



MIT'S

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

(Deemed to be University under section 3 of UGC Act, 1956)

A Report on

Six-Day Online Faculty Development Program on

“Smart Grids and Renewable Energy: Evolving with high EV penetration”

Organized by

Department of Electrical and Electronics Engineering, MITS

from 30/03/2026 to 04/04/2026

About FDP

This Faculty Development Program (FDP) covers the intersection of modern power systems and the green mobility revolution.

Faculty Development Program on "Smart Grids and Renewable Energy: Evolving with high EV penetration" from 30/03/2026 to 04/04/2026.

Organized by Department of Electrical and Electronics Engineering, MITS

About MITS - Deemed to be University

Madanapalle Institute of Technology & Science (deemed to be University) was established in 1984 by the Society of Engineers of Madanapalle. It is a reputed 302-acre campus. MITS (Deemed to be University) is governed by the society and presided over by Dr. H. Vijaya Lakshmi, Chairman of the Society and Chancellor.

With 27 years of academic excellence, MITS is recognized for its quality standards and performance in higher education. The institution at MITS continues to be internationally oriented and empowered and motivated to establish the leadership in the premier centers of academic excellence in India.

About Electrical and Electronics Engineering

The Department of Electrical and Electronics Engineering was established in the year 1988 and has been playing a vital role in producing well-trained professional engineers. The department offers an undergraduate program in Electrical & Electronics Engineering with an intake of 60 students in the first semester. Areas of academic excellence are: Power Systems, Power Systems Control Systems, Power Electronics, Signal Signal Processing, Protection & Control, and also in the emerging areas of electrical engineering such as Renewable Energy, Robotics, Smart Grids, Smart & Hybrid Vehicles. The 3-year program under the department has been consistently accredited and recognized by the National Board of Accreditation (NBA) since 2003 and India Council for Technical Education (ICTE) since 2007. The main reason being accreditation in 2007, was done 1988 and is accredited again in 2023 for the period 2023-26.

The Department works with regular members, guest lecturers, workshop and technical symposiums to extend its horizons to the benefit of students and faculty members.

The College Academic Council (CAC) and Board of Studies (BoS) of the department strive to make quality education the main educational objective for both the on and off-campus students with a vision to provide quality education to the students and make them stand in the domain of Electrical and Electronics Engineering.

Eminent Speakers:

Day 1 (30-03-2026)
Dr. Govind Devasuth
 Assistant Professor
 National Institute of Technology, Delhi

Day 2 (31-03-2026)
Dr. Suresh Mikkili
 Associate Professor
 National Institute of Technology, Deo

Day 3 (01-04-2026)
Dr. Anup Kumar Panda
 Professor
 National Institute of Technology, Raichur

Day 4 (02-04-2026)
Dr. Ritash Kowari
 Associate Professor
 VIT, Vellore

Day 5 (03-04-2026)
Dr. Chandra Sekhar Obbu
 Professor
 National Institute of Technology, Delhi

Day 6 (04-04-2026)
Dr. Tirupathi Raju Kanumuri
 Associate Professor
 National Institute of Technology, Delhi

Program Objectives.

The primary goal of this FDP is to provide a comprehensive platform for faculty members to explore their pedagogical and research skills in the field of modern energy systems, the rapidly evolving smart grid.

- Understanding Smart Grids: To explore the evolution of all the essential components for smart grid architecture and the impact of high penetration of renewable energy.
- Key Integration Challenges: To explore the technical impact of large-scale EV charging on distribution networks, including voltage profile regulation and power quality.
- Modeling Renewable Dynamics: To explore advanced control strategies for solar and wind energy systems, focusing on forecasting, power generation, and power quality.
- V2G & Grid Services: To investigate "Vehicle-to-Grid (V2G)" and "Grid-to-Vehicle (G2V)" technology in the context of increasing electric vehicle penetration.
- Edge Transformation: To introduce the use of AI, IoT, and Edge Computing in managing smart meter data and optimizing energy flow in networks.

