

# **REPORT**

**TOPIC:** DTE Sponsored One week Faculty Development Programme on “Next-Gen Energy: Electric Vehicles, Hydrogen Fuel Cells and Energy Storage” in Electrical Engineering Department, Government College of Engineering, Nagpur (Offline)

## **SPEAKERS:**

1. Mr. Tapan Kumar Halder, Joint Director, BIS Nagpur
2. Dr. N. K. Labhasetwar, Chief Scientist & Head, Energy & Resource Management Division, CSIR-NEERI Nagpur.
3. Dr. Narendra Babu, Assistant Professor, EED, VNIT Nagpur
4. Dr. M.M. Lokhande, Associate Professor, EED, VNIT Nagpur
5. Dr. P.V. Kane, Assistant Professor, MED, VNIT Nagpur
6. Dr. N.R. Patne, Professor, EED, VNIT Nagpur
7. Dr. P. S. Kulkarni, Professor, EED, VNIT Nagpur
8. Mr. Anil Dhole, Program Director, Tata Technologies Ltd.
9. Dr. (Mrs.) M. A. Chaudhari, Professor, EED, VNIT Nagpur
10. Mrs. Jaya Awari, Spiritual Meditation Trainer

**DATE:** 16/12/2024 - 20/12/2024    **TIME:** 10:15 AM - 5:15 PM (Everyday)

**FDP COORDINATOR:** Dr. R. S. Surjuse, Head Electrical

**FDP CO-COORDINATOR:** Praful Nandankar, Assistant Professor, Electrical Engg.

**ORGANISING COMMITTEE:** Neha Khadse, Rajani Sahare, Dr. S.P. Jolhe, Mr. Kundan Barai, Mr. Vijay Waghmare, Mr. Anil Bipte, Shweta Rajurkar, Pranali Hatwar, Dipti Bhawarkar, Yogita Ashtekar, Ankita Rawat, Mrugsarita Borkar and Mr. Rohit Fulzele

## **INTRODUCTION:**

The Department of Electrical Engineering at Government College of Engineering, Nagpur, successfully hosted a Directorate of Technical Education (DTE)-sponsored one-week Faculty Development Programme (FDP) on "Next-Gen Energy: Electric Vehicles, Hydrogen Fuel Cells, and Energy Storage" from December 16th to 20th, 2024. This FDP aimed to equip engineering faculty with the knowledge and practical insights required to understand and teach advanced green energy technologies.

The program addressed critical global challenges such as climate change and transitioning from fossil fuels to sustainable energy sources. Sessions focused on emerging technologies like

electric vehicles (EVs), hydrogen fuel cells, and advanced energy storage systems. Through engaging discussions and an industrial visit, participants explored the latest innovations and their practical applications. The event also highlighted interdisciplinary approaches to integrating these technologies into academic curricula, thereby fostering innovation and environmental responsibility among educators and researchers.

The FDP was inaugurated by esteemed dignitaries, including Mr. Tapankumar Haldar, Joint Director of BIS, and Dr. Nitin Labhassetwar of NEERI, who emphasized the urgent need for green energy solutions. Dr. R.P. Borkar, Principal of GCOE Nagpur, highlighted the institution's commitment to sustainability and its role in shaping future-ready engineers.

## **SUMMARY OF THE EVENT:**

### **Sessions Overview**

The FDP featured a diverse lineup of technical sessions delivered by experts from VNIT Nagpur, industry professionals, and academic leaders. Key topics included:

- ✓ Electric Vehicles: Technologies, charging infrastructure, and component design.
- ✓ Energy Storage Systems: Battery technologies and the charge distribution technique for lithium batteries.
- ✓ Hydrogen Fuel Cells: Basics, advances, and their integration with modern systems.
- ✓ Smart Grid Technologies: Impact on energy management and distributed generation systems.

Each session was meticulously planned, offering participants both theoretical insights and practical applications.

