



MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE (UGC-AUTONOMOUS)

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Report Guest-Lecture on "Rule-based Approach for Peak Shaving with Energy Storage" Organised by Department of Electrical & Electronics Engineering

Date: 02.11.2023

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS INSTITUTION)
Madanapalle-517325, Annamayya Dist., Andhra Pradesh

In association with
IEEE **AICTE** **NBA** **JNTUA** **ISTE** **TUV** **nirf**

Organized by Department of Electrical and Electronics Engineering
"Rule based Approach for Peak Shaving with Energy Storage"

Resource person
Dr. R Manoj Kumar
Assistant Professor, BVRIT Hyderabad.

Date: 02/11/2023 Time: 2.00 PM to 4.00 PM

Chief Patron: Dr. N. Vijaya Bhaskar Choudary, Ph.D., Secretary & Correspondent
Patron: Mrs. Keerthi Nadella, Executive Director
Chief Chair: Dr. C. Yuvraj, Principal
Conveners: Dr. Kamal Basha, Vice Principal, Administration; Dr. A. V. Pavan Kumar, HOD EEE, Professor.
Coordinator: Dr. Gumpu Sreenivasulu, Assistant Professor, EEE Department.

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Organized in association with: IEEE and ISTE student chapters, MITS Madanapalle.

Submitted by: Dr. Gumpu Srinivasulu, Assistant Professor, Dept. of EEE.

Attendance: 36 students and 4 faculty

The programme is started at 3.00 PM with a welcome address to all the audience by the **Dr. A V Pavan Kumar**, H.O.D, EEE, MITS, Madanapalle. The resource person **Dr. Manoj Kumar Rampelli Assistant Professor in EEE Department at BVRIT HYDERABAD College of Engineering (Women), India**, was introduced by **Dr. Gumpu Srinivasulu**, Assistant Professor, Dept. of EEE.

The resource person started the session by extending his hearty thanks to the participants, IEEE coordinators, executive members, HoD, Principal and Management of MITS Madanapalle for giving him opportunity to share his knowledge and experience in “**Rule-based Approach for Peak Shaving with Energy Storage**”.

The resource person highlighted the various types of peak shaving methods. Also, he focused on the various challenges in the implementation of these methods in real time. Besides, the growth in market and opportunities in the renewable energy sector are being discussed during the session. The distinguished speaker discussed various peak shaving models. During the session, the major opportunities, power converters and controllers design are being focused by the speaker. Besides, the prominent resource person pointed that there are huge number of opportunities for the engineering graduates in recent decades. Moreover, possibilities and innovations in energy sector are being highlighted during the session. At the end, the prominent speaker underlined the career opportunities for graduates. Also, speaker assured to help the participants/students for any kind of research guidance.

The session was concluded followed by a vote of thanks, given by Dr. Gumpu Srinivasulu, Assistant Professor, Department of EEE (IEEE and ISTE Coordinator) MITS, Madanapalle.



Photos:

The screenshots show a Zoom meeting with three presentations from Vishnu Institute of Technology & Science. The presentations cover distributed energy sources, energy management systems, and battery energy storage systems for peak shaving.

Distributed Energy Sources

Main Benefits of Renewable Energy Sources

- Environment friendly
- Defers new power plants installations and transmission lines extensions
- Power supply during emergency conditions.

Due to these benefits as well as the decrease in the tariff of solar and wind energy, there is a continuous growth in the use of PV and wind power sources in low voltage distribution systems.

Solar and PV energy tariff

Source	Value
Coal	105.98
Gas	6.02
Oil	28.824
Nuclear	0.312
Hydro	0.78
Wind	46.85
Solar	51.809
Wind	11.843
Small hydro	4.923
Biomass/ethanol	10.203
Waste to energy	0.703

Installed capacity in GW in India till Oct, 2022

Energy Management

Energy management is used to effectively coordinate energy sharing among the different energy sources while supplying required amount of load in the system.

Load sharing by different energy resources

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    graph TD
      PV[Wind system] --- Bus1[dc bus]
      BESS[BESS] --- Bus1
      Bus1 --- Bus2[ac bus]
      Bus2 --- Grid[Grid]
      Bus2 --- Bus3[ac bus]
      Bus3 --- DC[dc load]
      Bus3 --- AC[ac load]
  
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Optimal Rule-based Peak Shaving with Demand and Feed-in Limits Using Battery Energy Storage System

Simulation Results

- Case 1: More PV energy availability**
 - Only PV source is used to charge battery.
 - Grid demand is limited to 1.72 kW and the feed-in power is limited to 0.05 kW.
- Case 2: Less PV energy availability**
 - Both PV and utility grid are used to charge battery.
 - Grid demand is limited to 2.44 kW.

Energy Consumption Cost, Worst Maximum, and Minimum Bus Voltages

Parameter	Case 1		Case 2	
	without BESS	Proposed	without BESS	Proposed
TECC (INR/day)	162.35	140.57	217.26	209.78
V _{max} (p.u.)	1.01	1	1	1
V _{min} (p.u.)		0.94		0.96



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Signature of the Coordinator

Signature of HoD, EEE