



**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE  
(UGC-AUTONOMOUS)**

Affiliated to JNTUA, Anantapuramu & Approved by AICTE, New Delhi  
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**Report on**  
**One-week Short Term Course Program**  
**On**  
**“Big Data Analytics for Smart Grid”**  
**Organised by**  
**Department of Electrical & Electronics Engineering**  
**In Association with ISTE Chapter, MITS**  
**Date: 12.02.2024 to 16.02.2024**  
**Time: 9:30 AM – 4:30 PM**  
**Venue: EEE-Department Library WB114**

**Organized in association with: Electrical Engineering Department, NITTTR Chandigarh**

**Submitted by: Mr. Saravanan D, Assistant Professor, Dept. of EEE**

**Course Coordinator: Dr. Ritula Thakur, Associate Professor, Electrical Engineering Department, NITTTR Chandigarh**

**Remote Centre Program Convener: Dr. A V Pavan Kumar**

**Remote Centre Program Coordinator: Mr. Saravanan D**

**Remote Centre Program Co-Coordinator: Dr. Balaji Damodhar T S**

**Faculty attended:**

1. Dr. A V PAVAN KUMAR
2. Dr. K. ARUL KUMAR
3. Dr. LAKSHMIKHANDAN K
4. Dr. BALAJI DAMODHAR T S
5. Dr. V B THURAI RAAJ
6. Mr. CHODAGAM SRINIVAS
7. Mr. SARAVANAN D
8. Mr. BONDU VIJAYAKUMAR
9. Mr. EJJIROTU RAGHU BABU
10. Mr. VENKATESH M
11. Mr. RAMESH KUMAR R
12. Mr. RAJESH K S
13. Mr. IBRAHIM ZAFAR
14. Ms. REVATHY GOPINATH
15. Ms. KODURI REVATHI
16. Mr. ANANDH NAGARAJAN
17. Mr. YANUMULA RAMANJEYULU
18. Mr. SHAHENSHAH SYED

**Faculties Attended: 18**

**Venue: WB114-EEE Dept. Library**



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## “Big Data Analytics for Smart Grid”

*TIME-TABLE 12.02.2024 to 16.02.2024*

<b>DAY &amp; DATE</b>	<b>Live Session - 1 9.30 AM to 11. 00 AM</b>	<b>Live Session - 2 11.30 AM to 1.00 PM</b>	<b>Live Session - 3 2.30 PM to 4.00 PM</b>
<b>Monday 28/08/2023</b>	Introduction Smart Grid (Dr. Ritula Thakur, NITTTR Chandigarh)	Fundamentals of AI and Machine Learning (Dr. Maitreyee Dutta, NITTTR Chandigarh)	Basics of Data Science and Analysis (Dr. Jagriti Saini, Founder and Owner, Eternal RESTEM, HP)
<b>Tuesday 29/08/2023</b>	Overview of Python Programming (Dr. Maitreyee Dutta, NITTTR Chandigarh)	Hands on with Data Pre-Processing and Feature Engineering using Python (Dr. Jagriti Saini, Founder and Owner, Eternal RESTEM, HP)	Exploratory Data Analysis with a Domain Specific Dataset (Dr. Jagriti Saini, Founder and Owner, Eternal RESTEM, HP)
<b>Wednesday 30/08/2023</b>	Introduction to Real Time Simulation  (Dr. Ritula Thakur, NITTTR Chandigarh)	Optimal Real Time Controller for DFIG Based WECS (Dr. Shivaji Karad, DBATU, Lonere, Maharashtra)	Challenges in Smart Grid Implementation (Dr. C.K. Chanda, Professor, EED, IEST, Shibpur)
<b>Thursday 31/08/2023</b>	Case Study on Cyber Security Attacks Dataset - EDA and ML (Dr. Jagriti Saini, Founder and Owner, Eternal RESTEM, HP)	Case Study on Malware Detection Dataset - EDA & ML (Dr. Jagriti Saini, Founder and Owner, Eternal RESTEM, HP)	Cyber Security in Smart Meters (Dr. Maitreyee Dutta, NITTTR Chandigarh)
<b>Friday 01/09/2023</b>	PMU- an Intelligent Data Collection Device in Smart Grid (Dr. Ritula Thakur, NITTTR Chandigarh)	Devices and their Applications in Smart Grid (Dr. Arvind Dhingra, Director, STPE, GNEC, Ludhiana)	Valediction and Quiz  (Dr. Ritula Thakur, NITTTR Chandigarh)



