



# WORKSHOP REPORT



**Topic of FDP-** Future of Green Energy: Electric Vehicles, Hydrogen Fuel Cells and Energy Storage Systems

**Duration-** 27<sup>th</sup> Jan 2025 -1<sup>st</sup> Feb 2025

**Organising Institute-** Electrical Engineering Department, Govt. College of Engineering, Nagpur

## **AICTE Training and Learning (ATAL) Academy Sponsored Faculty Development Programme (FDP)**

### **Future of Green Energy: Electric Vehicles, Hydrogen Fuel Cells and Energy Storage Systems**

The AICTE-sponsored ATAL Faculty Development Programme (FDP) on Future of Green Energy: Electric Vehicles, Hydrogen Fuel Cells, and Energy Storage Systems was successfully organised by the Electrical Engineering Department, Government College of Engineering, Nagpur, from 27th January to 1st February 2025. The program aimed to provide faculty members, researchers, and professionals with in-depth knowledge of emerging green energy technologies, addressing the urgent need for sustainability and reduced carbon emissions. The FDP was inaugurated by Dr. Priya Jadhav, UMA (Unnat Maharashtra Abhiyan) Cell Coordinator who emphasized the importance of green energy technologies in mitigating climate change by reducing carbon emissions. During the valedictory session, Dr. R.P. Borkar, Principal of GCOE Nagpur, elaborated on the institute's efforts toward fostering environmental responsibility and sustainability. The FDP featured expert-led technical sessions conducted by distinguished faculty members from IIT Bombay, VNIT Nagpur, and Industry Professionals. These sessions covered advancements in electric vehicle technology, including charging infrastructure, hydrogen fuel cells and their applications, energy storage systems with a focus on battery technologies, and smart grid technologies that play a crucial role in sustainable energy solutions. The program also included an industrial visit to Novasys Greenergy Pvt. Ltd., where participants gained practical insights into real-world applications of renewable energy solutions. The FDP was meticulously planned and executed under the leadership of Dr. Rajesh Surjuse, Head Electrical and Praful Nandankar, Assistant Professor, Electrical Engineering Department. Participants highly appreciated the technical sessions, research article discussions and summary sessions, practical sessions, Novasys Industrial Visit, and hospitality provided by the organizing team. The program concluded with a valedictory session, where participants shared their positive feedback and underscored the importance of such initiatives in fostering innovation, interdisciplinary collaboration, and industry-academia partnerships.

The eminent resource persons for this AICTE-sponsored ATAL FDP are:

	<p><b>Prof. Priya Jadhav</b> <b>Education:</b></p> <ul style="list-style-type: none"><li>• PhD, Electrical Engineering and Computer Science, 2012 Massachusetts Institute of Technology, Cambridge, MA, USA</li><li>• M.S. Electrical Engineering, 1995 Boston University, Boston, MA, USA</li><li>• M.Sc. (Honors) Physics, 1993 B.E. (Honors) Electrical and Electronics, 1993 Birla Institute of Technology and Science, Pilani, India</li></ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"><li>• Faculty Incharge of Centre for Technology Alternatives for Rural Areas (CTARA), IIT Bombay</li><li>• 30+ years of experience in Teaching and Research</li></ul>
	<p><b>Dr. M.M. Lokhande</b> <b>Education:</b></p> <ul style="list-style-type: none"><li>• PhD, Energy Science and Engineering Department of IIT Bombay, India, 2010</li><li>• M.E. (Power System), University of Pune, India, 2003</li><li>• B.E., Electrical Engineering, G.H. Rasoni College of Engineering, Nagpur, 2001</li></ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"><li>• Associate Professor, VNIT Nagpur</li><li>• 15 Years of Experience in Academics</li><li>• Worked on DST project on Electric Vehicle</li><li>• IEEE Member</li></ul>
	<p><b>Dr. Ritesh Kumar Kesari</b> <b>Education:</b></p> <ul style="list-style-type: none"><li>• PhD in Energy Engineering from University of Padova, Italy</li><li>• M.Tech. from NIT Jamshedpur</li><li>• BSC in Engineering from NIT Jamshedpur</li></ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"><li>• Associate Professor, VNIT, Nagpur</li><li>• 18+ Years of Experience in Teaching &amp; Research</li><li>• Worked on Projects from DST and MEITY Government of India.</li></ul>