QR Code for Registration

No Registration Fee

Registration Form for FDP Program: <https://forms.gle/9Dy3JzV9vDp9R8fA>

Note: E-Certificates will be provided to all the participants after completion of FDP.

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Faculty Development Program on "Smart Grids and Renewable Energy: Evolving with high EV penetration" From 30/03/2026 - 04/04/2026

Schedule

| Day/Date/Start/End Time | Topic | Instructor name | Institution |
|-------------------------|--|-----------------------------|---|
| Day 1 (30-03-2026) | Inaugural Session (9:00 PM to 9:15 PM) Video lecture for IIT, IITKharagpur, IITM, IITD and faculty members | | |
| 9:15 PM to 9:30 PM | Evolution and Challenges of Smart Grids, V2G Technologies with Renewable Energy Sources | Dr. Govind Devasuth | Assistant Professor National Institute of Technology, Delhi |
| Day 2 (31-03-2026) | | | |
| 9:00 PM to 9:15 PM | Modeling Smart Grid Networks, Smart Grid Models from IEEE60480 Standard, Smart Grid Challenges and Opportunities | Dr. Suresh Mikkili | Associate Professor National Institute of Technology, Deo |
| Day 3 (01-04-2026) | | | |
| 9:00 PM to 9:15 PM | Application of Power electronics conversion in smart grid Electrical vehicles | Dr. Anup Kumar Panda | Professor National Institute of Technology, Raichur |
| Day 4 (02-04-2026) | | | |
| 9:00 PM to 9:30 PM | EV charging V2G and G2V | Dr. Ritash Kowari | Associate Professor VIT, Vellore |
| Day 5 (03-04-2026) | | | |
| 9:00 PM to 9:15 PM | Hybrid Electricity network Problems in the Smart Grids: Transport System and Renewable Energy | Dr. Chandra Sekhar Obbu | Professor National Institute of Technology, Delhi |
| Day 6 (04-04-2026) | | | |
| 9:00 PM to 9:30 PM | Application of Edge Computing for Improving Power Quality of Parkway Smart PV System | Dr. Tirupathi Raju Kanumuri | Associate Professor National Institute of Technology, Delhi |
| 9:30 PM to 9:45 PM | Valedictory Session: Principal, Deans, HOD and faculty members | | |

Report Submitted by: **Dr. Srinivas Chikkam, Assistant Professor, Department of Electrical and Electronics Engineering**

&

Dr. Sarat Kumar Mishra, Assistant Professor, Department of Electrical and Electronics Engineering

Total No. of Registrations: 197 participants

Mode of Delivery: Online (Microsoft Teams)

About the FDP:

This Faculty Development Program (FDP) covers on the intersection of modern power systems and the green mobility revolution. As the global energy landscape undergoes a paradigm shift, the integration of *Renewable Energy Sources (RES)* and the rapid surge in *Electric Vehicle (EV) penetration* present both unprecedented challenges and transformative opportunities for the electrical grid. This program is designed to bridge the gap between traditional power systems and the digitized, decentralized "Smart Grid" of tomorrow.

