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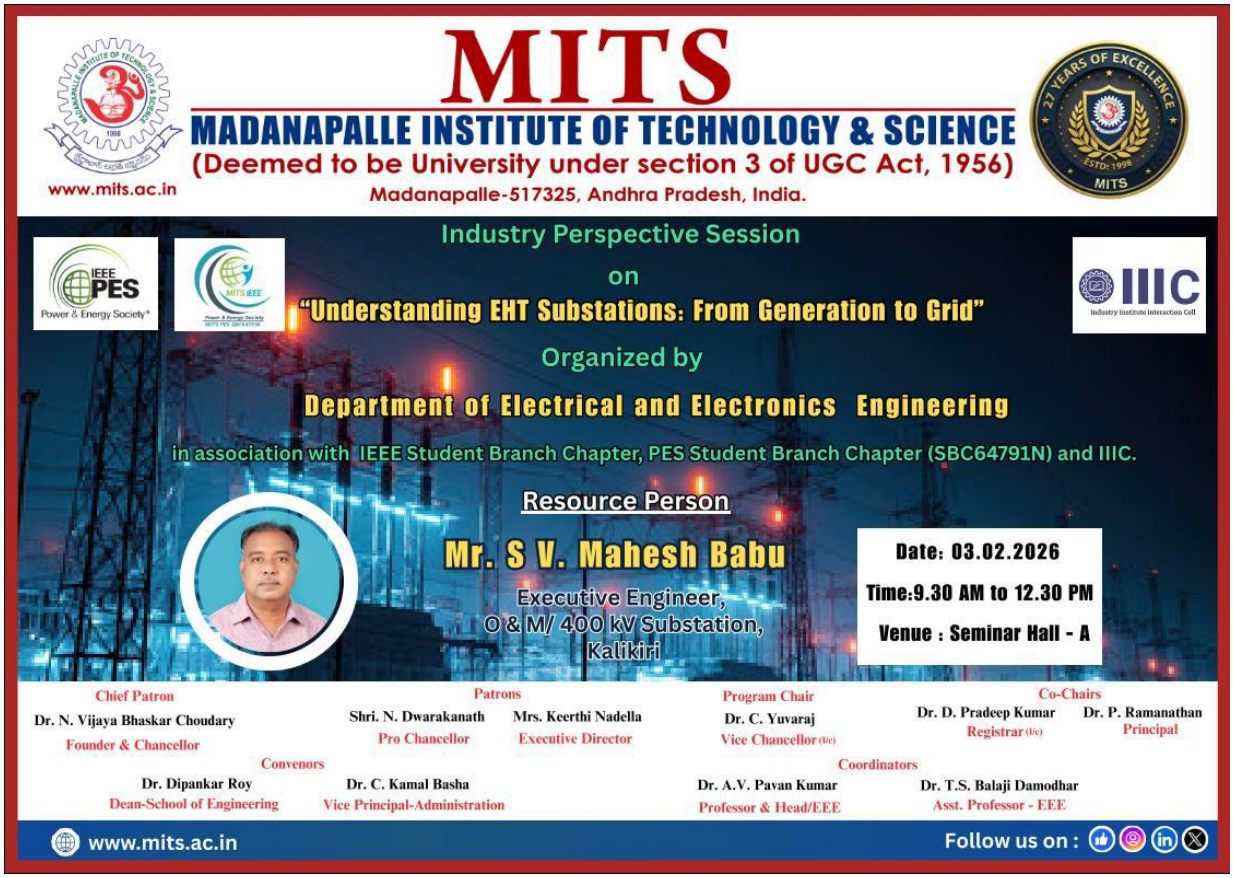
Report on
Industry Perspective Session
on
"Understanding EHT Substations: From Generation to Grid"
Organised by
Department of Electrical and Electronics Engineering
In Association with IEEE Student Branch Chapter, PES Student Branch Chapter and IIIC
Date: 03.02.2026

Coordinators: Dr. A V Pavan Kumar, Professor & Head/EEE and Dr. T S Balaji Damodhar, AP/EEE
Submitted by: Dr. T S Balaji Damodhar, Assistant Professor, Dept. of EEE
Resource Person: Mr. S V Mahesh Babu, Executive Engineer (O & M), 400 kV Substation, Kalikiri
Mode of Conduct: Offline
Total number of participants: 120 (B. Tech - II Year and III Year EEE Students)



Introduction:

The guest lecture program began with a welcome address by **Mr. Ramesh Kumar R**, followed by the Chief Guest introduction by **III Year student Ms. Sufiya Danish**. **Dr. Dipankar Roy**, Dean (School of Engineering), emphasized the role of guest lectures in bridging academia and industry, and **Dr. A. V. Pavan Kumar**, HoD/EEE, highlighted their impact on students' technical growth and career development. The inauguration of the guest lecture concluded with the Chief Guest sharing a few words on the importance of such sessions and motivating students to utilize them effectively.