	<p><b>Dr. R. S. Surjuse</b>  <b>Education:</b></p> <ul style="list-style-type: none"> <li>• PhD, MNIT Jaipur, 2011</li> <li>• M.Tech, VNIT Nagpur, 2003</li> <li>• BE, Nagpur University, VRCE, Nagpur, 1994</li> </ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"> <li>• Associate Professor, Govt. College of Engg. Nagpur</li> <li>• 27+ years of experience in Teaching and Research</li> <li>• Completed project titled “Modernization of Electrical Machine and Instrumentation Laboratory” under MODROB, AICTE scheme</li> </ul>
	<p><b>Dr. (Mrs.) M. A. Chaudhari</b>  <b>Education:</b></p> <ul style="list-style-type: none"> <li>• PhD, VNIT Nagpur, June 2007</li> <li>• M. Tech. (Integrated Power System), VRCE Nagpur, 2000</li> <li>• B.E. (Electronics and Power Engineering), Govt. C. O. E. Amt. Amravati University, 1989</li> </ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"> <li>• Professor, VNIT, Nagpur</li> <li>• 32+ Years of Experience in Teaching &amp; Research</li> <li>• Worked on SERB-funded project</li> </ul>
	<p><b>Dr. (Mrs.) N. R. Patne</b>  <b>Education:</b></p> <ul style="list-style-type: none"> <li>• PhD, VNIT Nagpur, 2010</li> <li>• M. Tech. (Integrated Power System), VNIT Nagpur, 2001</li> <li>• B.E. (Electrical Engineering), Amravati University, 1993</li> </ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"> <li>• Professor, VNIT, Nagpur</li> <li>• 28+ Years of Experience in Teaching &amp; Research</li> </ul>
	<p><b>Mrs. Jaya Awari</b>  <b>Education:</b></p> <ul style="list-style-type: none"> <li>• Master’s degree in Science from Sant Gadge Baba Amravati University</li> </ul> <p><b>Experience:</b></p> <ul style="list-style-type: none"> <li>• Spiritual Trainer since 2016</li> <li>• Delivered numerous expert lectures on the topic of “Meditation for a Peaceful Life”</li> </ul>



### **Dr. Pradyumn Chaturvedi**

#### **Education:**

- Ph.D, Power Electronics, MANIT, Bhopal, 2010
- M.E., Power Electronics, SATI, Vidisha, M.P. / Barkatullah Univ. Bhopal, 2001
- B. E., Electrical Engineering, SATI, Vidisha, M.P. / Barkatullah Univ. Bhopal, 1996

#### **Experience:**

- Associate Professor, VNIT Nagpur
- 20 Years of Experience in Academics
- Completed 04 sponsored research projects and currently working on 03 Research Projects sponsored by DST-SERB Core Research Grant

<b>Sr. No.</b>	<b>Date</b>	<b>Resource Person</b>	<b>Topic covered</b>
1	27 <sup>th</sup> Jan 2025	Prof Priya Jadhav	Introduction to Green Energy Technologies
2	27 <sup>th</sup> Jan 2025	Dr Makarand M Lokhande	Solar MPPT for Electric Vehicles
3	28 <sup>th</sup> Jan 2025	Dr Ritesh Kumar Keshri	Battery Modeling and performance evaluation
4	28 <sup>th</sup> Jan 2025	Dr Ritesh Kumar Keshri	PMBLDC Motor and Control for Light Electric Vehicle
5	29 <sup>th</sup> Jan 2025	Dr M A Chaudhari	Management of Solar PV energy for charging EVs
6	29 <sup>th</sup> Jan 2025	Dr R S Surjuse	Wireless Charging for Electric Vehicles
7	30 <sup>th</sup> Jan 2025	Mrs Jaya Awari	Stress Management
8	30 <sup>th</sup> Jan 2025	Dr R S Surjuse	Hydrogen Fuel Cells
9	31 <sup>st</sup> Jan 2025	Dr N R Patne	Distributed Generation Management in Distributed Network Configuration
10	1 <sup>st</sup> Feb 2025	Dr Pradyumn Chaturvedi	Electrical Vehicle Technology and Charging Infrastructure for EV

The schedule of this ATAL FDP is as below:

**AICTE ATAL Academy-sponsored FDP**  
**“Future of Green Energy: Electric Vehicles, Hydrogen Fuel Cells, and Energy Storage Systems”**  
 27<sup>th</sup> Jan to 1<sup>st</sup> Feb 2025  
 Programme Schedule