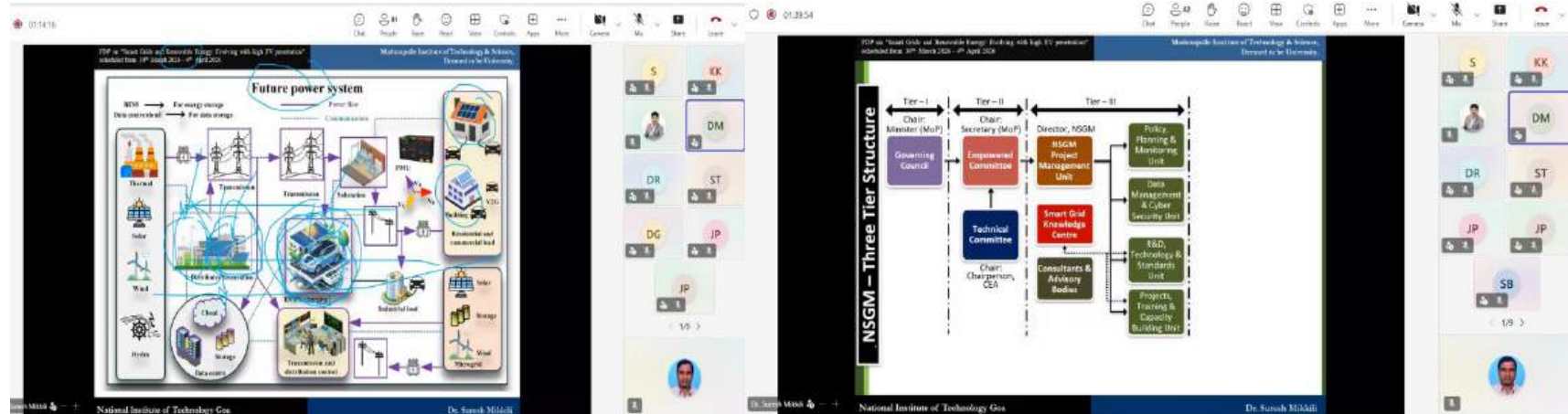
Day 2: 31 March 2026 (Tuesday)

Time: 6:00PM – 8:00 PM

Resource Person: Dr. Suresh Mikkili, Associate Professor, National Institute of Technology, Goa

Topic: Global Smart grid Drivers, Smart grid Goals from NSGM Framework, Smart grid challenges and opportunities

Dr. Suresh Mikkili gave an insight into how the future power system will be taking the government policies and support into account. He enumerated many initiatives and incentives given by Govt. of India to support installation of renewable energy infrastructures like solar and wind. Dr. Mikkili explained the National Smart Grid Mission (NSGM) Framework initiatives, their implementation, challenges and opportunities.



Day 3: 1 April 2026 (Wednesday)

Time: 6:00PM – 8:00 PM

Resource Person: Dr. Anup Kumar Panda, Professor (HAG), National Institute of Technology, Rourkela

Topic: Application of Power electronic converters to Smart grid and Electrical vehicles

Prof. Panda discussed about the different applications of power electronic converters and emphasised that the power quality issues are the major problems with power electronic converters used for smart grid and electric vehicle charging infrastructures. He discussed the various harmonics incorporated due to switching and their mitigation techniques. The various types of Filters used to reduce the harmonic content in the voltage and current waveform were also discussed by him.



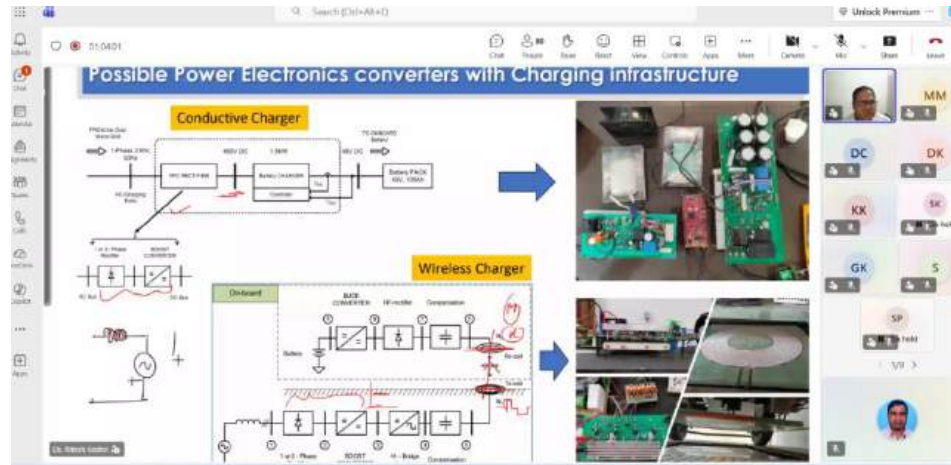
Day 4: 2 April 2026 (Thursday)