### **Industrial Visit**

A highlight of the FDP was the industrial visit to Novasys Greenergy Pvt. Ltd., a leading name in renewable energy solutions. This visit provided participants with a firsthand understanding of the real-world applications of solar panel manufacturing and energy management systems. Experts at Novasys shared their experiences in implementing advanced technologies, bridging the gap between theoretical knowledge and industrial practices. Participants greatly appreciated this opportunity to connect academic learning with industry standards.

### **Key Activities**

The week-long program also included:

- ✓ Interactive technical discussions by distinguished Faculty members from VNIT and Industry Experts.
- ✓ Stress management sessions to promote overall well-being among faculty.

- ✓ A reflection journal activity and feedback session on the final day, which provided valuable insights into participants' experiences and suggestions for future programs.

### **Participants' Feedback**

Participants praised the FDP for its well-rounded approach, combining advanced technical knowledge with practical insights and interdisciplinary collaboration. The hospitality extended by the faculty and the student volunteers was widely appreciated. The program successfully empowered attendees to integrate green energy concepts into their teaching and research, contributing to the collective goal of sustainability.

### **Valedictory Ceremony**

The FDP concluded with a valedictory session where participants expressed their gratitude for the enriching experience. Certificates of participation were distributed, and the organizing team received commendations for their efforts in making the event a grand success.

### **Detailed Report on Technical Sessions**

The FDP began with an inaugural session and a keynote address delivered by Mr. Tapankumar Haldar, Joint Director of BIS, who emphasized the critical role of standardization and interoperability in EV technologies. Dr. N.K. Labhasetwar of NEERI spoke about the future of green energy, highlighting India's potential to lead the global energy transition. The first day also included sessions on EV technologies and components, followed by an in-depth discussion on EV charging infrastructure by Dr. Narendra Babu, where participants explored design challenges, fast-charging solutions, and the economics of charging station development.

On the second day, Dr. M.M. Lokhande provided an overview of energy storage technologies, including lithium-ion and solid-state batteries. He further discussed advancements in battery technologies and their performance metrics. In another session, Dr. P.V. Kane introduced participants to the dynamics of electric motors in EV applications, focusing on efficiency optimization and torque-speed characteristics. The day concluded with an engaging session by Dr. Lokhande on current trends in electric motor technologies, such as BLDC and PMSM motors, emphasizing their significance in modern EVs.

The third day highlighted the integration of distributed energy resources (DERs) into the power grid, presented by Dr. N.R. Patne. She explored the challenges and benefits of distributed generation on distribution systems and delved into the role of smart grid technologies in energy management. In subsequent sessions, Dr. P.S. Kulkarni introduced the basics of hydrogen fuel

cells and discussed emerging technologies, including advanced materials and efficiency improvements. These sessions shed light on the immense potential of hydrogen fuel cells in powering the next generation of energy systems.

On the fourth day, the sessions shifted focus to practical aspects of EV design. Mr. Anil Dhole conducted sessions on EV components, tools, and design principles, offering hands-on insights into EVs' assembly, testing, and maintenance. The day's highlight was the industrial visit to Novasys Greenergy Pvt. Ltd., a leading firm specializing in renewable energy solutions. During the visit, participants gained invaluable insights into solar panel manufacturing processes and energy management systems. The interaction with industry experts bridged the gap between academic concepts and industrial practices, significantly enhancing the participants' understanding of real-world applications.

The final day featured sessions by Dr. (Mrs.) M.A. Chaudhari explained advanced charge distribution techniques for lithium batteries and the management of solar PV energy for EV charging. These sessions emphasized the integration of renewable energy with EV systems, highlighting the importance of power electronics and storage technologies. To address participants' mental well-being, Mrs. Jaya Awari conducted a session on stress management, offering practical strategies for maintaining a work-life balance. The FDP concluded with a reflection journal activity, a feedback session, and a valedictory event where participants shared their experiences and received certificates of participation.