The online one-week STP was inaugurated on 12<sup>th</sup> February 2024 at 9:30 AM with a welcome address to all the audience by the **Dr. A.V. Pavan Kumar HoD**, EEE, MITS Madanapalle, and followed by inaugural address by **Dr. Ritula Thakur**, Associate Professor & Head, Electrical Engineering Department, NITTTR Chandigarh through google meet. The brief introduction about the FDP and the resource person was addressed by **Mr. Saravanan D.**

The **first session** of the FDP was delivered by **Dr. Ritula Thakur**, Associate Professor, Electrical Engineering Department, NITTTR Chandigarh on the Topic “Introduction Smart Grid”. Key components of a smart grid discussed the session as follows Advanced Metering Infrastructure (AMI), Grid Automation, Distributed Energy Resources (DERs), Demand Response, Integration of Information and Communication Technology (ICT).

Benefits of smart grids include:

- Improved reliability and resilience
- Increased energy efficiency and reduced waste through better management of electricity consumption.
- Integration of renewable energy sources, leading to a more sustainable
- Enhanced grid security and cybersecurity
- Empowerment of consumers

The second Session of the day was handled by **Dr. Maitreyee Dutta**, NITTTR Chandigarh on the topic “*Fundamentals of AI and Machine Learning*”- The session mainly encompasses a spectrum of capabilities, including learning, reasoning, perception, problem-solving, and natural language understanding. At its core, this AI aims to create systems that can mimic human cognition and perform tasks that traditionally necessitate human intellect.

Artificial Intelligence and Machine Learning are not just technological advancements; they represent a paradigm shift in how we interact with technology and perceive the capabilities of machines.

The Post Lunch session of Day 1 was handled by **Dr. Jagriti Saini**, Founder and Owner, Eternal RESTEM, HP, Research Scholar, NITTTR Chandigarh on the topic “*Basics of Data Science and Analysis*”. The session highlight the key concepts of Data Collection, Data Cleaning, Exploratory Data Analysis (EDA), Feature Engineering, Model Building, Model Evaluation, Deployment and Monitoring.

The **Day 2** of the FDP was started with the topic “*Overview of Python Programming*” by **Dr. Maitreyee Dutta**, NITTTR Chandigarh. The session went more interaction with participants and the topics discussed are Key Features of Python which are Simple and Easy to Learn, Interpreted and Interactive, Dynamic Typing, Extensive Standard Library, Cross-Platform Compatibility.

The extended features of python also discussed like Python Data Structures, Object-Oriented Programming (OOP), File Handling, Libraries and Frameworks, Community and Resources.

The second session of **Day 2** was handled by **Dr. Jagriti Saini**, Founder and Owner, Eternal RESTEM, HP, Research Scholar, NITTTR Chandigarh on the topic “*Hands on with Data Pre-Processing and Feature Engineering using Python*”. This session was a hands on training all the participants were created a account in Google-colabs, and started with working on basic



concepts of python programming. Then the inclusion of various libraries in python programming is taught. Followed by the data handling with python was addressed. How to upload a big data into platform, how to access the uploaded data, how to structure the data, like name change, inclusion, exclusion and so on. The session went with more interaction.

The post lunch session of **Day 2** was followed by the same resource person the topic “*Exploratory Data Analysis with a Domain Specific Dataset*” the coding were executed on the following topics Load the Dataset, Inspect the Data, Data Cleaning, Data Visualization, Exploring Relationships, Domain-specific Analysis, Iterative Analysis

**Day 3** Started with the topic “*Introduction to Real Time Simulation*” by **Dr. Ritula Thakur**, Associate Professor, Electrical Engineering Department, NITTTR Chandigarh. The discussion Real-time simulation which is about the computational method where a model is executed at the same rate as the actual system it represents, ensuring that the simulation evolves in synchronization with real-world events. The discussion more focused on how to connect the real world to the system and make the system to interact with the system.