Time: 6:00 PM – 8:00 PM

Resource Person: Dr. Ritesh Kesari, Associate Professor VNIT, Nagpur

Topic: EV charging: V2G and G2V

Dr. Ritesh Keshri delivered a talk on the various types of EV charging devices and their ratings and standards. He discussed the practical aspects of power requirements, types of transmission in different electric vehicles, conductive and inductive (wireless) chargers etc. He also highlighted some of the research problems in the areas of Grid to Vehicle (G2V) and Vehicle to Grid (V2G)



Day 5: 3 April 2026 (Friday)

Time: 6:00PM – 8:00 PM

Resource Person: Dr. Chandra Sekhar Obbu, Professor National Institute of Technology, Delhi

Topic: Hybrid Electrical vehicle Evolution in the 21St Century: Towards Green and Sustainable Mobility

Dr. Chandra Sekhar Obbu delivered a talk on the evolution of hybrid electric vehicles in the present scenario with the encouragement from the Govt. of India. He emphasized on the various types of advanced motors used in electric vehicles. He also discussed how to do research and development of high-performance motors for EV. He also described the control aspects of motors, battery and controllers etc.

CONTROL OF SWITCHED RELUCTANCE MOTOR

The general expression for the stator phase voltage of the SRM is

$$v = L \frac{di}{dt} + i \frac{dL}{dt}$$

The above equation can be rewritten as

$$v = L \frac{di}{dt} + i \omega \frac{d\theta}{d\omega}$$

where $\omega = \frac{d\theta}{dt}$

Multiply with i on both sides of equation

$$vi = i^2 R + Li \frac{d\omega}{dt} + \omega i^2 \frac{dL}{d\omega}$$
$$vi = i^2 R + \frac{d}{dt} \left(\frac{1}{2} Li^2 \right) + \frac{1}{2} \omega i^2 \frac{dL}{d\omega}$$
$$vi = i^2 R + w_f + T_e \omega$$

- Aligned position – rotor pole axis coincides with the excited stator pole axis. (minimum reluctance)
- Unaligned position – stator pole axis is along the inter-polar axis of the rotor poles (maximum reluctance)
- Intermediate positions – remaining all other rotor positions.
- During the rotation of the rotor, the reluctance of the motor varies from a minimum value to a maximum value.



Day 6: 4 April 2026 (Saturday)

Time: 6:00PM – 8:00 PM

Resource Person: Dr. Tirupathi Raju Kanumuri, Associate Professor National Institute of Technology, Delhi

Topic: Application of Image Processing for Improving Power Output of Partially Shaded PV Arrays

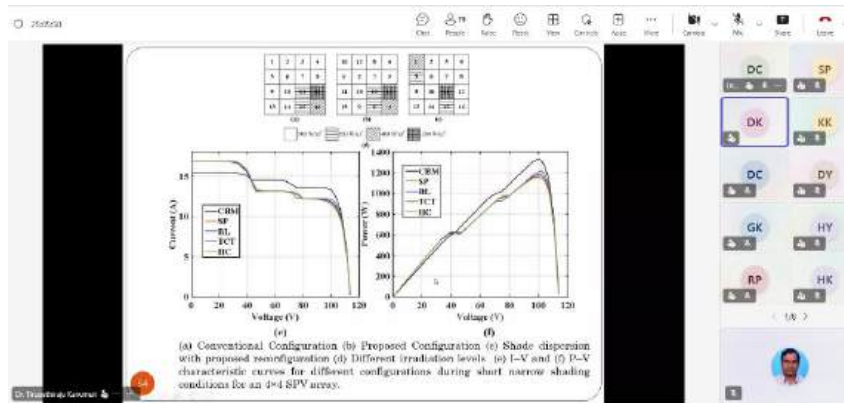


Table 5: Summary of the results under Progressive Incremental Top-to-Bottom Shading Conditions for 4x4 PV Array