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
10:00 – 10:30 Inauguration					
10:30 – 1:00 Session 1 Introduction to Green Energy Technologies Prof. Priya Jadhav IIT Bombay	10:00 – 12:30 Session 3 Battery Modeling and performance evaluation Dr. Ritesh Kumar Keshri VNIT Nagpur	10:00 – 12:30 Session 5 Management of Solar PV energy for charging EVs Dr. (Mrs.) M. A. Chaudhari VNIT Nagpur	10:00 – 12:30 Session 7 Stress Management Mrs. Jaya Awari Spiritual Meditation Trainer	10:00 – 12:30 Session 9 Distributed Generation Management in Distributed Network Configuration Dr N R Patne VNIT Nagpur	10:00 – 12:30 Session 10 Electric Vehicle Technology & Charging Infrastructure for EV Dr. Pradyumn Chaturvedi VNIT Nagpur
1:00 – 1:30 Research Article Discussion	12:30 – 1:30 Research Article Discussion	12:30 – 1:30 Research Article Discussion	12:30 – 1:30 Practical Session	12:30 – 1:30 Article Summary	12:30 – 1:30 Practical Session
1:30 – 2:30 Lunch	1:30 – 2:30 Lunch	1:30 – 2:30 Lunch	1:30 – 2:30 Lunch	1:30 – 2:30 Lunch	1:30 – 2:30 Lunch
2:30 – 5:00 Session 2 Solar MPPT for Electric Vehicles Dr. Makarand M. Lokhande VNIT Nagpur	2:30 – 5:00 Session 4 PMBLDC Motor and Control for Light Electric Vehicle Dr. Ritesh Kumar Keshri VNIT Nagpur	2:30 – 5:00 Session 6 Wireless Charging for Electric Vehicles Dr. R. S. Surjuse Govt. College of Engg Nagpur	2:30 – 5:00 Session 8 Hydrogen Fuel Cells Dr. R. S. Surjuse Govt. College of Engg Nagpur	Technical Discussion & Industrial Visit	2:30 – 4:30 MCQ & Reflection Journal
5:00 – 6:00 Practical Session	5:00 – 6:00 Practical Session @ VNIT Nagpur	5:00 – 6:00 Practical Session @ VNIT Nagpur	5:00 – 6:00 Research Article Discussion		4:30 – 5:30 Valedictory Session

The inaugural session began with registration and breakfast allowing participants to network and interact before the formal proceedings. The distinguished guests included Dr R. S. Surjuse, Head Electrical and FDP Coordinator, Dr Suraj Khante, Incharge Principal, Government College of Engineering, Nagpur, and Prof. Priya Jadhav, the keynote speaker and Incharge of the Centre for Technology Alternatives for Rural Areas (CTARA), IIT Bombay. The formal lamp-lighting ceremony symbolized the beginning of a knowledge-enriching journey. Following this, Dr. R. S. Surjuse, FDP Coordinator, delivered the welcome address, emphasizing the importance of green energy technologies and the objective of the FDP. He encouraged participants to actively engage in discussions, share insights, and collaborate on innovative ideas. This was followed by the address by the Guest of Honour, Prof. Priya Jadhav, who provided an overview of the latest developments in electric vehicles, hydrogen fuel cells, and energy storage systems. She highlighted the crucial role of academia and research in fostering sustainable solutions and encouraged participants to contribute actively to the energy transition. The Incharge Principal, Dr. Suraj Khante, then addressed the gathering, shedding light on the institute’s ongoing sustainability initiatives. He spoke about the successful implementation of a 110-kW solar rooftop power plant, which has significantly reduced the college’s electricity expenses. Additionally, he mentioned the transition to energy-efficient LED lighting and BLDC fans, as well as the upcoming Centre of Excellence for Energy Research, which will further enhance research and innovation in sustainable energy solutions. To conclude the inaugural session, a vote of thanks was proposed, expressing gratitude to all

dignitaries, faculty members, participants, and organizing committee members for their efforts in making this event successful.

Immediately after the inauguration, the first technical session commenced by Prof. Priya Jadhav on the topic Introduction to Green Energy Technologies. The session provided a comprehensive overview of India's renewable energy landscape. Prof. Jadhav emphasized the importance of supply-demand matching, explaining how mismatches between renewable generation and peak demand patterns lead to inefficiencies and higher costs. She discussed how Time-of-Day (ToD) pricing, smart metering, and demand-side management strategies can optimize energy consumption, reduce grid stress, and enhance efficiency. Using case studies from Maharashtra and Germany, she illustrated how smart metering and data-driven demand modelling can help in better grid integration.