Objectives of the Guest Lecture:

- To provide a clear understanding of the role of EHT/UHT substations in the power system from generation to transmission and distribution.
- To explain the major equipment used in 400 kV substations such as transformers, circuit breakers, isolators, CTs, PTs, lightning arresters, etc.
- To familiarize students with substation layout, busbar arrangements, and switching operations followed in real substations.
- To understand operation and maintenance (O&M) practices in high-voltage substations through an industry expert.
- To create awareness about protection, control, and safety procedures followed in EHT substations.
- To bridge the gap between theoretical knowledge and practical industry exposure in power system engineering.
- To motivate students towards career opportunities in transmission, substations, and power utilities.

Content Delivered during the Session:

The guest lecture was delivered on the topic "Overview of an EHT Substation", highlighting the importance of Extra High Tension substations in modern power systems. The resource person explained that transmission utilities operate at higher voltage levels such as 132 kV, 220 kV, and 400 kV to ensure reliable power supply and reduce transmission losses. The session began with a discussion on how electrical power is generated at low voltages and stepped up to EHT levels using step-up transformers to minimize I^2R losses during long-distance transmission. The voltage is later stepped down in stages at substations to meet consumer requirements such as 230 V single-phase and 400/440 V three-phase supply.

The lecture covered substation classification based on voltage and technology, including conventional outdoor substations and Gas Insulated Substations (GIS). The major components of an EHT substation were explained, including power transformers, circuit breakers, CTs, PTs/CVTs, lightning arresters, isolators, busbars, station transformers, wave traps, control and relay panels, batteries and chargers, AC/DC distribution systems, earthing, cables, and PLCC.

The working and construction of power transformers were discussed in detail, including cooling methods (ONAN/ONAF/OFAF) and protection devices such as Buchholz relay, PRV, and differential protection.

The functioning of circuit breakers and protective relays during normal and fault conditions was explained clearly. Instrument transformers were introduced for metering and protection, along with key safety precautions such as CT secondary should never be open-circuited and PT secondary should never be short-circuited. The lecture concluded with an overview of busbar arrangements, lightning protection, isolator safety practices, and control room systems. Overall, the session provided students with valuable practical understanding of substation operation, protection practices, and safety procedures.

Photographs:

Outcomes:

1. Students understood the role of EHT substations in transmitting power efficiently from generating stations to load centers.
2. Students gained clarity on major substation equipment such as power transformers, circuit breakers, CTs, PTs, CVTs, lightning arresters, isolators, and busbars.
3. Students learned the working principles and safety precautions of CTs, PTs, isolators, and circuit breakers.
4. Students understood different busbar arrangements and their importance in reliability and operational flexibility.
5. Students gained practical exposure to control room systems, protection relays, DC supply systems, and overall substation operation practices.