After a short Tea break, **Dr. Shivaji Karad**, DBATU, Lonere, Maharashtra delivered a lecture on “*Optimal Real Time Controller for DFIG Based WECS*”. The lecture was completely on the research findings on the optimal controller design for various topologies of DFIG based WECS. The focus was more about the selection of control parameters, how to optimize the controller with dynamic inputs and how to control the output with dynamic input.

The post lunch session on day 3 was handled by **Dr. C.K. Chanda**, Professor, EED, IEST, Shibpur on the topic “*Challenges in Smart Grid Implementation*”. The lecture addresses about EVs and DGs, which can provide a number of benefits, such as reducing emissions and improving grid reliability. However, they can also introduce power quality problems, such as voltage fluctuations and harmonics. Some of the recommendations has been discussed in order to mitigate the power quality issues.

**Day 4** started with Grid “*Case Study on Cyber Security Attacks Dataset - EDA and ML*” by **Dr. Jagriti Saini**, Founder and Owner, Eternal RESTEM, HP, Research Scholar, NITTTR Chandigarh. The address started with Exploratory Data Analysis (EDA)-Load the dataset and inspect its structure, including column names, data types, and missing values and Explore the distribution of different attack types and other categorical variables. After the categorization, the Analyze temporal patterns by visualizing the frequency of attacks over time was discussed and Investigated relationships between different features, such as source/destination IP addresses, attack types, and timestamps.

Session 3 of Day 4 was addressed by **Dr. Maitreyee Dutta**, NITTTR Chandigarh on the topic “*Cyber Security in Smart Meters*”. On Topics Madam Saini discussed on some of the cyber threats to grid like, Malware Phishing, DDoS attacks, and Ransomware attacks. Also, the Cyber security measures can help to protect smart grids from cyberattacks by: Detecting and preventing cyberattacks, responding to cyberattacks, and Mitigating the impact of cyberattacks has been discussed.



“*Devices and their Applications in Smart Grid*” by **Dr. Arvind Dhingra, Director, STPE, GNEC, Ludhiana** was the resource person the first session of **Day-5**. Some of the key trends in smart grid like Smart meters, Phasor Measurement Units (PMUs), Smart Sensors and Actuators, Synchrophasors, Energy Storage Systems (ESS), Distributed Energy Resources (DERs) has been addressed.

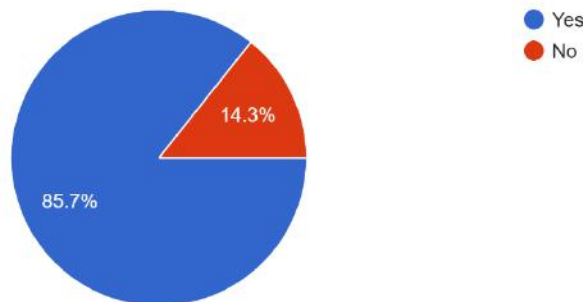
Last day session 2 was handled by **Dr. Ritula Thakur**, on the topic of “*PMU- an Intelligent Data Collection Device in Smart Grid*” The address was about the real time data collection, monitoring, fault detection and stability analysis of the grid.

In the post lunch valedictory session hosted by the coordinator and **Dr. A.V. Pavan Kumar**, HoD / EEE, MITS, Madanapalle shared his experience of the one-week FDP. Vote of Thanks delivered by **Dr. T.S. Balaji Damodhar**, who takes this opportunity to thank the NITTTR Chandigarh, MITS Management, Principal, Vice-Principal, and **Dr. Ritula Thakur** and the resource persons of various sessions and all the people who directly and indirectly involved in organizing this event. The participants submitted their valuable feedback through google form.