| Case | Topology | Power (W) | Power Loss (%) |
|--------------|----------|-----------|----------------|
| Case - (I) | SP | 4236 | 38.44 |
| | BL | 4321 | 38.69 |
| | TCT | 4369 | 37.42 |
| | HC | 4391 | 38.47 |
| | Proposed | 4885 | 40.48 |
| Case - (II) | SP | 4247 | 40.11 |
| | BL | 4282 | 39.49 |
| | TCT | 4320 | 38.49 |
| | HC | 4311 | 40.19 |
| | Proposed | 4766 | 42.31 |
| Case - (III) | SP | 4183 | 40.36 |
| | BL | 4207 | 40.32 |
| | TCT | 4246 | 39.47 |
| | HC | 4188 | 40.32 |
| | Proposed | 4643 | 43.99 |
| Case - (IV) | SP | 4147 | 41.19 |
| | BL | 4143 | 41.18 |
| | TCT | 4179 | 40.65 |
| | HC | 4151 | 41.25 |
| | Proposed | 4566 | 45.11 |

Dr. Tirupathi Raju Kanumuri presented an excellent session on the application of image processing for improving power output of partially shaded PV arrays. He informed that when the shadow of any moving or stationary objects falls on the PV arrays, due to partial shading the power output decreases. Under such conditions, image processing techniques can be applied to maximize the power output of the PV arrays.

Valedictory Session:

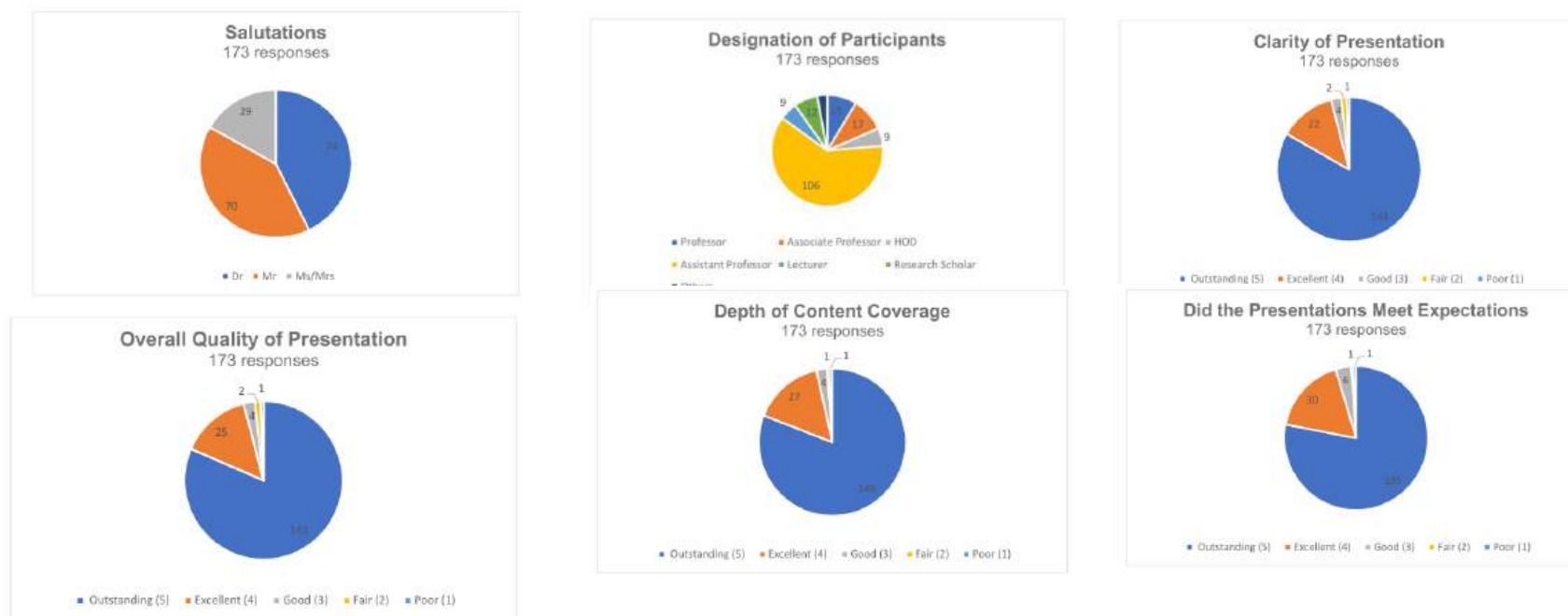
The FDP concluded with the valedictory session on 4 April 2026, where the organising team expressed gratitude to the eminent resource persons, the participants and University Chancellor, Pro-chancellor, Vice Chancellor, Principal for sponsoring the event. The organising team also expressed gratitude to all the employees of the university involved in the event for its grand success. Dr. Srinivas Chikkam delivered vote of thanks to all the resource persons, participants, faculty members for their support.