Overall, the FDP successfully combined technical expertise with practical exposure, creating a platform for interdisciplinary learning and collaboration. Participants praised the comprehensive nature of the sessions, the hospitality extended by the organizers, and the valuable insights gained during the industrial visit. This program effectively bridged the gap between academia and industry, empowering participants to integrate green energy concepts into their teaching and research, thus contributing to a sustainable future.

## **Conclusion**

The DTE-sponsored FDP on "Next-Gen Energy: Electric Vehicles, Hydrogen Fuel Cells, and Energy Storage" marked a significant step toward bridging the gap between academia and industry in the field of sustainable energy. Through engaging sessions, hands-on training, and collaborative discussions, the program not only enhanced participants' technical acumen but also inspired them to contribute actively to the development of green energy solutions. The successful completion of this program underscores the importance of such initiatives in fostering innovation and preparing educators to address global sustainability challenges.

**NO. OF PARTICIPANTS: 28**

**Government College of Engineering, Nagpur**  
**Department of Electrical Engineering**

DTE sponsored  
One-week Faculty Development Programme  
on  
"Next-Gen Energy: Electric Vehicles, Hydrogen Fuel Cells  
and Energy Storage"  
(December 16-20, 2024)

**Participants List with their Participant ID**

Sr. No.	Participant ID	Name	Institute Name
1	PID001	Dr. Devendra Kishorilal Borikar	Government Polytechnic, Gadchiroli
2	PID002	Lokesh Purushottam Nikhade	Government College of Engineering, Chandrapur
3	PID003	Mrs Jyoti Dinesh Waghmare	Government Polytechnic, Mumbai
4	PID004	Dr. Seema S. Munjewar	Government Polytechnic, Bramhapuri
5	PID005	Vinod Nirdhari Bobde	Government Polytechnic, Murtizapur
6	PID006	Mr. Rashtrapal Bhagwatrao Teltumade	Government College of Engineering, Karad
7	PID007	Dr. Mudrika Ahmed	Government Polytechnic, Nagpur
8	PID008	Prof. Chandan M. Chawhan	Laxminarayan Innovation Technological University, Nagpur
9	PID009	Dr. Gaurav Gadge	St. Vincent Pallotti College of Engineering & Technology, Nagpur
10	PID010	Smita Pramod Bhuyarkar	Smt. Radhikatai Pandav College of Engineering, Nagpur
11	PID011	Anagha Waghadkar	Smt. Radhikatai Pandav College of Engineering, Nagpur
12	PID012	Manoj Bhaurao Deokate	Priyadarshini Polytechnic, Nagpur
13	PID013	Dr. Kiran M. Tajne	Government College of Engineering, Nagpur
14	PID014	Dr. Uday Wankhede	Government College of Engineering, Nagpur
15	PID015	Dr. Nilay Khobragade	Government College of Engineering, Nagpur

16	PID016	Trupti Kumbhalpuri	Government College of Engineering, Nagpur
17	PID017	Dr. Shrikant Tekade	Government College of Engineering, Nagpur
18	PID018	Dr. Prashant Jawade	Government College of Engineering, Nagpur
19	PID019	Sujata Bhele	Government College of Engineering, Nagpur
20	PID020	Rajani Sahare	Government College of Engineering, Nagpur
21	PID021	Neha Khadse	Government College of Engineering, Nagpur
22	PID022	Praful Nandankar	Government College of Engineering, Nagpur
23	PID023	Shweta Rajurkar	Government College of Engineering, Nagpur
24	PID024	Mrugsarita Borkar	Government College of Engineering, Nagpur
25	PID025	Pranali Hatwar	Government College of Engineering, Nagpur
26	PID026	Yogita Ashtekar	Government College of Engineering, Nagpur
27	PID027	Dipti Bhawarkar	Government College of Engineering, Nagpur
28	PID028	Ankita Rawat	Government College of Engineering, Nagpur