### Feedback Analysis:

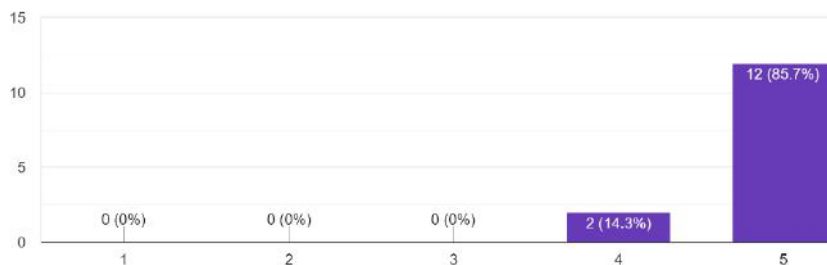
Were you aware of the course objectives before joining the course

14 responses



Rate the Relevance of the Content delivered by Experts

14 responses







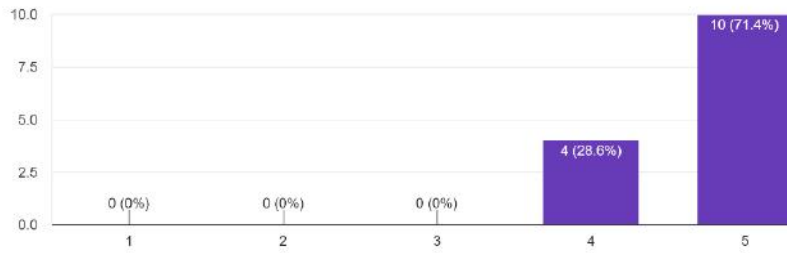
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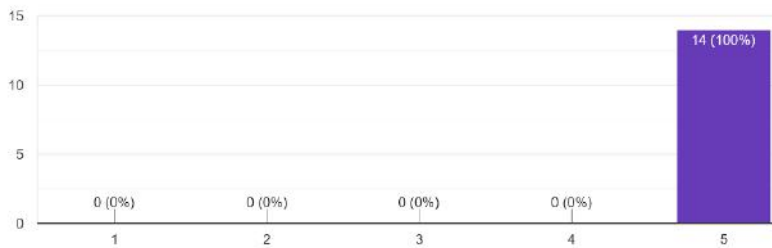
## Rate the Sequence and organization of contents

14 responses



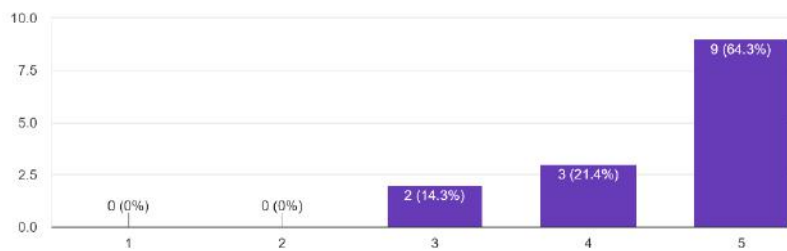
## Soft skills of the co-ordinator in handling of programme

14 responses



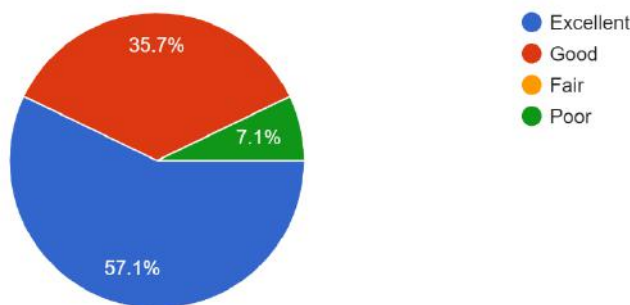
## Whether your queries are answered?

