A TECHNICAL REPORT ON

COE Training

In

UIT RGPV
Shivpuri

From 6th Oct 2023 to 10th Oct 2023

WITH

14 Students

Organized by
DEPARTMENT OF ELECTRICAL ENGINEERING

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
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Introduction

In an era marked by unprecedented technological advancements, the power sector plays a pivotal role in shaping the world's future. With an ever-increasing demand for reliable and sustainable energy sources, governments across the globe are recognizing the urgent need to invest in cutting-edge training and education. To address this challenge, a groundbreaking government-funded training program has been organized, spanning five intensive days, to empower individuals and professionals in the domains of power transmission, smart grid technology, power generation, and fuel cell applications. This training initiative represents a significant step forward in nurturing the talents and skills essential for the growth and sustainability of the energy industry. Throughout these five days, participants will gain invaluable insights into the latest developments, technologies, and strategies that will drive the power sector into a smarter, more efficient, and environmentally friendly future. This program not only demonstrates a commitment to fostering innovation but also a dedication to the welfare and progress of society, as we collectively embark on a journey toward a more sustainable and energy-efficient world.

List of students who participated in this program

Sr. No.	Name	Class	Enrolment	Mobile no.	Email	Category
1	Mantavy Kishor Sandal	UG	0901EE213D02	8435352404	mantavy.t@gmail.com	OBC
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9	Kunal Jolly Saxena	UG	0901EE201067	6266360324	20ee1067@mitsgwl.ac.in	GEN
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13	SachinMahor	UG	0901EE201103	9522065615	sachinmahor304@gmail.com	SC
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Day-1 **Date-06/10/2023**

About COE (PERE)

Speaker: Dr. Rakesh Singhai (Director, UIT Shivpuri)

The director of UIT Shivpuri introduced us to the whole program. He told us that the students of Electrical Engineering/Electrical and Electronics Engineering discipline can utilize the facilities of COE PERE and facilities available in NPTI Shivpuri for the UG/PG lab experiments. The proposed Labs for Existing B.Tech/M.Tech Course and for Elective Subjects of B.Tech/M.TechCourses. Though, as per the scheme of RGPV, elective subjects do not offer labs, performing experiments in this modern lab will strengthen the subject topic among students.

Power Transmission (Theory & Practical)

Speaker: Mrs. Shweta Gupta

Power Transmission(Practical)

Speaker: Mr. Amit and Mr. R. Narbaria

Learning power transmission through simulators can impart a range of valuable knowledge and skills, including:

Understanding Power Transmission Systems: Participants learn the fundamental principles and components of power transmission systems, including substations, transformers, high-voltage lines, and distribution networks.

Operation and Control: They gain insights into how these systems are operated, controlled, and managed to ensure efficient electricity distribution, including load balancing, voltage regulation, and fault detection.

Safety Protocols: Training covers essential safety protocols and procedures to minimize risks associated with working in high-voltage environments and emergency response techniques.

Troubleshooting Skills: Simulators enable participants to develop troubleshooting skills, helping them identify and rectify issues within the power transmission system effectively.

Grid Reliability: Participants understand the importance of grid reliability and learn how to ensure a continuous supply of electricity, reducing downtime and disruptions.

Smart Grid Technologies: Simulators may introduce trainees to smart grid technologies, including advanced monitoring and control systems, to enhance grid performance and sustainability.

Environmental Impact: Trainees may explore the environmental aspects of power transmission, including reducing environmental impact through efficient transmission and distribution practices.

Adaptive Decision-Making: The dynamic nature of simulations fosters adaptive decision-making, helping participants make informed choices in rapidly changing conditions.

Regulatory Compliance: Participants may gain insights into regulatory requirements and compliance in the power transmission sector.

Teamwork and Communication: Collaborative exercises within the simulators promote effective teamwork and communication skills, which are crucial in real-world power transmission operations.

Energy Efficiency: Training may emphasize energy efficiency strategies and techniques to minimize losses during power transmission.

Data Analysis: Participants can learn how to analyze data from the transmission system, enabling them to make data-driven decisions and optimize network performance.