Day 1, Session 1 Video Clip:

<https://drive.google.com/file/d/1PyrHckyquEEpNYwruVGvGPASO3XiEK2Y/view?usp=sharing>

The second technical session of the AICTE ATAL-sponsored Faculty Development Program on "Future of Green Energy" was conducted by Dr. Makarand M. Lokhande, Associate Professor at VNIT Nagpur. His session focused on the topic of "MPPT for Solar Electric Vehicles," covering key aspects of solar cell characteristics, equivalent circuits, the impact of radiation and temperature, and various MPPT techniques. Dr. Lokhande explained different types of DC-DC converters such as Buck, Boost, and Buck-Boost, along with their applications in optimizing solar power for electric vehicles. He also highlighted the importance of efficient MPPT algorithms in maintaining maximum power extraction under varying environmental conditions.

Day 1, Session 2 Video Clip:

<https://drive.google.com/file/d/1t7sHD3Hf0tnq0iLx4K5eas7XZKzsrKQX/view?usp=sharing>

In addition to the theoretical discussion, Dr. Lokhande conducted a practical session with a tutorial that included problem-solving exercises related to solar photovoltaic panels, fill factor calculations, efficiency analysis, V-I curve plotting, and the impact of different resistances and battery connections. Participants actively engaged in solving numerical problems and understanding the role of MPPT in optimizing solar power utilization for electric vehicles.

The third technical session of the AICTE ATAL-sponsored Faculty Development Program on "Future of Green Energy" was conducted by Dr. Ritesh Kumar Keshri, Associate Professor at VNIT Nagpur. The session focused on "Battery Modeling and Performance Evaluation," covering crucial aspects of battery technologies, their modelling techniques, and methods for assessing performance in energy storage applications. Dr. Keshri provided insights into various battery chemistries, equivalent circuit models, state-of-charge (SOC) and state-of-health (SOH) estimation techniques, and their significance in electric vehicle and renewable energy integration.

Day 2, Session 3 Video Clip:

[https://drive.google.com/file/d/18Owd0x2DGBxjKncdYFaqve4NK86O4y5\\_/view?usp=sharing](https://drive.google.com/file/d/18Owd0x2DGBxjKncdYFaqve4NK86O4y5_/view?usp=sharing)

The fourth technical session was conducted by Dr. Ritesh Kumar Keshri. Dr. Keshri provided an in-depth understanding of PM BLDC motors, discussing their classification, electrical structure, and advantages over other motor types used in electric vehicle applications. He explained key aspects such as torque-speed characteristics, back-EMF behaviour, and phase current control strategies, highlighting their role in enhancing motor performance and efficiency.

Day 2, Session 4 Video Clip:

<https://drive.google.com/file/d/1c8rSfdzG2C7fQA6bwkhh2Hv8bGz2E3wm/view?usp=sharing>

Dr Keshri elaborated on the difference between sinusoidal and square wave phase current supplies, explaining their impact on motor operation. The practical session was conducted at VNIT Nagpur under the guidance of Dr. Ritesh Kumar Keshri. This hands-on session provided participants with valuable insights into battery charging and discharging characteristics under constant voltage and constant current conditions. During the session, participants observed the behaviour of batteries under different charging methodologies, analysing their performance, efficiency, and thermal characteristics.

The fifth technical session was conducted by Dr. (Mrs.) M. A. Chaudhari, Associate Professor at VNIT Nagpur. The session focused on "Management of Solar PV Energy for Charging Electric Vehicles," highlighting the integration of solar photovoltaic (PV) systems with electric vehicle (EV) charging infrastructure. Dr. Chaudhari discussed the key challenges and strategies for efficient solar energy utilization, including maximum power point tracking (MPPT), energy storage solutions, grid-connected vs. off-grid solar charging stations, and load management techniques. She also elaborated on solar-powered EV charging station designs, emphasizing the role of DC-DC converters, battery management systems, and smart grid technologies in optimizing energy flow.