**DTE Sponsored One-week Faculty Development Programme**  
**Title: Next-Gen Energy: Electric Vehicles, Hydrogen Fuel Cells and Energy Storage**  
**December 16 – 20, 2024**  
**Programme Schedule**

Day/ Date	10:15-11:45	11:45 to 12:00	12.00 to 13:30	13:30 to 14:00	14:00-15:30	15:30 to 15:45	15:45 to 17:15
Monday 16/12/2024	Inauguration and keynote on Standardization and Interoperability in EV Charging Infrastructure and Components <i>Mr. Tapan Kumar Haldar</i>	Tea Break	The Future of Green Energy <i>Dr. N. K. Labhasetwar</i>	Lunch Break	EV Technologies and Components <i>Dr. Narendra Babu</i>	Tea Break	Charging Infrastructure for EVs <i>Dr. Narendra Babu</i>
Tuesday 17/12/2024	Overview of Energy Storage Technologies <i>Dr. M.M. Lokhande</i>		Battery Technologies for Energy Storage <i>Dr. M.M. Lokhande</i>		Electric Motor Dynamics in EV applications <i>Dr. P.V. Kane</i>		Current Trends of Electric Motors in EV applications <i>Dr. M.M. Lokhande</i>
Wednesday 18/12/2024	Impact of Distributed Generation on Distribution system <i>Dr. N.R. Patne</i>		Smart Grid Technologies and Energy Management <i>Dr. N.R. Patne</i>		Hydrogen Fuel Cells: Basics and Advances <i>Dr. P. S. Kulkarni</i>		Emerging Technologies in Hydrogen Fuel Cells <i>Dr. P. S. Kulkarni</i>
Thursday 19/12/2024	Electric Vehicle Components and Tools <i>Mr. Anil Dhole</i>		Design of Electric Vehicle <i>Mr. Anil Dhole</i>		Technical Discussion on Solar Panel Manufacturing & Industrial Visit <i>Mr. Deepak Tripathi</i>		Technical Discussion on Solar Panel Manufacturing & Industrial Visit <i>Mr. Deepak Tripathi</i>
Friday 20/12/2024	Charge distribution technique for lithium battery <i>Dr. (Mrs.) M. A. Chaudhari</i>		Management of Solar PV energy for charging EV <i>Dr. (Mrs.) M. A. Chaudhari</i>		Stress Management <i>Mrs. Jaya Awari</i>		Reflection Journal, MCQs, Feedback Session and Valedictory

## Government College of Engineering Nagpur

**DTE-sponsored One-Week Faculty Development Programme**  
**Next-Gen Energy: Electric Vehicles, Hydrogen Fuel Cells, and Energy Storage Systems**

16<sup>th</sup> -20<sup>th</sup> December 2024

### INAUGURATION SESSION

16<sup>th</sup> December 2024 (Monday)

9:00 am to 10:45 am

#### Programme Schedule

Timeline	Activity
9:00 to 10:00 AM	Registration and Breakfast for FDP Participants
10:00 to 10:15 AM	Arrival of Guest of Honour & Keynote Speaker
10:15 to 10:20 AM	Lightning of Lamp
10:20 to 10:25 AM	Welcoming Guests with plant saplings
10:25 to 10:30 AM	Address by FDP Coordinator
10:30 to 10:35 AM	Address by Guest of Honour
10:35 to 10:40 AM	Address by Principal
10:40 to 10:45 AM	Vote of Thanks
@10: 45 AM	Start of 1 <sup>st</sup> FDP Session

# FDP Brochure:

**Directorate of Technical Education**  
Maharashtra State, Mumbai  
*Sponsored*

**One-Week Faculty Development Programme (FDP)**  
*on*  
**Next-Gen Energy: Electric Vehicles,  
Hydrogen Fuel Cells and Energy Storage**  
16<sup>th</sup> Dec 2024 -20<sup>th</sup> Dec 2024



**Eligibility**  
Full-time faculty (from any discipline) from AICTE-approved Government/ Government-Aided Engineering Colleges/ Polytechnics/ Research scholars from Government institutions can participate. Eligible applicants will be selected on a first-come-first-served basis.