Preventive Maintenance: Understanding maintenance procedures and schedules helps maintain the integrity and reliability of transmission equipment

Day-2 Date-07/10/2023

Smart Grid (Theory)

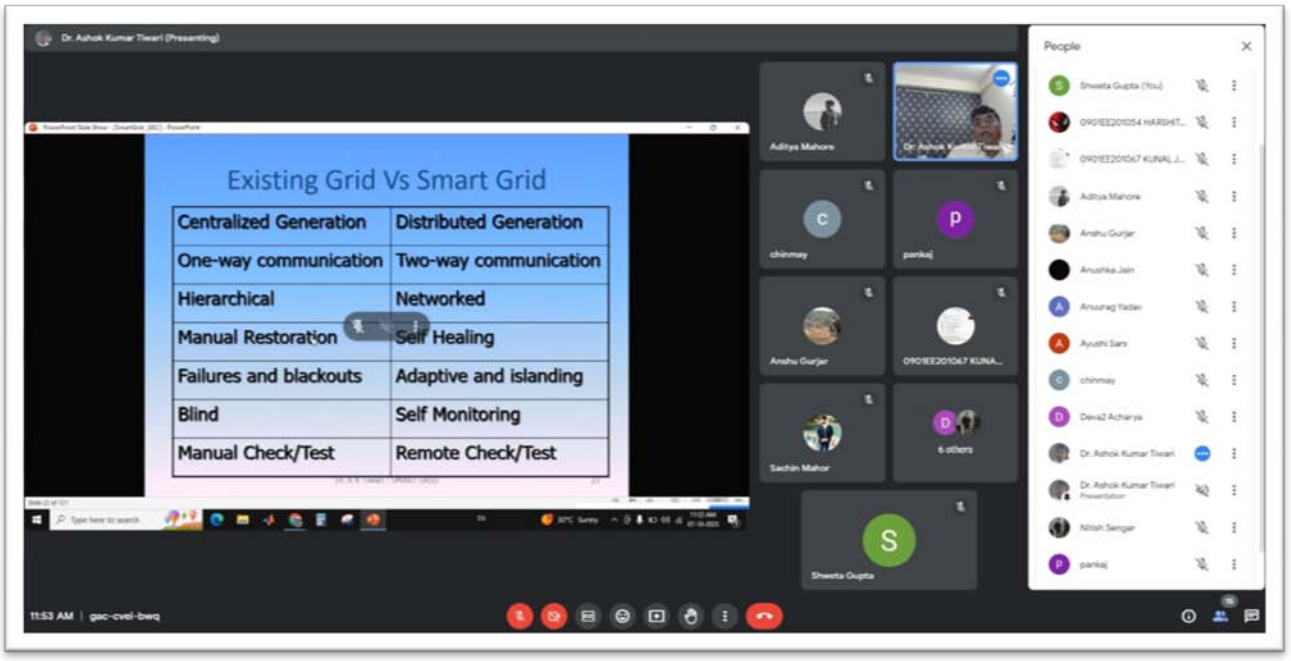
Speaker: Dr. Ashok Kumar Tiwari (DGM CTI, Jabalpur)

Smart Grid (Practical)

Speaker: Mr. Amit and Mr. R. Narbaria

Learning about smart grids through simulators offers a comprehensive understanding of this transformative technology and its impact on the energy sector. Here's what we learned from a smart grid training program using simulators:

Smart Grid Fundamentals: Participants gain a deep understanding of smart grid principles, components, and concepts, including advanced metering infrastructure (AMI), distribution automation, and demand response.



Grid Operations: Trainees learn how smart grids enhance the monitoring and control of the electrical grid. They explore real-time data collection and analysis, grid balancing, and load management.

Renewable Energy Integration: The training program demonstrates how smart grids facilitate the integration of renewable energy sources, such as solar and wind, into the existing grid infrastructure. Participants understand the challenges and solutions related to intermittent power generation.

Energy Management: Simulators allow trainees to experiment with energy management systems, which enable consumers to optimize their energy consumption and reduce costs.

Demand Response Programs: Participants can simulate demand response scenarios, learning how smart grids enable utilities to incentivize customers to reduce energy usage during peak periods, ultimately contributing to grid stability.