Day 3, Session 5 Video Clip:

<https://drive.google.com/file/d/1nyTjUVzirIV7NN65h6mjQBzKER3iTHU2/view?usp=sharing>

Dr. R. S. Surjuse from the Government College of Engineering, Nagpur, conducted the sixth technical session. The session focused on "Wireless Charging for Electric Vehicles," highlighting the advancements and challenges in inductive power transfer technology for EVs. Dr. Surjuse provided a detailed explanation of wireless power transfer (WPT) mechanisms, resonant inductive coupling, and magnetic field alignment for efficient energy transfer. The discussion covered key components of wireless charging systems, including transmitters, receivers, power electronics converters, and control strategies.

Day 3, Session 6 Video Clip:

<https://drive.google.com/file/d/1fQ6-JKXrYi8xCpN8y3eDTp7o9Gkps7AQ/view?usp=sharing>

In the Practical session at VNIT Nagpur, Dr. Keshri demonstrated the working principles of wireless power transfer (WPT) and explained inductive and resonant coupling techniques used for contactless energy transfer. He also provided a detailed explanation of the coils used in wireless charging systems, focusing on primary (transmitter) and secondary (receiver) coil configurations. He discussed the significance of coil design, material selection, and winding techniques in optimizing energy transfer efficiency.

The seventh session on Stress Management, conducted by Mrs. Jaya Awari, Spiritual Meditation Trainer, provided valuable insights into the impact of stress on health and the benefits of meditation. Mrs Awari elaborated on the effects of meditation on the mind and body, emphasizing the role of alpha brain waves, which help individuals achieve a state of relaxation, focus, reduced stress, positive thinking, and improved learning capabilities. After her session, she also conducted a practical session on meditation, allowing participants to experience its calming effects firsthand. She guided them through breathing exercises and mindfulness techniques to help reduce stress and enhance focus.

Day 4, Session 7 Video Clip:

[https://drive.google.com/file/d/1Go6C0\\_2\\_BB4hb2lvfwPRiXy4hdzwDB\\_0/view?usp=sharing](https://drive.google.com/file/d/1Go6C0_2_BB4hb2lvfwPRiXy4hdzwDB_0/view?usp=sharing)

The eighth session on Hydrogen Fuel Cells, conducted by Dr. R.S. Surjuse, provided an in-depth understanding of hydrogen as a sustainable energy source. The session began with an overview of the limitations of electric vehicles (EVs), such as long charging times and battery degradation, highlighting the potential of hydrogen fuel cells as an alternative. The session covered the methods of hydrogen production, including steam methane reforming (SMR), coal gasification, photovoltaic-electrolyzer (PV-EL), hydropower-electrolyzer (H-EL), partial oxidation of hydrocarbons (POX), biomass gasification (BG), and wind power-electrolyzer (W-EL).

Day 4, Session 8 Video Clip:

[https://drive.google.com/file/d/1uP6sVYi1mGMf\\_bCT1CBDBi2Z38NvvtYj/view?usp=sharing](https://drive.google.com/file/d/1uP6sVYi1mGMf_bCT1CBDBi2Z38NvvtYj/view?usp=sharing)

The ninth session on Distributed Generation Management in Distributed Network Configuration, conducted by Dr. N. R. Patne from VNIT Nagpur, provided insights into the reconfiguration of distribution networks (DN) and the optimal integration of distributed generation (DG). Reconfiguration is crucial due to the growing complexity of modern power distribution networks, particularly with the integration of renewable energy sources (RES) and smart grid advancements.

Day 5, Session 9 Video Clip:

<https://drive.google.com/file/d/1BO8IeDjDpq1TQBcIXOjzYihlQycsDF-P/view?usp=sharing>

The tenth session on Electric Vehicle Technology & Charging Infrastructure for EVs, conducted by Dr Pradyumn Chaturvedi from VNIT Nagpur, covered the fundamentals of EV technology, types of EVs, and advancements in battery systems. He discussed charging infrastructure, including Level 1, Level 2, and DC fast charging, along with global standards like CHAdeMO and CCS. The session also highlighted grid integration challenges, smart charging solutions, and policy incentives supporting EV adoption. Future trends, such as solid-state batteries and hydrogen fuel cells, were also explored.