**Registration**  
Submit the details in Google form, Link below, and upload a scanned copy of the sponsorship letter from the Head of the Institution in the same Google form. Participants can also email a scanned copy of the registration form to the coordinator. No registration Fees.  
<https://forms.gle/vFsAgEPASS5TXDKG9>

**Accommodation and TA/DA**  
The Institute may provide accommodation at the institute hostel. If the participant asks, assistance will be provided for identifying outside lodging and boarding facilities. No TA/DA will be provided by this institute to any participant. Tea and lunch will be provided during the program.

**Important Dates**

Last Date of Registration	: 10.12.2024
Selection of Participants	: 12.12.2024
Commencement of Course	: 16.12.2024

**Patrons**

**Hon. Dr. Vinod Mohitkar**  
Director, Directorate of Technical Education, M.S. Mumbai

**Hon. Dr. S. S. Bhamre**  
Joint Director, DTE Mumbai

**Hon. Dr. M. B. Daigavane**  
Joint Director, Directorate of Technical Education, Regional Office, Nagpur

**Hon. Dr. Rewatkumar P. Borkar**  
Principal, Government College of Engineering, Nagpur

**Coordinator**  
**Dr. Rajesh S. Surjuse**  
Associate Professor & Head Electrical  
Govt. College of Engineering Nagpur

**Co-coordinator**  
**Prof. Praful V. Nandankar**  
Assistant Professor, Dept. of Electrical Engineering

**Advisory Committee**  
Dr. S. S. Pusadkar, Professor (CAS) & Head Civil  
Dr. Latesh Malik, Associate Professor & Head CSE  
Dr. S. B. Ingole, Associate Professor & Head Mechanical  
Prof. D. S. Chaudhari, Professor & Head ETC  
Dr. C.M. Khairnar, Associate Professor (CAS) & Head S&H  
Dr. S. W. Rajurkar, Associate Professor & Dean Acad.  
Dr. K. M. Tajane, Associate Professor & Dean SWC  
Dr. R. D. Raut, Associate Professor & Dean III & P  
Dr. P. B. Daigavane, Professor (CAS) & Dean Infra  
Dr. S. N. Khante, Associate Professor & Dean R&D

**Organising Committee**  
Dr. S. P. Jolhe, Assistant Professor, Electrical  
Prof. Rajani Sahare, Assistant Professor, Electrical  
Prof. Neha Khadse, Assistant Professor, Electrical  
Mr. Kundan Barai  
Mr. Vijay Waghmare  
Mr. Anil Bipte  
Mr. A. B. Mirase  
Mr. Rohit Fulzele



**Govt. College of Engineering  
Nagpur**  
(An Institute of Govt. of Maharashtra)

*organizes,*

**DTE Sponsored One-week  
Faculty Development Programme  
on**

**Next-Gen Energy: Electric Vehicles,  
Hydrogen Fuel Cells and Energy Storage**  
16<sup>th</sup> Dec 2024 -20<sup>th</sup> Dec 2024



**Address**

The Principal  
Government College of Engineering, Nagpur  
Sector 27, MIHAN Rehabilitation Colony, Khapri  
(Railway), Nagpur, Maharashtra, INDIA 441108.  
Phone:07103-295220, 295211  
Mail: principal.gcoenagpur@dtmaharashtra.gov.in  
Website: [www.gcoen.ac.in](http://www.gcoen.ac.in)