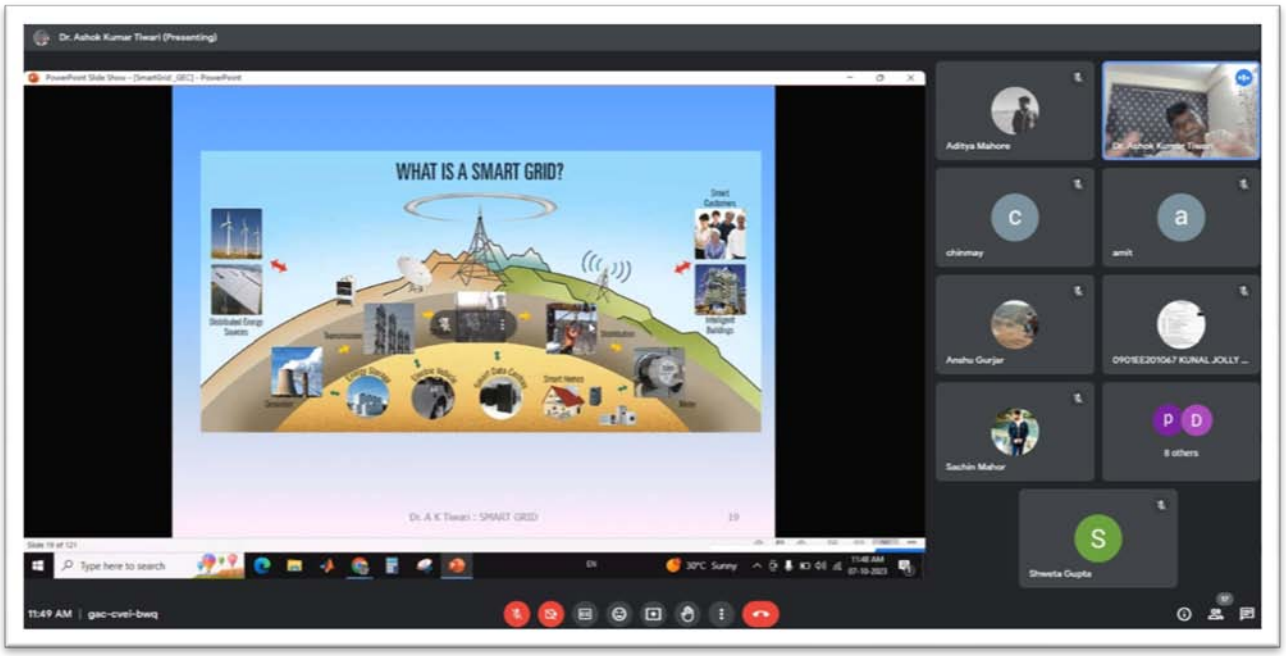
Cybersecurity: Understanding the importance of cybersecurity in protecting smart grid infrastructure is a key component of the training. Participants explore potential threats and security measures to safeguard the grid.

Data Analytics: Trainees develop skills in data analytics, which are essential for making informed decisions within a smart grid environment. They learn to process, analyze, and interpret data for improved grid management.

Grid Resilience: The training program addresses grid resilience and how smart grid technologies enhance the ability to respond to disruptions and recover quickly from outages, ensuring uninterrupted power supply.

Efficiency and Reliability: Participants learn how smart grids optimize energy distribution, reduce energy losses, and improve the reliability of the electrical grid.

Sustainability: The program covers the environmental benefits of smart grids, including reduced carbon emissions, efficient energy utilization, and support for sustainable energy practices.



Communication Protocols: Trainees delve into the communication protocols and technologies used within smart grids, including the Internet of Things (IoT) devices, sensors, and advanced communication networks.

Regulatory and Policy Framework: Understanding the regulatory and policy framework surrounding smart grids is vital. Participants learn about standards, regulations, and government initiatives that influence smart grid deployment

Simulated Scenarios: Participants engage in realistic scenarios within the smart grid simulation environment. These scenarios may include grid optimization, fault detection, renewable energy integration, and emergency response exercises.

Day-3 **Date-08/10/2023**

Power Generation (Theory)

Speaker: Mr. Rohit Gupta (Asst. Director, NPTI, Shivpuri)

Power Generation (Practical)

Speaker: Mr. Amit and Mr. R. Narbaria

Learning about power generation through simulators is a dynamic and hands-on way to understand the complexities and innovations in the field of energy production. Here's what we learned from a power generation training program using simulators:

Power Generation Basics: The training program covers the fundamental principles of power generation, including various energy sources such as fossil fuels, nuclear, renewable energy, and emerging technologies.

