MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE
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Report on
Industrial Visit
to
"400 kV/220 kV Substation, Kalikiri"
Organised by
Department of Electrical and Electronics Engineering
In Association with IIIC and ISTE Chapter, MITS
Date: 03.01.2026

Coordinator: Mr. Ramesh Kumar R
Submitted by: Mr. Ramesh Kumar R, Assistant Professor, Dept. of EEE
Participants: B. Tech-III Yr / II Sem-EEE Students
Total No of participants: 40
Faculties Accompanied:

Mr. R. Ramesh Kumar
Dr. R Saravana Kumar
Mrs. Sujatha

Introduction:

On 3rd January 2026, a group of B.Tech. III Year/II Sem - EEE students from Madanapalle Institute of Technology & Science, Madanapalle, Andhra Pradesh, embarked on an industrial visit to the 400 kV/220 kV Substation, Kalikiri. The purpose of the visit was to provide students with practical insights into the operation, maintenance, and functioning of a substation.

Objectives of the Visit:

- Gain practical knowledge about the operation and management of electrical substations and their role in power transmission and distribution.
- Understand the main components of a substation, including transformers, circuit breakers, isolators, bus bars, and protection systems.
- Learn about the voltage transformation process, load management, and safety measures implemented in substation operations.
- Observe the real-time monitoring, control, and protection mechanisms used to ensure reliable and uninterrupted power supply.
- Explore career opportunities and research possibilities in the areas of power systems, substation automation, and electrical protection engineering.

Activities during the Visit:

The industrial visit commenced with a comprehensive technical briefing on the SCADA-based Control and Monitoring System by Mr. S. V. Mahesh Babu, EE (O&M), 400 kV Substation, Kalikiri. The session provided in-depth insights into the Supervisory Control and Data Acquisition (SCADA) architecture employed for real-time monitoring, remote control, data logging, alarm management, and event analysis of the extra-high-voltage (EHV) power system. The engineer demonstrated how key electrical parameters such as voltage, current, power flow, frequency, breaker status, and fault indications are continuously supervised through computer-based Human–Machine Interfaces (HMIs) to ensure grid stability and operational reliability.

Subsequently, students were taken on a guided technical tour of the substation yard, accompanied by Mr. S. V. Mahesh Babu and Mr. B. Purushottam, DEE (Maintenance). During this session, the overall single-line diagram (SLD), bay configuration, and physical layout of the 400 kV and associated transformation facilities were explained in detail. The engineers elaborated on the power flow path from incoming EHV transmission lines through bus bars, circuit breakers, isolators, current transformers (CTs), potential transformers (PTs), and power transformers, ultimately feeding the downstream transmission and distribution networks. The functional role of each component in maintaining system continuity, redundancy, and reliability was highlighted.

The students participated in interactive technical sessions focusing on the operating principles, construction, and protection schemes of major substation equipment, including power transformers, SF_6 circuit breakers, disconnectors, earthing switches, and numerical protective relays. Detailed explanations were provided on load dispatch, protection coordination, fault detection, isolation mechanisms, and system restoration procedures following disturbances.

Students observed the control room operations, gaining exposure to real-time grid supervision, switching operations, interlocking schemes, alarm handling, and system event analysis that collectively ensure the safe, reliable, and uninterrupted supply of electrical power. The engineers further briefed the students on substation safety practices, including earthing and grounding systems, , personal protective equipment (PPE), and preventive and predictive maintenance strategies.

The visit concluded with an interactive question-and-answer session, during which students engaged with the technical personnel to understand practical challenges related to power transmission, grid management, substation automation, and maintenance of EHV systems. The session provided valuable hands-on exposure and bridged the gap between theoretical concepts and real-world power system operations in modern electrical substations.

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Sustainable Development Goal (SDG) Mapping

Focus Area	Related SDG	SDG Badge
Understanding power transmission, distribution, and grid reliability	Affordable and Clean Energy	SDG 7
Promoting safe, efficient, and sustainable electrical infrastructure	Industry, Innovation and Infrastructure	SDG 9
Enhancing technical education, practical exposure, and skill development in electrical engineering	Quality Education	SDG 4
Encouraging awareness of safety standards and environmental responsibility in power systems	Climate Action	SDG 13

Program Outcomes (PO) Mapping

Activity Aspect	Related PO
Understanding substation components, power flow, and voltage transformation	**PO1 – Engineering Knowledge**
Observing the operation of transformers, circuit breakers, and protection systems	**PO2 – Problem Analysis**
Exposure to safety standards, earthing systems, and operational regulations	**PO6 – The Engineer and Society**
Awareness of electrical safety measures and sustainable power distribution practices	**PO7 – Environment and Sustainability**
Interaction with substation engineers and technical staff	**PO8 – Ethics & PO9 – Individual and Team Work**
Discussion on substation automation and emerging technologies	**PO12 – Life-long Learning**

Conclusion:

The Industrial Visit to the 400 kV/220 kV Substation was highly informative and enriching. Students gained a clear understanding of the operation and significance of substations in the power transmission and distribution network. The Executive Engineer and the technical team provided detailed explanations about the working of transformers, circuit breakers, isolators, and protective relays, along with their specifications and safety mechanisms.

Acknowledgments:

We thank our Chancellor, Pro Chancellor Vice Chancellor, Registrar, Principal, Vice-Principal-Administration, Dean (School of Engineering) and the HoD/EEE for giving us the permission to experience such an insightful Industrial visit to 400 kV/220 kV Substation, Kalikiri. We extend our sincere thanks to the management and staff of Substation for their hospitality and cooperation in organizing this Industrial visit.

R. Ramesh Kumar

Coordinator

Head of the Department/ EEE