Day 6, Session 10 Video Clip:

<https://drive.google.com/file/d/1eF7bJc0amOjdQTs8I9Z4jITxnBVeyfdJ/view?usp=sharing>

The Valedictory Session marked the conclusion of the AICTE ATAL-sponsored Faculty Development Program (FDP) on the Future of Green Energy: Electric Vehicles, Hydrogen Fuel Cells, and Energy Storage Systems. The session was graced by Dr R.P. Borkar, Principal, Government College of Engineering Nagpur, Dr. R.S. Surjuse, FDP Coordinator and Head Electrical, and Praful Nandankar, FDP Co-Coordinator along with faculty members and participants. The session highlighted the active involvement, enthusiasm, and research-driven approach that made this FDP unique. The program successfully provided insights into emerging green energy technologies and equipped participants with the knowledge to publish research papers in indexed journals, enhance their teaching methodologies, and contribute to a sustainable future. A detailed summary of the FDP was presented by Dr. R.S. Surjuse, revisiting key sessions and discussions. The feedback session allowed participants to share their experiences, while Dr. R.P. Borkar's address inspired attendees to continue their research and academic contributions. Certification requirements were outlined, emphasizing attendance, assessment performance, and reflective journal submission. The session concluded with expressions of gratitude to the organizing

team, technical session coordinators, and support staff, followed by a group photo session, marking the successful completion of the FDP.

### List of Participants

Sr. No.	Name	Institute Name	Email	Contact Number
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## Participant Feedback

During the valedictory session, participants shared their feedback and provided suggestions. The following are the highlights of their feedback:

- Almost all participants appreciated the effective delivery and engaging presentation by resource persons.
- Almost 95% of participants agreed that the FDP provided valuable practical knowledge on emerging green energy technologies.
- 95% of participants praised the seamless coordination and organization of the FDP.
- Participants strongly recommended that similar FDPs should be conducted regularly to stay updated with advancements in the field.

### **Participant Feedback Link:**

<https://drive.google.com/file/d/10untyCCEgcRyXviXOd-5vmUk6PHuynGv/view?usp=sharing>

### **Research Article Discussion and Summary:**

As part of the AICTE ATAL-sponsored Faculty Development Program (FDP), five groups were formed to engage in article analysis and discussion. Over the first four days, each group analyzed research articles based on specific evaluation criteria provided in the document. On the fifth day, groups were required to summarize one selected article and present their conclusions. Each team provided insights into the key principles, practical applications, and major takeaways from the articles. This exercise helped participants enhance their research skills, critically evaluate scientific literature, and understand the real-world applications of green energy technologies. The structured approach ensured that participants not only gained theoretical knowledge but also developed a research-oriented mindset that will aid them in publishing high-quality papers and integrating findings into their academic and professional work.

### **Research Article Discussion and Summary Video Link:**

<https://drive.google.com/file/d/1cQjw7UnKN1HfIcHQYc7xpAz5PdG9n4EK/view?usp=sharing>

**Practical Sessions:** The practical sessions are conducted during the AICTE ATAL-sponsored FDP and provide participants with hands-on exposure to key technologies in Electric Vehicles (EVs) and Green Energy Systems. The practical sessions began with Battery Charging and Discharging, where participants explored the charging cycles, efficiency, and Battery Management Systems (BMS) essential for improving battery life and performance. A tutorial on Solar MPPT for EV Charging was conducted, where participants solved problems related to Maximum Power Point Tracking (MPPT), an essential technique for optimizing solar energy utilization in EV charging applications. A dedicated practical session on Wireless Charging of EVs introduced participants to inductive charging principles, efficiency considerations, and the future of contactless power transfer. Additionally, simulations on Fuel Cells were performed, analyzing the energy output and performance characteristics of hydrogen fuel cells for sustainable energy solutions. The FDP also included simulations on EV Charging Infrastructure, focusing on grid integration, power flow analysis, and charging station optimization to ensure efficient deployment of EV charging networks. Furthermore, various Power Electronic Converters were simulated to understand their role in efficient power conversion for EV applications.

### **Practical Sessions Video Link:**

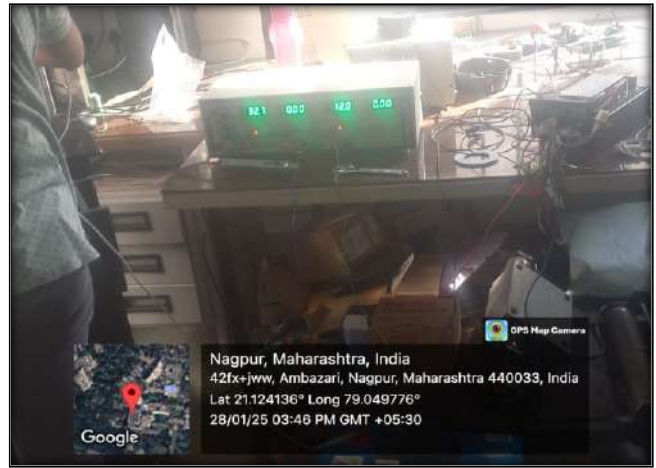
[https://drive.google.com/file/d/1HnheTMON1ppZbbpTwxBfXEU\\_hUW6ldD/view?usp=drive\\_link](https://drive.google.com/file/d/1HnheTMON1ppZbbpTwxBfXEU_hUW6ldD/view?usp=drive_link)

**Industrial Visit:** The highlight of the fifth day was the industrial visit to Novasys Greenergy Pvt. Ltd., a leading firm specializing in renewable energy solutions. This visit provided participants with firsthand exposure to the solar panel manufacturing process and advanced energy management systems. The visit allowed them to observe cutting-edge technologies in action, reinforcing their understanding of solar energy integration and its role in sustainable development. During the visit, participants had the opportunity to interact with industry experts, gaining valuable insights into the challenges and innovations in the renewable energy sector. The discussions focused on solar panel efficiency, quality control, and advancements in photovoltaic technology. This engagement helped bridge the gap between academic learning and industrial applications, providing participants with a practical perspective on the deployment of renewable energy solutions. Overall, the industrial visit significantly enhanced the participants' technical knowledge and awareness of industry best practices. It was an eye-opening experience that emphasized the importance of collaborating with industry partners to drive innovation and sustainable energy solutions in the green energy sector.

Novasys Greenergy Pvt. Ltd. Video Clip:

<https://drive.google.com/file/d/1T1gLDurlyvBmYs98p88B2M6J-pwMygOE/view?usp=sharing>





Trainer demonstrating Battery charging and discharging to FDP participants in E-mobility lab



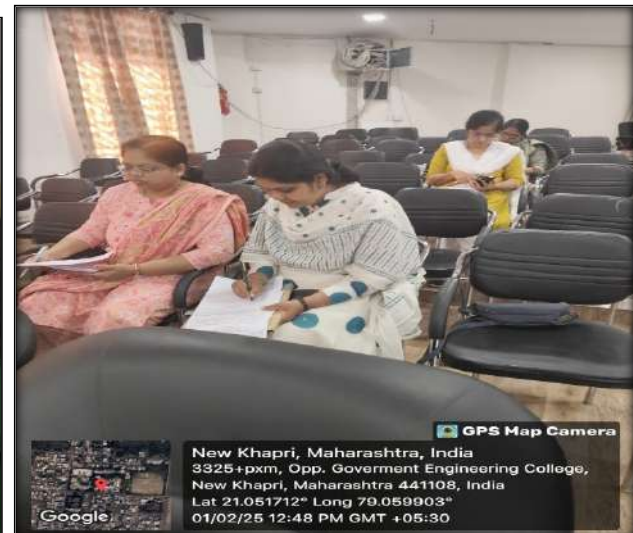
Trainer demonstrating Wireless charging of Electrical vehicle



Trainer devised a new topology for Power Electronic converter and Dr Makarand M. Lokhande explaining tutorial questions on Solar MPPT for EV charging to FDP Participants



Participants in a group discussing research articles allotted to them



ATAL FDP Participants writing their key takeaways and learnings in the Reflection Journal



ATAL FDP Coordinator giving insights about the FDP and Group photo during Inaugural Session



Prof. Priya Jadhav giving insights about the present scenario of Green Energy Technologies and Dr. Makarand Lokhande explaining the need of Solar MPPT for EV



FDP Coordinator welcoming Dr. R. K. Keshri and explaining the Battery Modelling



Dr. (Mrs.) M. A. Chaudhari explaining management of Solar PV energy for charging EVs and Dr. R. K. Keshri discussing commutation phenomena



Dr. Pradyumn Chaturvedi motivating FDP participants by exploring various research topics and Participants in a group presenting their allotted article



Dr N R Patne discussing Distributed Generation Management in Distributed Network Configuration with FDP participants and the FDP Coordinator thanking Mrs. Jaya Awari by giving memento for her expert session



Group photo after valedictory session of AICTE ATAL FDP