Power Plant Operations: Participants gain insights into the operation of different types of power plants, from coal-fired and natural gas plants to nuclear reactors, hydroelectric facilities, and renewable energy farms.

Efficiency and Performance Optimization: Trainees learn how to maximize the efficiency and performance of power generation systems. Simulators enable them to make adjustments, monitor outputs, and troubleshoot issues to achieve optimal results.

Environmental Impact: The program explores the environmental impact of different power generation methods, emphasizing the importance of reducing emissions and mitigating environmental harm.

Renewable Energy Integration: Participants can experiment with simulators to understand how renewable energy sources like wind, solar, and geothermal power are harnessed, stored, and integrated into the grid.

Energy Storage Solutions: Learning about energy storage systems is crucial. Simulators help participants grasp the concepts of battery technology, flywheels, and other energy storage solutions.

Grid Connection: Trainees learn how power generation facilities connect to the electrical grid, manage energy distribution, and contribute to grid stability.

Safety Protocols: Safety is paramount, and participants gain an understanding of safety measures and protocols specific to power generation facilities.

Maintenance and Repairs: The training program includes maintenance and repair simulations, teaching participants how to ensure the reliability and longevity of power generation equipment.

Remote Monitoring and Control: Simulators showcase remote monitoring and control systems, allowing trainees to operate power plants from a distance and respond to emergencies in real-time

Cost Analysis: Understanding the cost analysis of different power generation methods is essential. Participants can explore the financial aspects of power generation, including cost per megawatt-hour and return on investment.

Emerging Technologies: The program may introduce emerging technologies in power generation, such as advanced modular reactors, advanced gas turbines, and carbon capture and storage (CCS).

Grid Integration Challenges: Participants learn about the challenges and solutions associated with integrating diverse power generation sources into a cohesive energy system, ensuring grid reliability.

Day-4 **Date-09/10/2023**

Fuel Cell technology (Theory)

Speaker: Dr. S. K. Dhakad (Professor & Head of Mechanical Dept.)

Wind Power Generation & Fuel Cell (Practical)

Speaker: Mr. Amit and Mr. R. Narbaria

Learning about fuel cells and wind turbines through simulators provides a comprehensive understanding of these renewable energy technologies and their applications. Here's what they told us that we can learn from a training program using simulators for fuel cells and wind turbines:

Fuel Cells:

Fuel Cell Basics: Participants gain a strong foundation in the principles of fuel cells, including how they convert chemical energy into electricity, and the different types of fuel cells, such as hydrogen

fuel cells and solid oxide fuel cells.

Fuel Sources: Trainees learn about various fuel sources used in fuel cell technology, including hydrogen, natural gas, and biofuels, and understand the advantages and challenges associated with each.

Hydrogen Production: Simulators provide insights into the production of hydrogen, which is often used as the fuel source for fuel cells. This includes steam methane reforming, electrolysis, and other hydrogen production methods.

Fuel Cell Operation: Participants have the opportunity to operate and control fuel cells in a simulated environment, understanding how they generate electricity efficiently and with minimal emissions.

Energy Storage: Learning about fuel cells also involves understanding their potential as energy storage devices. Participants explore how fuel cells can store excess energy and release it when needed.

Environmental Impact: The training program emphasizes the low environmental impact of fuel cells and how they can contribute to reducing greenhouse gas emissions.

Applications: Trainees explore various applications of fuel cells, including stationary power generation, transportation (fuel cell vehicles), and backup power systems.

Fuel Cell Maintenance: The program covers maintenance and troubleshooting of fuel cells, enabling trainees to ensure the long-term functionality and reliability of these systems.

Wind Turbines:

Wind Energy Fundamentals: The program covers the fundamentals of wind energy, explaining how wind turbines convert kinetic energy from the wind into electrical power.

Wind Turbine Types: Participants learn about different types of wind turbines, including horizontal-axis and vertical-axis turbines, and understand their design principles and applications.

