Report on
One Week Faculty Development Program
On
"Smart Grid and Integration of Distributed Generation"
Organised by
Department of Electrical & Electronics Engineering
Date: 28.08.2023 to 01.09.2023
Time: 9:30 AM – 4:30 PM
Venue: WB116

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

Submitted by: Mr. Saravanan D, Assistant Professor, Dept. of EEE
Course Coordinator: Dr. Lini Mathew, Professor & Head, 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. JAWAHAR BABU
6. Dr. V B THURAI RAAJ
7. Dr. SUMAN YADAV
8. Dr. GUMPU SREENIVASULU
9. Mr. N SRIDHAR
10. Mr. SHYAMSUNDAR N
11. Mr. CHODAGAM SRINIVAS
12. Mr. SARAVANAN D
13. Mr. G MALLIKARJUNA
14. Mr. BONDU VIJAYAKUMAR
15. Mr. EJJIROTU RAGHU BABU
16. Mr. VENKATESH M
17. Mr. RAMESH KUMAR R
18. Mr. RAJESH K S
19. Mr. IBRAHIM ZAFAR
20. Ms. REVATHY GOPINATH
21. Ms. KODURI REVATHI
22. Mr. ANANDH NAGARAJAN
23. Dr. GOURAV KUMAR SUMAN

Faculties Attended: 23

Venue: WB116

"SMART GRID AND INTEGRATION OF DISTRIBUTED GENERATION" (O. PLAN No. ICT-57)

TIME-TABLE (28/08/2023 to 01/09/2023)

DAY & DATE	Live Session - 1 9.30 AM to 11. 00 AM	Live Session - 2 11.30 AM to 1.00 PM	Live Session - 3 2.30 PM to 4.00 PM
Monday 28/08/2023	Modern Era Energy Grid (Dr Lini Mathew, Professor, EED, NITTTR Chandigarh)	Renewable Energy Sources (Dr.Poonam Syal, Professor, EED, NITTTR Chandigarh)	Microgrid – Types, Topologies and Control (Er. M. Soujanya, Research Scholar, NITTTR Chandigarh)
Tuesday 29/08/2023	Design, Development and Implementation of Grid Connected Solar PV System (Dr. Ajay Sheoran, Associate Professor, EED, PEC, Chandigarh)		Challenges in Smart Grid Implementation (Dr. C.K. Chanda, Professor, EED, IIEST, Shibpu)
Wednesday 30/08/2023	Smart Grid – Architecture, Standards and Technologies (Dr Lini Mathew, Professor, EED, NITTTR Chandigarh)	Cyber Security in Smart Grid with some Practical Examples (Dr. Poonam Saini, Assistant Professor, PEC, Chandigarh)	Measurement based Power Quality Study of EV & DG Integration into the Grid (Dr. Shimi.S.L, Associate Professor, EED, PEC, Chandigarh)
Thursday 31/08/2023	Grid Connected EVs and their related Power Quality Issues (Dr. Ritula Thakur, Associate Professor, EED, NITTTR Chandigarh)	Wind Power Extraction and Grid Connection Techniques (Dr. A.V.Ravi Teja, Assistant Professor, IIT, Ropar)	Power Electronic Traction for High Speed Trains (Dr.Moumita Das, Assistant Professor, IIT, Mandi)
Friday 01/09/2023	Real Time Simulation of various DG systems and Microgrid using Typhoon HIL (Er. Mohini Gunjal, Research Scholar, NITTTR Chandigarh)		STC Valediction (Dr. Lini Mathew, Professor & Head, Electrical Engineering Department, NITTTR Chandigarh)

The online one-week FDP was inaugurated on 28th August 2023 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. Lini Mathew**, 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. Lini Mathew**, Professor & Head, Electrical Engineering Department, NITTTR Chandigarh on the Topic "*Modern Era Energy Grid*". The topics covered in this session is about the Energy Grid. It is the network of power lines, substations, and other infrastructure that delivers electricity from power plants to homes and businesses. The modern era energy grid is facing a number of challenges, including:

- The increasing demand for electricity
- The need to integrate more renewable energy sources
- The need to improve grid reliability and resilience

The second Session of the day was handled by **Dr.Poonam Syal**, Professor, EED, NITTTR Chandigarh on the topic "*Renewable Energy Sources*"- The session mainly focuses on the benefits and challenges of Renewable Energy in the modern era. Some of the key challenges highlighted in the session was follows:

- Renewable energy sources are intermittent, meaning that they do not produce energy all the time. This can make it difficult to integrate them into the grid.
- Renewable energy technologies are often more expensive than fossil fuel technologies.
- Renewable energy projects can face opposition from local communities.

The Post Lunch session of Day 1 was handled by **Er. M. Soujanya**, Research Scholar, NITTTR Chandigarh on the topic "*Microgrid – Types, Topologies and Control*". The session highlight the benefits of microgrid.