Sustainable Development Goal (SDG) Mapping

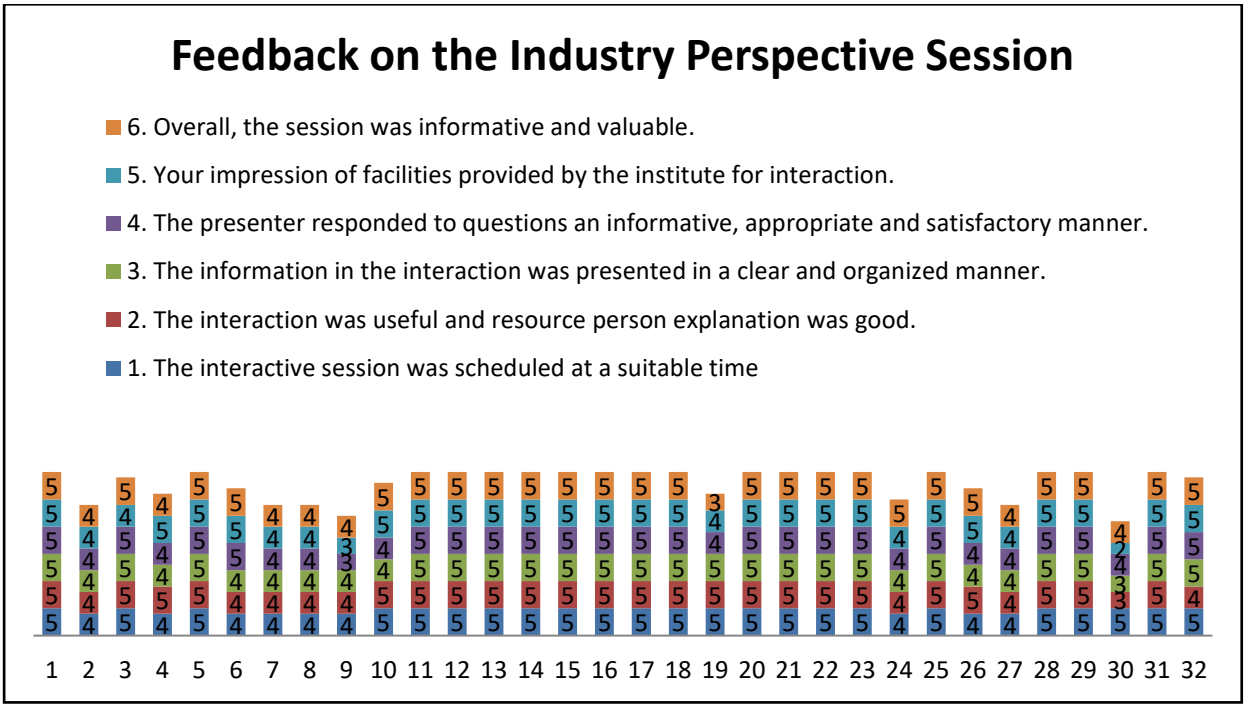
Focus Area	Related SDG	SDG Badge
Understanding UHV transmission, substations, and grid reliability	Affordable and Clean Energy	SDG 7
Promoting advanced and sustainable power infrastructure (UHV lines, substations, and grid modernization)	Industry, Innovation and Infrastructure	SDG 9
Enhancing technical education through industry interaction, practical exposure, and skill development in power systems	Quality Education	SDG 4

Encouraging awareness of safety standards and environmental responsibility in UHV power systems	Climate Action	SDG 13

Program Outcomes (PO) Mapping

Activity Aspect	Related PO
Understanding the role of UHV/EHT substations in power transmission, voltage stepping, and grid operation	PO1 – Engineering Knowledge
Learning the working and purpose of major equipment such as transformers, circuit breakers, CTs, PTs, isolators, busbars, and lightning arresters	PO2 – Problem Analysis
Understanding protection systems, relays, and fault clearing process for reliable grid operation	PO3 – Design/Development of Solutions
Awareness of safety practices such as earthing systems, isolator operation sequence, and maintenance precautions in substations	PO6 – The Engineer and Society
Understanding the importance of loss reduction, efficiency improvement, and sustainable electrical power delivery	PO7 – Environment and Sustainability
Interaction with industry expert and learning real-time substation operational practices	PO9 – Individual and Team Work
Gaining awareness on modern substation trends such as automation, monitoring, and future expansion	PO12 – Life-long Learning

Feedback:



Conclusion:

The guest lecture program concluded on a successful note with an interactive session, where students actively participated and clarified their doubts with the Chief Guest. As a mark of respect and gratitude, the Chief Guest was honored with a shawl and a memento. Finally, the vote of thanks was delivered by the III Year student Ms. Reddy Neeraja, expressing sincere gratitude to the Chief Guest, dignitaries, faculty members, and students for their support and participation, which made the event a grand success.

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 conduct such an insightful Industry Perspective Session. We also express our sincere gratitude to the Chief Guest, Mr. S. V. Mahesh Babu, for sparing his valuable time and delivering a wonderful and highly informative lecture for the benefit of the students.

Coordinator

Head of the Department/ EEE

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