14 responses



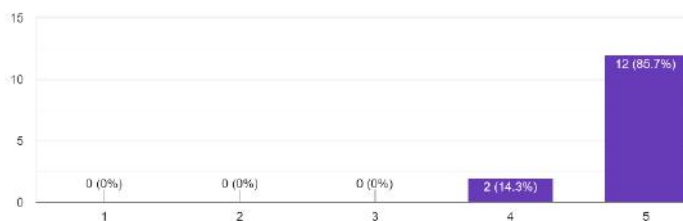
## Extent of expectations fulfilled

14 responses



## Rate the Overall arrangements of the program

14 responses



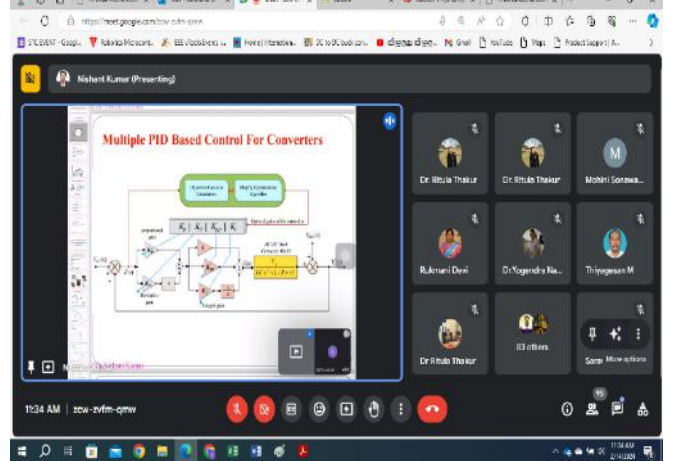
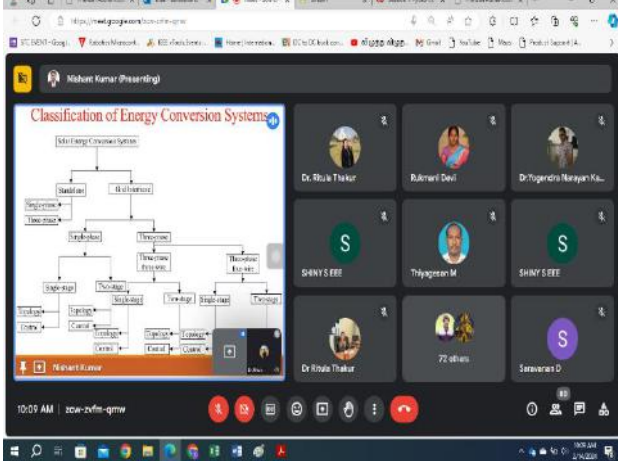
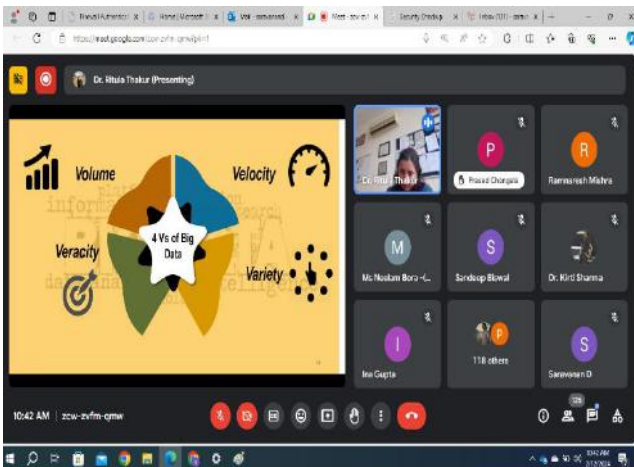


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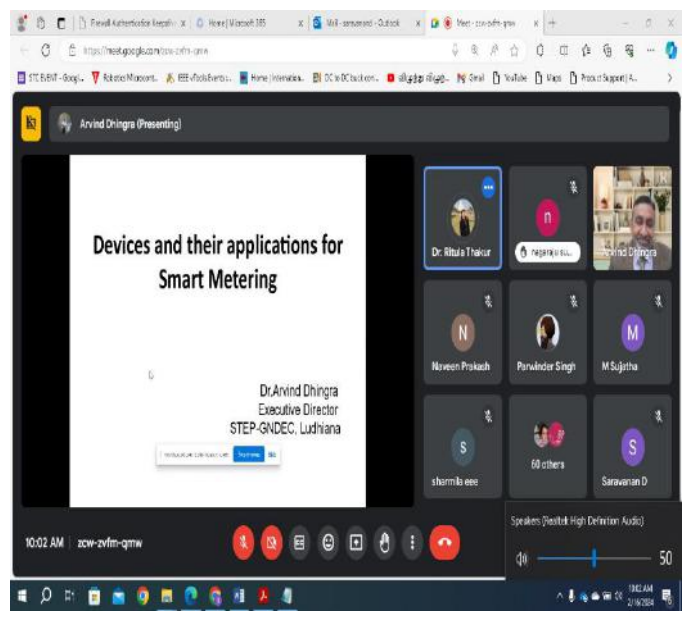
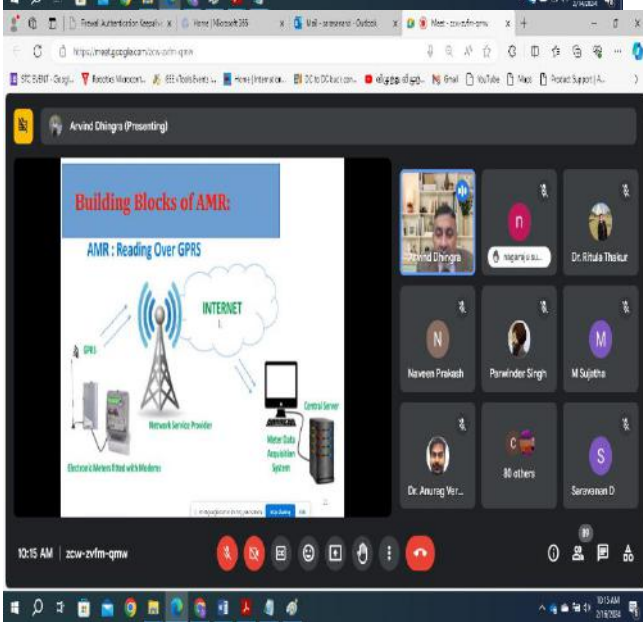
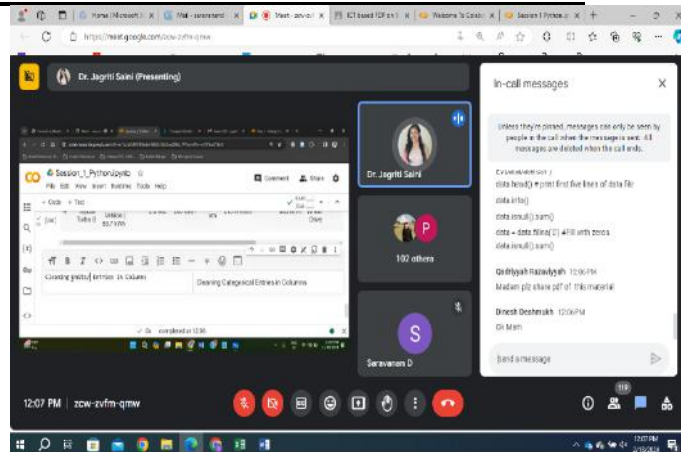
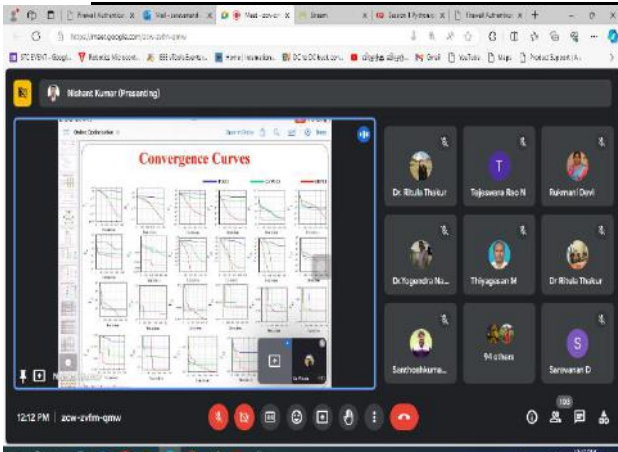
## Photos:





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We thank the MITS Management, Principal, Vice Principal (Administration), Vice Principal (Academics), for giving the opportunity to host the one Week FDP successfully.

Signature of the Coordinator

Signature of HoD, EEE