**About the Institute**

Government College of Engineering Nagpur was started in 2016 with 5 UG & 1 PG Engineering Programmes under the administrative control of the Higher and Technical Education Department, Govt. of Maharashtra. The Institute is affiliated to RTM Nagpur University Nagpur. The Institute is spread over a Green Campus of 11.87 acres in New Khapri, MIHAN, Nagpur. Many students have brought laurels to the Institute in various activities. Many students are pursuing higher studies in NITs, IITs, IIMs, renowned Government institutes and outside the country viz. USA, Canada. The institute has been accredited with B++ Grade for 5 years. The government of Maharashtra has granted a Centre of Excellence in "Renewable Energy Utilization and Conservation of Energy" to the Institute. The Institute is also extending services to society through technology transfer under "Unnat Bharat Abhiyan (UBA)". UBA cell of the Institute is also awarded a National award of Rs. 1.75 Lakh

**About the Department**

The Electrical Engineering Department aims to be a centre of excellence in imparting quality education; catering to the needs of industry and society for the last 4 years, established in 2016-17 with an intake capacity of 60 students in B.Tech. (Electrical Engg.) program. The Department is well-equipped with modern labs and faculty. The Department has successfully organized various STTPs and FDPs. Electrical Engineering Student Association (EESA) has organized various technical, social and professional activities in the last four years.

**Introduction**

With climate change and our reliance on fossil fuels becoming more pressing, the future of green energy is a subject of great significance and quick development. Electric vehicles (EVs), hydrogen fuel cells, and sophisticated energy storage systems are three technologies that are essential as we move toward a more sustainable future. Innovations in battery technology, such as those involving lithium-ion and newer alternatives, are essential to guarantee a steady and

dependable energy source. Our understanding of the problems and opportunities around energy storage technologies, hydrogen fuel cells, and electric cars will shape a sustainable and wealthy world as we explore the future of green energy.

**About the Course**

The objective of our DTE FDP is to empower engineering faculty with the knowledge and skills necessary to comprehend, educate, and contribute to the evolution of green energy technologies. Through focused sessions, participants will delve into the principles and applications of electric vehicles, hydrogen fuel cells, and energy storage systems. Emphasizing interdisciplinary collaboration, the program will encourage faculty to integrate these concepts seamlessly into their curricula. Hands-on training opportunities will be provided to ensure practical understanding and proficiency. Engaging with industry experts and policymakers will offer insights into market trends and regulatory landscapes, enhancing participants' real-world perspectives. Ultimately, our objective is to nurture a community of educators and researchers equipped to tackle sustainability challenges and drive positive change in the field of sustainable energy

**Course Contents**

Broad areas to be covered in the Course –

- EV charging infrastructure and technologies
- Battery technologies for EVs
- Fuel cell vehicles: technology and infrastructure
- Battery storage technologies
- Green Hydrogen Economy
- Smart grid technologies and their role in green energy
- Environmental benefits of green energy technologies

**Contacts-**  
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Office contact: 07103295226(P), 07103295220(O)

**Registration Form**

One week FDP on  
**Next-Gen Energy: Electric Vehicles,  
Hydrogen Fuel Cells and Energy Storage**  
16-20 December 2024

Name (in Block letters): \_\_\_\_\_

Designation: \_\_\_\_\_

Department: \_\_\_\_\_

Address: \_\_\_\_\_

Mobile Number (WhatsApp): \_\_\_\_\_

Email ID: \_\_\_\_\_

Educational Qualification: \_\_\_\_\_

Specialization: \_\_\_\_\_

Experience: Teaching: \_\_\_\_\_ Others: \_\_\_\_\_

I agree to abide by the rules and regulations of FDP and will attend the FDP for the entire duration.

Place: \_\_\_\_\_  
Date: \_\_\_\_\_ Signature of Applicant

This is certified that Mr./Ms./Dr. \_\_\_\_\_ is a regular faculty of the institute. He/ She will be deputed for the said program and upon selection, he/she will be relieved for attending the said FDP.

Date: \_\_\_\_\_

(Name & Signature)  
(Head of the Institute)

Seal of the Institute

### Photographs during the Event:



















## FDP News:

