indian Institute of Technology, Bombay. Topic Delivered: Multi Utility Pumps
29.6.2021	Dr.E.Anil Kumar, IIT Tirupati Topic Delivered: Hydrogen based energy conversion and storage systems
30.6.2021	Dr. T.Srinivas, NIT Jalandhar Topic Delivered: Thermal Poly-generation
1.7.2021	Dr.B.Ashok, VIT, Vellore Topic Delivered: Role of electronics in modern engine control applications
2.7.2021	Dr.M.Pulla Rao, IIITDM, Kurnool. Topic Delivered: Thermal management of electronics using impinging jets
2.7.2021	Dr.S.V.K.Reddy, Vice-Chancellor, VIT, Amaravati Campus, A.P. Topic Delivered: Desicant based Humidification/Dehumidification systems.

Outline of the topics covered in FDP

Multi utility heat pumps application for domestic, commercial and industrial applications, energy conservation using renewable energy sources, plastic solar panels, sorption cooling systems development of hybrid cooling systems.

Hydrogen based energy conversion and storage technologies, challenges, energy crisis, requirements of energy storage, methods, different methods of hydrogen storage, metal hydride hydrogen storage systems.

Thermal poly generation models, integration, modeling, development of poly generation systems for a thermal power plant, refrigeration and air conditioning, thermodynamic cycles

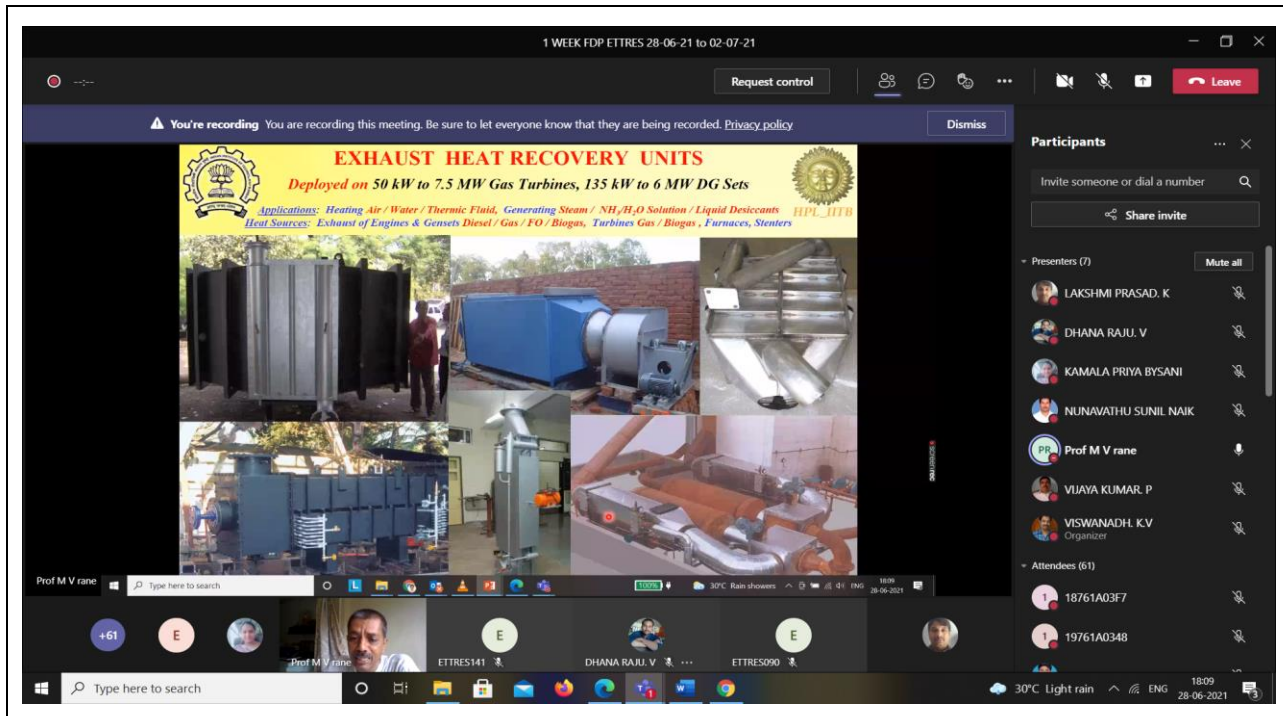
Modern IC engine control using electronics, different methods, engine electronics, integration of electronics in engine, engine control system/algorithms

Desiccant based systems, liquid and solid desiccants, humidification and dehumidification, cross flow humidification systems, case studies with experiments

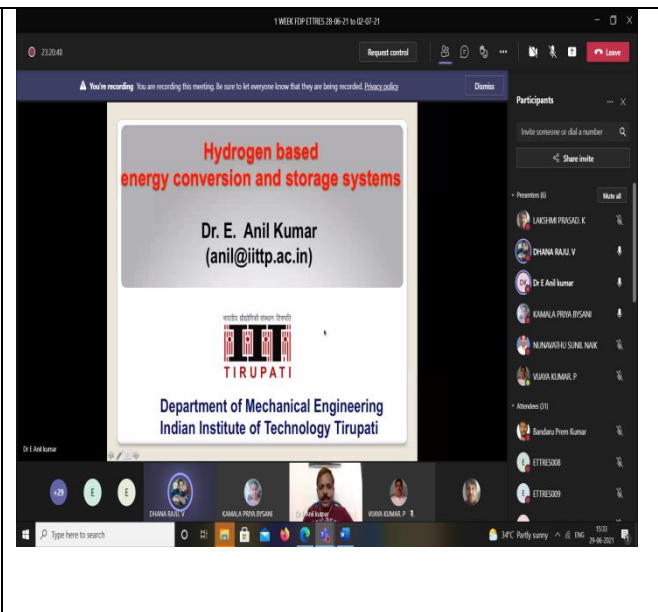
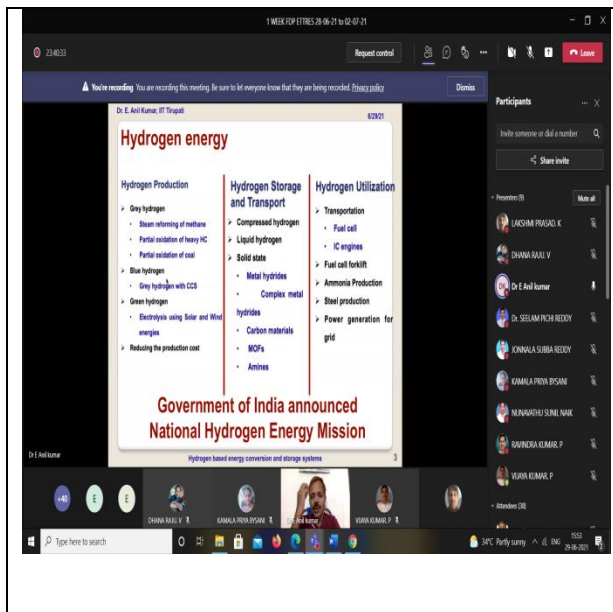
Day-1: 28-06-2021, Prof.M.V.Rane, IIT, Bombay

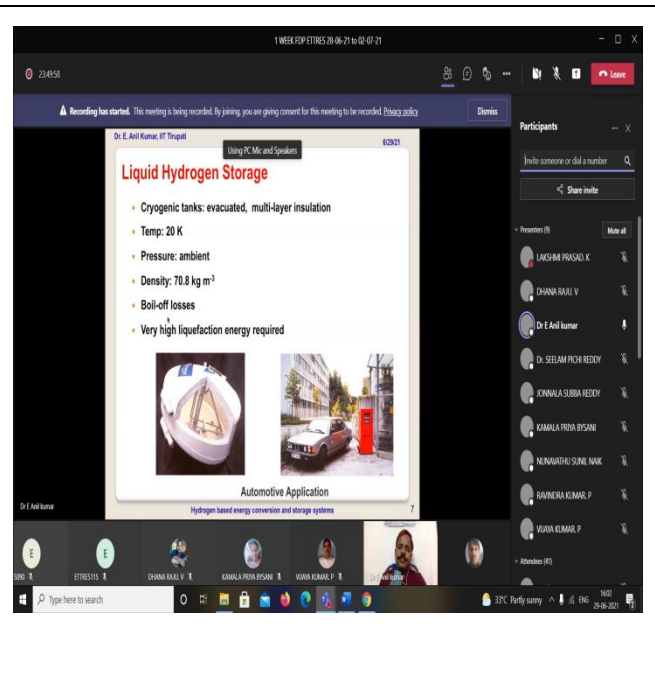
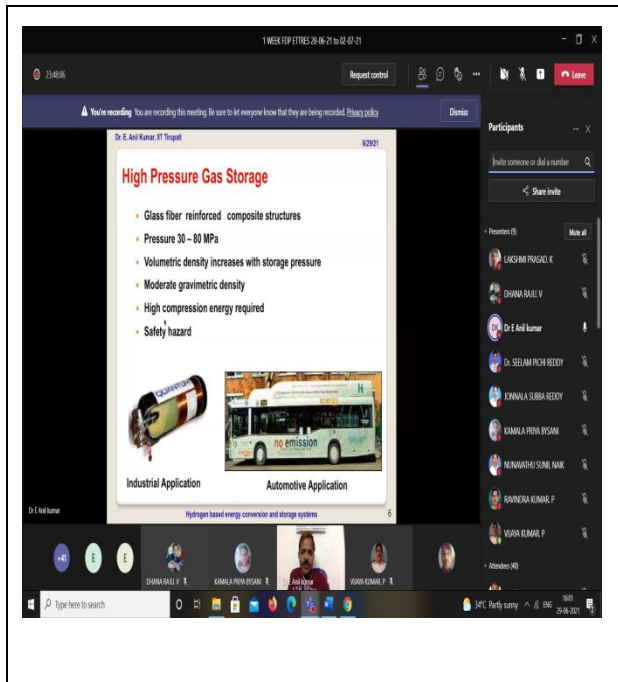
The figure consists of four screenshots from a Zoom meeting, arranged in a 2x2 grid. Each screenshot shows a different slide from a presentation by Prof. M. V. Rane, IIT Bombay.

- Top-Left Screenshot:** Shows a slide titled "MULTI UTILITY HEAT PUMPS". The text on the slide includes: "Some Technologies Developed at the Heat Pump Laboratory at IIT Bombay, IITB", "Indian Patents Filed 33 (as Owner - 11, applicant/working grant - 1 being received)", "Several Technologies Developed / Transferred / Licensed / Commercialized", and "Mihir V Rane, PhD, Professor and Energy Technology Consultant, Heat Pump Laboratory, IITB, Department of Mechanical Engineering, Indian Institute of Technology Bombay, Mumbai 400 076, INDIA".
- Top-Right Screenshot:** Shows a slide titled "MULTI UTILITY HEAT PUMPS" with the same text as the top-left screenshot.
- Bottom-Left Screenshot:** Shows a slide titled "MULTI UTILITY HEAT PUMP" with the text: "Commissioned in Mar-2017", "Retrofitting an 11 TR 6-in-1 Heat Pump for Various Applications at NERL/NTPC", and "Heat Exchanger: Water 2000 L @ 40°C for Cooling + 80 Water 200 L @ 40°C for Cooling + Blended Fresh Air @ 11 TR @ 40°C for Space Heating in Winter". It also includes "Cooling Capacity: Dehumidified Fresh Air to Maintain Indoor @ 27°C @ 40% RH in Summer and Minimum + Potable Water 150 L @ 15 in 40°C for Drinking + 1000 L Refrigerated Cabinet Maintained at 10 in 15°C for Processing Fresh Fruits, Vegetables, Milk, etc.", "Operating Cost Saving: 1500 2.85 Lac/year 300 days operation Payback @ 20% Cost of 0.875 Lac, <- 3 year for Solar Option", and "Cost of 6-in-1 HPCU: 1500 1.15 Lac./month Payback @ 20% Cost of 0.875 Lac, <- 3 year for Solar Option". Below the text are two photographs: one of a large industrial heat pump unit and another of a laboratory setting.
- Bottom-Right Screenshot:** Shows a slide titled "SORPTION REFRIGERATION SYSTEMS" with the text: "Direct Air Conditioners, Energy Efficient AC using Liquid Desiccant, Shipboard Chilling System, Engine Exhaust used in Chilled Water, Liquid Desiccant based Solar Water-Cooled Heat Pump, AC + Potable Water + Hot Water". Below the text is a photograph of a laboratory setup for a sorption refrigeration system.