- Increased reliability: Microgrids can provide power even when the main grid is down.
- Increased resilience: Microgrids can withstand disturbances, such as power outages or changes in load demand.
- Increased flexibility: Microgrids can be adapted to meet the changing needs of the loads.
- Increased sustainability: Microgrids can be used to integrate renewable energy sources into the grid.

The **Day 2** of the FDP was started with the topic "*Design, Development and Implementation of Grid Connected Solar PV System*" by **Dr. Ajay Sheoran**, Associate Professor, EED, PEC, Chandigarh. The session went more interaction with participants and resource person related to the hardware Implementation and its challenging. The development of a grid-connected solar PV system involves the following steps:

- Procurement: The system includes solar panels, the inverter, and the other components.
- Installation: This includes mounting the solar panels, connecting the system to the electrical grid, and commissioning the system.
- Operation and maintenance: This include monitoring the system performance and making repairs as needed.

- Hardware Design of components and its performance analysis.

Mr. Srinivas Ch, Asst. Prof/ EEE, interacted with the resource person and asked few informative questions related to the grid connected system. The question was related to the simulation of grid connected distributed solar PV system and its challenges.

The post lunch session was handled by **Dr. C.K. Chanda**, Professor, EED, IIEST, Shibpur on the topic "*Challenges in Smart Grid Implementation*". The talk covers various challenges in Smart Grid Implementation includes the cost, standardization, Security, Privacy, Acceptance. Also, the challenges of smart grid implementation include Government support, Collaboration, Education, Research and development.

Day 3 Started with the topic *"Smart Grid – Architecture, Standards and Technologies"* by **Dr. Lini Mathew**, Professor & Head, Electrical Engineering Department, NITTTR Chandigarh. The discussion started with Architecture of smart grid, followed by standards for smart grid like IEC61850, IEEE1547 and Technologies for smart grid like Advanced metering infrastructure (AMI), Distribution automation (DA), Energy storage, Renewable energy integration.

After a short Tea break, **Dr. Poonam Saini**, Assistant Professor, PEC, Chandigarh delivered a lecture on *"Cyber Security in Smart Grid with some Practical Examples".* 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.

The post lunch session on day 3 was handled by **Dr. Shimi.S.L**, Associate Professor, EED, PEC, Chandigarh on the topic *"Measurement based Power Quality Study of EV & DG Integration into the Grid".* 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 *"Connected EVs and their related Power Quality Issues"* by **Dr. Ritula Thakur**, Associate Professor, EED, NITTTR Chandigarh. The complete session was an interactive. Connected EVs can introduce power quality problems to the grid. However, there are a number of measures that can be taken to mitigate these problems: Smart charging, Distributed energy resources, Power quality filters.

Session 2 of Day 4 was addressed by **Dr. A. V. Ravi Teja,** Assistant Professor, IIT, Ropar on the topic "*Wind Power Extraction and Grid Connection Techniques"*. The talk mainly focused on Grid flexibility, Wind power forecasting, Grid integration studies.

"Power Electronic Traction for High Speed Trains" by **Dr.Moumita Das**, Assistant Professor, IIT, Mandi was the post lunch session. Some of the key trends in power electronic traction for high-speed trains was addressed:

- The use of lighter and more efficient power converters.
- The development of new traction motors that are more powerful and efficient.
- The use of advanced control systems that can provide even smoother acceleration and deceleration.
- The development of new technologies that can reduce the cost and complexity of power electronic traction systems.

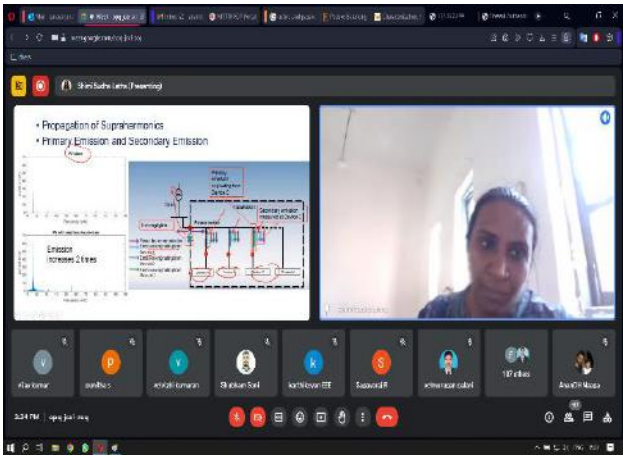
Last day of the FDP started with the session on "Real Time Simulation of various DG systems and Microgrid using Typhoon HIL" by **Er. Mohini Gunjal**, Research Scholar, NITTTR Chandigarh. Typhoon HIL, can help engineers and researchers to design, optimize, and test new technologies and operating strategies for these systems. Hands on training has been given to the participants on designing the circuits and simulation on typhoon HIL software. The software package has been shared with all the participants for practice.

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. Lini Mathew** and all the people who directly and indirectly involve in organizing this event. The Post FDP Quiz was conducted for the participants, all the participants, have attended their quiz and submitted their feedback through google form.

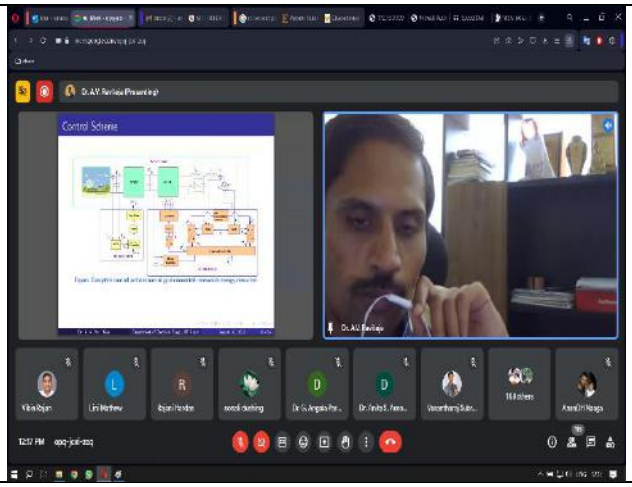
Photos:

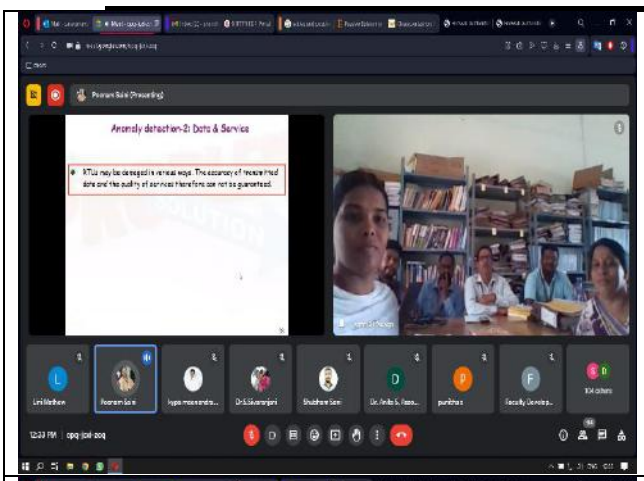

2023/08/28 10:10

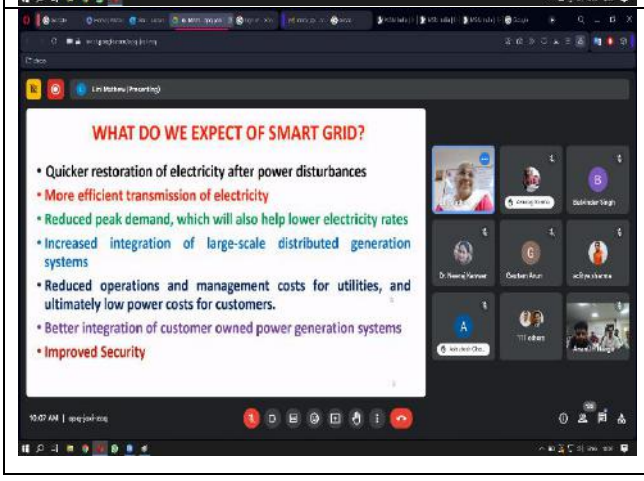

VIRTUAL POWER PLANT (VPP)
• A Virtual Power Plant (VPP) in a broad way is defined and characterized as a virtual aggregation of decentralized, medium-scale power generating units as well as flexible power consumers and storage systems to operate flexibly and in a coordinated way.
• The major characteristics of VPP are information gathering and processing, geographical influence ignorance and dynamic operation and optimization.

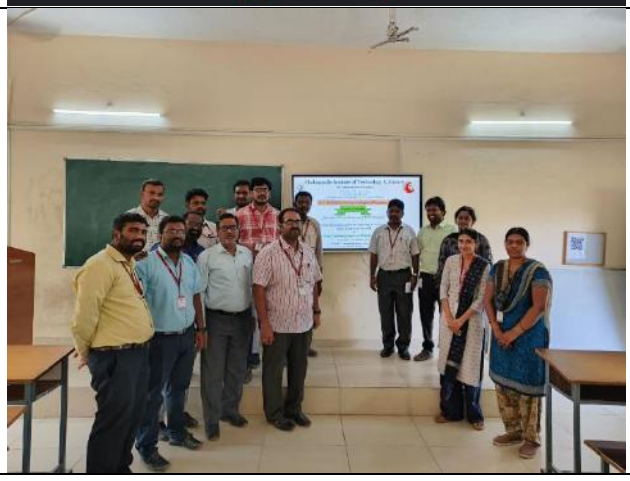

• Propagation of Suprahermonics
• Primary Emission and Secondary Emission


MICRO GRID SYSTEM


Control Scheme







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