FDP Outcomes:

- Participants gained valuable concepts about **Smart grid and renewable energy systems**.
- The FDP enhanced the **awareness about the required changes in the power system operation and maintenance due to the presence of bulk load of EV charging**.
- Faculty members and researchers **gained insight about the government initiatives and schemes for smart grid and electric vehicle adoption**.
- The knowledge of **power quality issues in smart grids and EVs due to use of power electronic converters and their mitigation** was improved.
- Practical knowledge of the **types of EV charging infrastructures used in the present day, and their design aspects** was enhanced.
- Participants knew about the **emerging research areas of smart grid, EV charging and renewable energy**.

Participants Feedback Summary

The **Faculty Development Program (FDP)** received feedback from the participants including faculty members, research scholars and students from various institutions. Feedback was collected through online google forms after the end of each session. The outcome of the feedback is summarised in the pie charts as follows:



Conclusion of the FDP

The six-day online **Faculty Development Program (FDP)** on “**Smart Grids and Renewable Energy: Evolving with high EV penetration**” was successfully organized by the **Department of Electrical and Electronics Engineering, Madanapalle Institute of Technology & Science (MITS)** from **30 March 2026 to 4 April 2026**. The program brought together distinguished academicians from reputed institutions who delivered insightful sessions in the field of Smart Grid, Renewable Energy and Electric Vehicles. The FDP provided valuable exposure to the participants about the emerging areas of research and development in the field. The enthusiastic participation, interactive discussions and positive feedback from participants reflect the success of the program. Overall, the FDP helped in bridging the gap between academic learning and industry advancements.

Impact of the FDP on Teaching, Research and Industry Collaborations

The FDP contributed significantly enhancing the **teaching and research capabilities of faculty and researchers** in the areas of smart grid, renewable energy and EV technology. The faculty members gained new knowledge of the recent advancements in the field and can incorporate the same in their **future research activities**. The sessions were helpful to the participants to explore **interdisciplinary research** in the field. They also gained by interaction with expert speakers in developing new **network of research community** for future learning, research, conducting workshops and joint research activities. Overall, this FDP was helpful in creating a vast community of academicians and researchers for future activities.

Acknowledgement

We thank the **management of Madanapalle Institute of Technology and Science (MITS)** for allowing us to conduct this faculty development program. The organising team expresses sincere gratitude to **Dr. C. Yuvaraj, Vice Chancellor (I/C), Dr. D. Pradeep Kumar, Registrar (I/C) and Dr. P. Ramanathan, Principal** for providing all the financial and logistic support for this program.

Our special thanks to **Dr. G. Manavaalan, HOD, EEE and Dr. A. V. Pavan Kumar, Assistant Dean** for their initiation and constant motivation throughout the program. We also appreciate our **distinguished resource persons** for accepting our request and giving time and effort to deliver the sessions.

We thank all the **faculty members and staff of EEE department** who helped in the successful completion of the program. Finally, we sincerely thank all the **participants** for their enthusiastic participation and contribution for making this FDP successful.