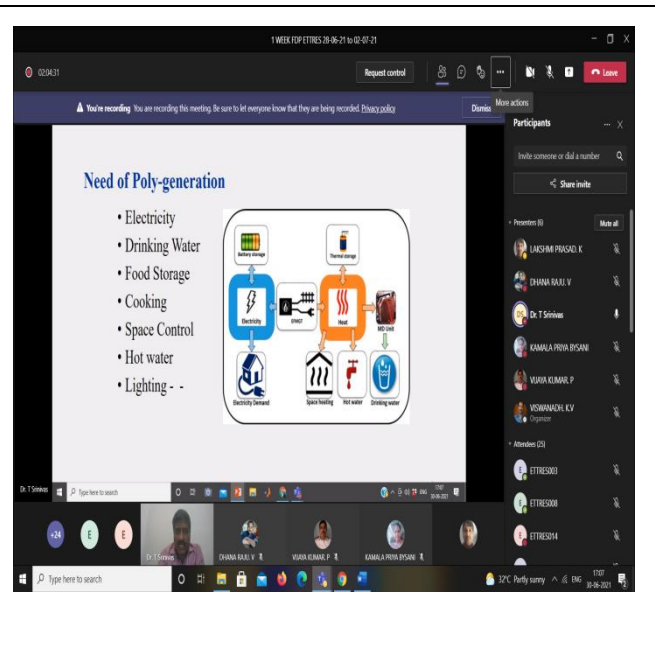
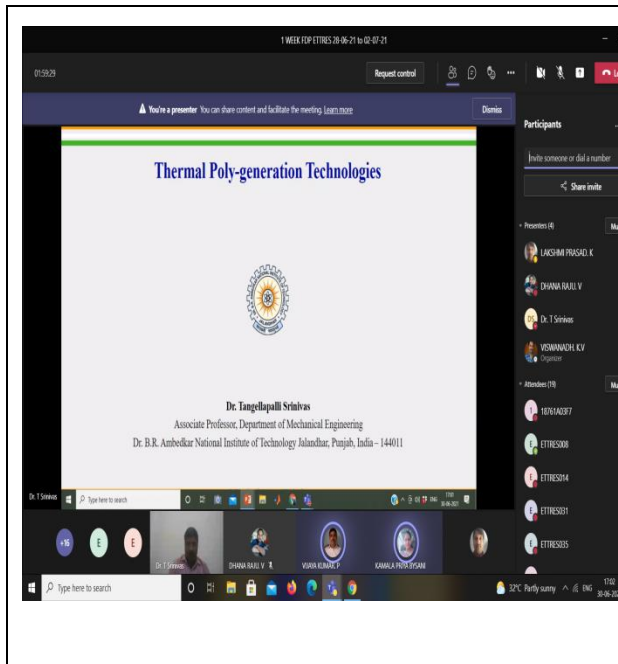


Day-2: 29-06-2021, Dr.E.Anil Kumar, IIT, Tirupati





Day-3: 30-06-2021, Dr.T.Srinivas, NIT, Jalandhar



Integrated Approach

The diagram shows a cycle between three sectors: Energy (top), Water (left), and Food (right). Arrows indicate interdependencies:

- Water is needed to cool power plants.
- Energy is needed to extract, heat, and distribute drinking water.
- Agricultural land is needed to grow energy crops, such as bioethanol.
- Energy is needed for crop irrigation and food processing.
- Water is needed to grow food.
- Land use decisions impact water.

Some of the Elements of the Poly-generation

- Power generation (steam, ORC, OFC, KC, Fuel cell etc).
- Cooling (VCR, VAR, Ejector etc.)
- Process heat
- Desalination (any suitable desalination such as HDH, RO etc.)
- Source (Gasification, firing, solar thermal, PV, PVT, heat recovery etc).

The slide also features a 3D bar chart showing energy sources: WOOD, CHP, and SOLAR.

Day-4: 1-07-2021, Dr.B.Ashok, VIT, Vellore

PCM based bandage for heat treatment

Influences on technology development

Technology developments are characterized by:

- customer requirements (e.g. emission, image)
- legislation (e.g. environmental and safety demands)
- manufacturer and supplier (e.g. operational benefit, sales volume)

The fulfillment of demands concerning function, weight and economy is decisive for the success of new technologies under compliance of legal regulations.

PCM for Medical application in orthopaedic device

Influences on technology development

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ONE WEEK ONLINE FDP ON "EMERGING TRENDS IN THERMAL AND RENEWABLE ENERGY SYSTEMS" from 28-06-2021 to 02-07-2021

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Engine Electronics

The ECU/ECU receives engine operating parameters from a sensor and controls the amount of fuel and start of injection timing through actuators to maximize power and efficiency and minimize emissions

Engine Control Unit

MCU

Prof B Ashok OMSIC VIT

ONE WEEK ONLINE FDP ON "EMERGING TRENDS IN THERMAL AND RENEWABLE ENERGY SYSTEMS" from 28-06-2021 to 02-07-2021

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Engine Control System/algorithm

Based on a certain torque reference structure, which coordinates torque demands originating from the driver, engine management functions and external subsystems like the cruise control system, etc.

The coordinated overall torque reference value is realized by the control signal to different actuators through the EMS control system, which comprised of a large number of control modules (control loops) in its architecture.

Basic Control Modules in ECU

- Torque Control Module
- Electronic Throttle control
- AFR control
- Idle speed control
- Ignition control
- Turbocharger Control
- Knock Control, etc.

Day-5: 2-07-2021 Session-1, Dr.M.Pulla Rao, IITDM , Kurnool

1 WEEK FDP ETRES 28-06-21 to 02-07-21

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THERMAL MANAGEMENT OF ELECTRONICS - USING IMPINGING JETS

A talk by:

Dr. Muvvula Pullarao
Assistant Professor

Department of Mechanical Engineering,
IITDM Kurnool,
Kurnool, Andhra Pradesh

1 WEEK FDP ETRES 28-06-21 to 02-07-21

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Major Causes of Electronic Failures

Cause	Percentage
Temperature	55%
Humidity	19%
Vibration	20%
Dust	6%

Remel, M. 1990
Source: U.S. Air Force Avionics Integrity Program

1 WEEK FDP ETTR25 28-06-21 to 02-07-21

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Participants

Invite someone or dial a number

Share invite

Presenters (5)

Make all

LAKSHMI PRASAD, K

CHANDRA RAJU, V

Dr. M. Pulla Rao

VARSHA KUMAR, P

YOSHINAKHI, K.V

Organizer

Attendees (18)

ETTR2503

On hold

ETTR2508

ETTR2509

ETTR2514

ETTR2517

Dr. M. Pulla Rao

Dr. Manohar Paluram

ETTR2501

YOSHINAKHI, K.V

CHANDRA RAJU, V

Dr. M. Pulla Rao

Type here to search

29°C Haze

02-07-2021

1 WEEK FDP ETTR25 28-06-21 to 02-07-21

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ETTR2508

ETTR2509

ETTR2514

ETTR2517

Dr. M. Pulla Rao

Dr. Manohar Paluram

ETTR2501

CHANDRA RAJU, V

YOSHINAKHI, K.V

Dr. M. Pulla Rao

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02-07-2021

Day-5: 2-07-2021 Session-2

Dr.S.V.K.Reddy, VIT, Vellore

1 WEEK FDP ETTR25 28-06-21 to 02-07-21

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CHANDRA RAJU, V

Dr. S.V.K.Reddy

MUNIVARTHA SUNEEL, NAVEK

RAVINEERA KUMAR, P

VARSHA KUMAR, P

YOSHINAKHI, K.V

Organizer

Attendees (18)

ETTR2501

ETTR2508

Dr. S.V.K.Reddy

VIT-AP UNIVERSITY

Humidification and Dehumidification Systems

Presented by

Dr. S.V. Kota Reddy

Professor & Vice Chancellor

VIT-AP University

Andhra Pradesh, India PO 522237

Email:vc@vitap.ac.in

Type here to search

29°C Haze

02-07-2021

1 WEEK FDP ETTR25 28-06-21 to 02-07-21

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Dr. S.V.K.Reddy

MUNIVARTHA SUNEEL, NAVEK

RAVINEERA KUMAR, P

VARSHA KUMAR, P

YOSHINAKHI, K.V

Organizer

Attendees (18)

ETTR2501

ETTR2508

Dr. S.V.K.Reddy

VIT-AP UNIVERSITY

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29°C Haze

02-07-2021

1 WEEK FDP ETRES28-06-21 to 02-07-21

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Presenters (1) Meet all

LAKSHMI PRASAD, K

CHANA RAJU, V

Dr. M. Pulla Rao

MUNNATHU SUNIL NAIK

RAVINDRA KUMAR, P

VISHA KUMAR, P On hold

VEDRANATH, KV Organiser

Attendees (4)

ETRES203

(a) Single nozzle (b) Four nozzles (c) Nine nozzles

Figure 11: Photographs of the orifice plates used in the study

Dr. M. Pulla Rao

Dr. M. Pulla Rao

ETRES203

CHANA RAJU, V

VEDRANATH, KV

Dr. M. Pulla Rao

ETRES203

28°C Hyderabad ENG 02-07-2021

1 WEEK FDP ETRES28-06-21 to 02-07-21

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Presenters (1) Meet all

LAKSHMI PRASAD, K

CHANA RAJU, V

Dr. S.V.K Reddy

MUNNATHU SUNIL NAIK

RAVINDRA KUMAR, P

VISHA KUMAR, P

VEDRANATH, KV Organiser

Attendees (5)

Dr. SEELAM PICH REDDY

ETRES201

Introduction

Figure.1: Window AC

Figure.2: Split AC

Limitations of VCR based AC unit:

1. High energy consumption
2. Pollute the environment
3. Problem of leakages

Dr. S.V.K Reddy

Dr. S.V.K Reddy

ETRES203

CHANA RAJU, V

VISHA KUMAR, P

Dr. S.V.K Reddy

ETRES201

28°C Hyderabad ENG 02-07-2021

1 WEEK FDP ETRES28-06-21 to 02-07-21

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CHANA RAJU, V

Dr. S.V.K Reddy

Dr. SEELAM PICH REDDY

MUNNATHU SUNIL NAIK

RAVINDRA KUMAR, P

VISHA KUMAR, P

VEDRANATH, KV Organiser

Attendees (5)

ETRES201

Cross Flow Humidifier

Figure 13: Schematic sketch of cross flow humidifier

Figure 14: Experimental set up the cross flow humidification system

Dr. S.V.K Reddy

Dr. S.V.K Reddy

ETRES203

CHANA RAJU, V

VISHA KUMAR, P

Dr. S.V.K Reddy

ETRES201

28°C Hyderabad ENG 02-07-2021

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Dr. SEELAM PICH REDDY

MUNNATHU SUNIL NAIK

RAVINDRA KUMAR, P

VISHA KUMAR, P

VEDRANATH, KV Organiser

Attendees (5)

ETRES201

Figure 21: Humidification or dehumidification system

Dr. S.V.K Reddy

Dr. S.V.K Reddy

ETRES203

CHANA RAJU, V

VISHA KUMAR, P

Dr. S.V.K Reddy

ETRES201

28°C Hyderabad ENG 02-07-2021



DEPARTMENT OF MECHANICAL ENGINEERING

One Week online Faculty Development Programme on

“Emerging Trends in Thermal and Renewable Energy Systems”

from 28th June 2021 to 2nd July 2021 ; Timings 5PM to 7PM.

Program Objective: To impart the knowledge of emerging trends and research in the area of thermal and renewable energy systems happening around the globe.

Program Outcomes: The participants able to

1. Understand the importance of developing the thermo-economic thermal and renewable energy systems
2. Comprehend the variety of thermal and renewable energy storage systems
3. Identify the novel thermal poly-generation systems
4. Know the role electronics in modern engine control applications.
5. Apply the jet impingement methods for electronic cooling.
6. Develop the Desiccant Humidification and Dehumidification systems, cross flow humidifier

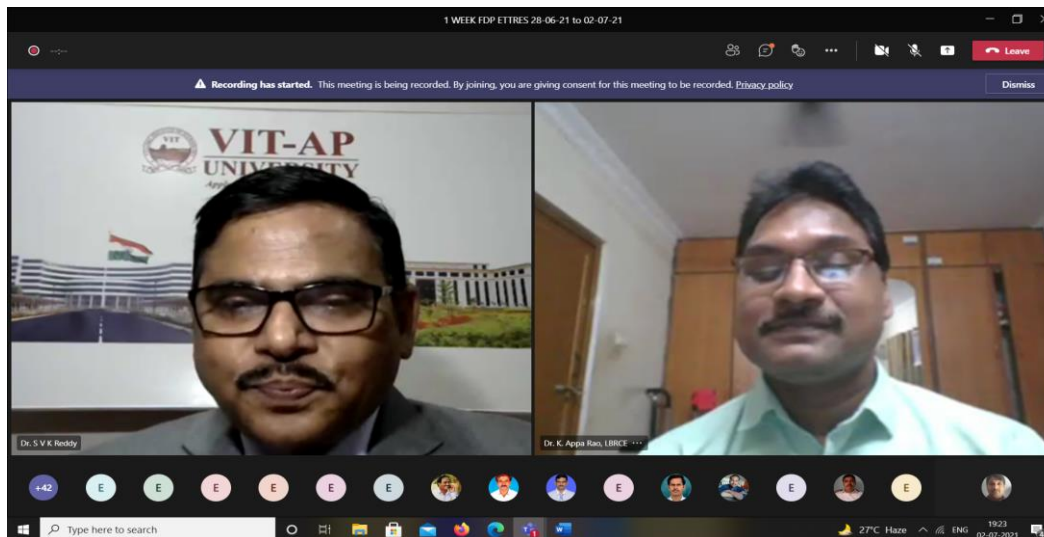
COORDINATORS

1.Dr.P.Vijay Kumar **2.Dr.V.Dhanaraju**
Professor Assoc.Professor

CONVENER

Dr.S.Pichi Redd
Professor and Head

Valedictory Function Images, Conversation of Dr.K.AppaRao, Principal and Dr.S.V.K.Reddy, Vice-Chancellor, VIT, Amaravati Campus, A.P.



One Week online Faculty Development Program on
**EMERGING TRENDS IN THERMAL AND RENEWABLE ENERGY
SYSTEMS**

(28 June - 02 July 2021)

**WELCOME TO
Resource Persons and
Participants**

Dr. P. Vijaya Kumar
Dr. V. Dhanaraju
(Co-ordinators)

Dr. S.Pichi Reddy
(Convenor)

Dr. K.Appa Rao
(Principal)



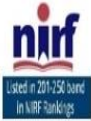
**DEPARTMENT OF MECHANICAL ENGINEERING
LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**

(Autonomous)

Accredited by NAAC & NBA (CSE,IT, EEE,ECE & ME)

Approved by AICTE, New Delhi & Affiliated by JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram, Andhra Pradesh 521230



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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DEPARTMENT OF MECHANICAL ENGINEERING

**Five Day online Faculty Development Programme on
Emerging Trends in Thermal and Renewable Energy Systems**

28th June – 2nd July 2021

Programme Schedule

S.No	Day	Date & Time	Resource Person	Topic to be delivered
DAY-1				
1	MONDAY	28-06-2021 5PM - 6.30PM	Dr. M.V.Rane, Professor of Mechanical Engineering, Indian Institute of Technology, Bombay.	Multi utility heat pumps
DAY-2				
2	TUESDAY	29-06-2021 5PM - 6.30PM	Dr. E.Anil Kumar, Professor Department of Mechanical Engineering, Indian Institute of Technology, Tirupathi.	Hydrogen based energy conversion and storage systems
DAY-3				
3	WEDNESDAY	30-06-2021 5PM - 6.30PM	Dr. T.Srinivas, Associate Professor Department of Mechanical Engineering, National Institute of Technology, Jalandhar.	Thermal Poly generation
DAY-4				

4	THURSDAY	01-07-2021 4PM -5PM	Dr. B.Ashok, Associate Professor Department of Mechanical Engineering, Vellore Institute of Technology, Vellore.	Role of electronics in modern engine control application
DAY-5				
5	FRIDAY	02-07-2021 5PM -6PM	Dr.M.Pulla Rao, Assistant Professor Department of Mechanical Engineering, Indian Institute of Information Technology Design and Manufacturing, Kurnool.	Thermal management of electronics using impinging jets
6	FRIDAY	02-07-2021 6PM -7PM	Dr. S.V.K.Reddy, Vice-Chancellor, VIT Amaravathi Campus, A.P and Professor in Mechanical Engineering	Dessicant humidification/dehu midification systems

About the Institute & Department

The Lakireddy Bali Reddy College of Engineering (LBRCE) was established in the year 1998 by Er. Lakireddy Bali Reddy garu. The institute is established with the sole aim of providing high quality educational opportunities in the field of science, engineering, technology and management. It is approved by AICTE, affiliated to JNTUK, Kakinada and attained autonomous status in the year 2010. It attained NAAC accreditation. The institute is certified by ISO: 9001-2015. The Department of Mechanical Engineering was started in the year 1998. The Department is accredited by NBA (Tier-I). The Dept. is recognized as a Research centre by JNTUK Kakinada.

About the FDP

The present challenges for the researchers looking at the ever growing energy demand to develop efficient thermal and renewable systems with thermo-economic and energy conservation consciousness. The objective of this FDP is to address the above mentioned objectives and provide solutions in terms of expert deliberations by eminent speakers on the advancements in thermal and renewable energy systems covering all the latest research works happening in this area.

Registration and Fee Particulars:

<https://forms.gle/tN7yC3WGajJaOGCWE9>

Registration and Fee Particulars:

> There is **no registration fee**

Important Dates:

> Submission of Application: **26/06/2021**

> Confirmation: **27/06/2021**

The selected candidates will be intimated through email only.

All the sessions are conducted online through **Microsoft Teams App**.

E-certificate will be given to the participants that satisfy the criteria set by the organising committee

COMMITTEE MEMBERS

Chief Patrons:

1. **Er. Lakireddy Bali Reddy**, Chairman
2. **Sri L. Jaya Prakash Reddy**, Co-Chairman
3. **Sri L.R.N.K. Prasad Reddy**, Vice-Chairman

Patrons:

1. **Sri G. Srinivasa Reddy**, President
2. **Er. K. Thimma Reddy**, Director Infra
3. **Dr. K. Appa Rao**, Professor & Principal
4. **Dr. K. Haranadha Reddy**, Prof. & Vice-Principal

Convener:

Dr. S.Pichi Reddy, Professor & HOD

Coordinators:

1. **Dr. P. Vijaya Kumar**, Professor
2. **Dr. V.Dhana Raju**, Associate Professor

Co-Coordinator:

1. **Dr.N.Sunil Naik**, Associate Professor
2. **Mr.K.V.Viswanadh**, Sr.Asst Professor
3. **Mr.K.Lakshmi Prasad**, Asst Professor

Resource persons:

1. **Prof. M.V.Rane**, IIT Bombay
2. **Dr.E.Anil Kumar**, IIT, Tirupathi
3. **Dr.T.Srinivasa**, NIT, Jalandhar,
4. **Dr.M.Pulla Rao**, IIITDM, Kurnool.
5. **Dr.B.Ashok**, VIT, Vellore

Contact Person(s):

1. **Dr. P.Vijaya Kumar**, Professor, ME
pjoc2013@gmail.com, Cell **9381245195**
2. **Dr. V.Dhanaraju**, Assoc. Professor, ME
ghanaraju1984@gmail.com, Cell 9848363670

ONE WEEK ONLINE FACULTY DEVELOPMENT PROGRAM ON

EMERGING TRENDS IN THERMAL AND RENEWABLE ENERGY SYSTEMS

(28 June - 2 July 2021)



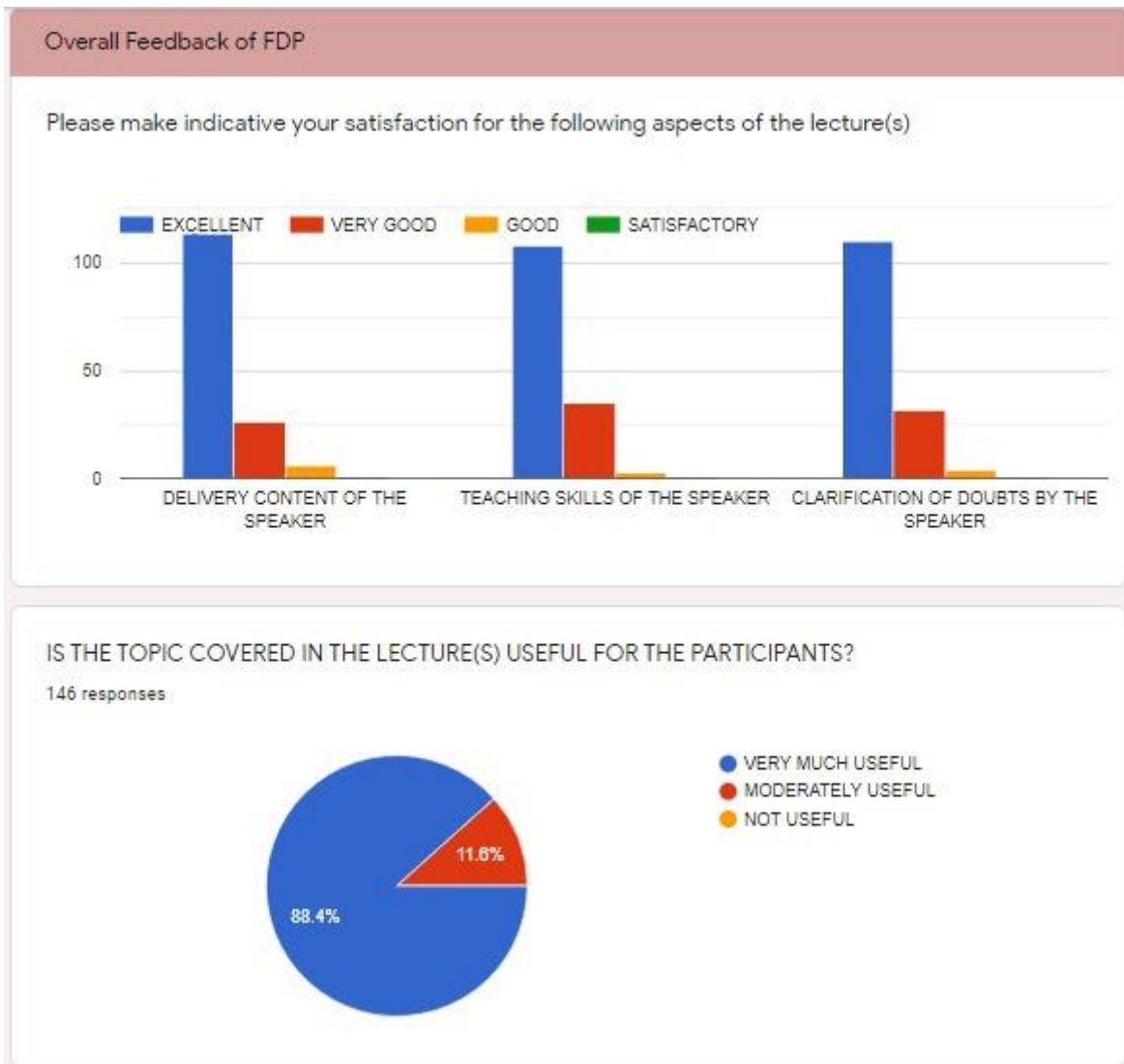
FDP Timings: Evening 5 PM-7 PM

Organized by

DEPARTMENT OF MECHANICAL ENGINEERING LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (A)

(Accredited by NAAC & NBA (CSE,IT,ECE,EEE, MECH), ISO 9001:2015 Certified Institution Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P. 521 236.

The overall Feedback of FDP” EMERGING TRENDS IN THERMAL AND RENEWABLE ENERGY SYSTEMS”



S. S. S. S.
HEAD
Dept of Mechanical Engineering
LAKIREDDY BALI REDDY COLLEGE OF ENGG
MYLAVARAM - 521 230, Krishna Dt., A.P.

HoD