Wind Resource Assessment: Simulators allow trainees to assess wind resources at potential wind farm locations, taking into account factors such as wind speed, direction, and variability.

Turbine Siting and Design: Trainees explore the siting and design considerations for wind turbines, including tower height, blade design, and environmental impacts.

Grid Integration: Understanding how wind energy is integrated into the electrical grid is essential. The program covers grid connection, energy storage options, and the role of wind energy in grid stability.

Wind Turbine Operation: Participants have the opportunity to operate wind turbines in a virtual environment, adjusting turbine settings to optimize energy generation and respond to changing wind conditions.

Maintenance and Troubleshooting: The training program includes maintenance and troubleshooting exercises for wind turbines, ensuring that participants can keep these systems operating efficiently.

Economic Analysis: Trainees can perform economic analyses, including calculating the cost of

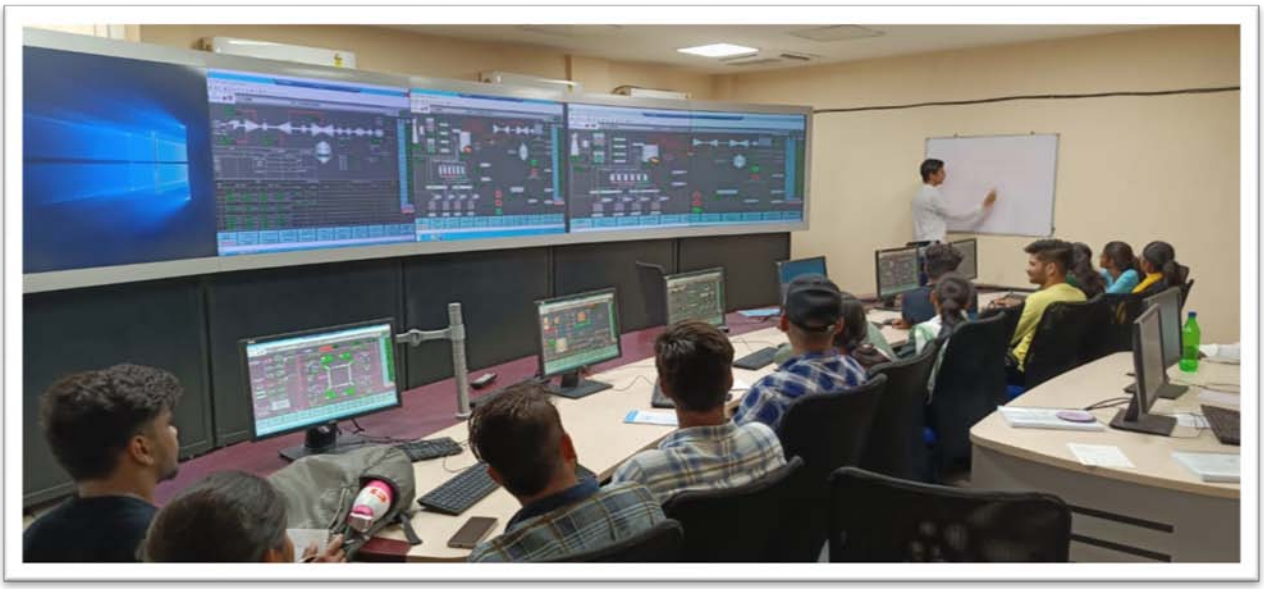
energy produced by wind turbines, return on investment, and project financing.

Day-5 **Date-10/10/2023**

Lab Visit NPTI

NPTI is an organization in India that provides training and education related to the power and energy sector. It offers a variety of courses, including those related to power plant operation, maintenance, and management. NPTI Shivpuri is one of the regional branches of NPTI, and it is known for its contributions to the power sector by offering training and educational programs to individuals interested in pursuing careers in the power industry.

Visiting NPTI Shivpuri is an opportunity to bridge the gap between theoretical knowledge and practical application in the power and energy sector. It provides valuable insights for students, professionals, and anyone interested in understanding the complexities and importance of power generation and distribution.



As I stepped onto the NPTI campus, I was immediately struck by the atmosphere of innovation and the institute's commitment to energy education. The visit was a guided tour that provided a well-structured introduction to various aspects of the power industry.

Evaluation/Feedback & Certificate distribution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