Industrial Visit Report

on

220/132/33 kV, MSETCL Baramati Substation, Baramati, Dist. Pune

Date: 13th March 2025

SY B. Tech Electrical Student & Teacher with 220/132/33 kV, MSETCL Baramati Substation staff

Industrial Visit Report: 220/132/33 kV, MSETCL Baramati Substation, Baramati, Dist. Pune

Date of Visit: 13th March 2025
Organized By: Department of Electrical Engineering, VPKBIET, Baramati
Location: 220/132/33 kV, MSETCL Baramati Substation, Baramati, Dist. Pune
Co-ordinator: Mr. Dipak S. Yeole, Mrs. P. N. Jaiswal
Number of Students Participated: 81

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1. Introduction:

As part of the curriculum for the Power System Analysis (PSA), Electrical Machine I (EM I), Power Electronics (PE) course, an industrial visit was organized to 220/132/33 kV, MSETCL Baramati Substation, Baramati, Dist. Pune on 13th March 2025. The visit aimed to provide students with practical exposure to the workings of a substation and its components. This hands-on experience was essential for reinforcing theoretical concepts covered in the classroom.

2. Objectives of the Visit:

The primary objective of this industrial visit was to provide students with practical exposure to substation operations, equipment, and protection systems. The visit aimed to reinforce theoretical concepts studied in the curriculum by allowing students to observe real-world applications of electrical engineering principles.

Visit Overview:

The visit commenced with a briefing by substation engineers, explaining the layout, key components, and operational significance of the 220/132/33 kV substation. Students were divided into groups and guided through different sections of the substation, where they interacted with engineers and observed various equipment in operation.

Topics Covered

Power System Analysis (PSA)

1. **Single Line Diagram Explanation:** The substation's single-line diagram was presented and explained in detail, highlighting power flow, voltage levels, and major components such as transformers, circuit breakers, and busbars.
2. **Conductors and Their Types:** Different types of conductors used in transmission and distribution were discussed, including:
   i) **ACSR (Aluminum Conductor Steel Reinforced):** High mechanical strength and conductivity.
   ii) **AAAC (All Aluminum Alloy Conductor):** Better corrosion resistance.
   iii) **Copper Conductors:** Used for high-reliability applications.

3. **Faults and Their Types:**
   i) Symmetrical Faults: Three-phase faults that affect all phases equally, causing severe system instability.
   ii) Unsymmetrical Faults: Include single-line-to-ground, line-to-line, and double-line-to-ground faults, which cause unbalanced system conditions.

Electrical Machine I (EM I)

1. **Applications of 3-Phase Transformers:** Power transmission, industrial machinery, renewable energy systems, and electrical substations.
2. **Cooling Methods:**
   i) **Air Natural (AN):** Used for dry-type transformers.
   ii) **Oil Natural (ON):** Common in power transformers.
   iii) **Oil Forced (OF):** Used in high-capacity transformers.
   iv) **Air Blast:** Used in specialized installations.
3. **Current Transformer (CT) and Potential Transformer (PT):**
   i) **CT:** Measures current and provides protection.
   ii) **PT:** Steps down high voltage for measurement and protection.

Power Electronics (PE)

1. **Battery Charger:** Used to restore battery charge and maintain power backup.
2. **Battery Set:** A combination of batteries connected in series or parallel to ensure uninterrupted power supply.
3. **Types of Battery Chargers:**
   i) **Trickle Chargers:** Provide a slow charge to maintain battery health.
   ii) **Fast Chargers:** Rapidly charge batteries for quick power restoration.
   iii) **Smart Chargers:** Automatically adjust the charging process for efficiency.
4. **Converter and Inverter and Their Types:**
   i) **Converters: AC-DC (Rectifiers):** Converts alternating current to direct current.
   ii)**DC-DC (Choppers):** Used for voltage regulation in DC systems.
5. **Inverters:**
   i) **Square Wave Inverter:** Basic design with harmonic distortion.
   ii) **Modified Sine Wave Inverter:** Improved efficiency over square wave.
   iii) **Pure Sine Wave Inverter:** Provides high-quality power output.

Key Learnings from the Visit:

- Understanding of substation layout and operation.
- Hands-on knowledge of transformers, busbars, circuit breakers, and protective relays.
- Practical exposure to power system protection and fault analysis.
- Insight into power electronics applications in substations.
- Real-world implementation of theoretical concepts studied in class.

Conclusion:

The industrial visit to the 220/132/33 kV MSETCL, Baramati Substation provided students with a valuable learning experience by reinforcing theoretical knowledge through practical exposure. The visit enhanced their understanding of substation components, electrical machines, and power electronics. This experience will play a crucial role in their academic and professional growth in electrical engineering.

Acknowledgment:
We extend our sincere gratitude to the authorities at MSETCL Baramati Substation for their support and guidance. Also, thank to Hon. Management, Principal and Hod Electrical Engineering, Faculties for allowing us to visit substation.

Some Glimpses:

Mrs. Kekan and Mr. Dheeraj R. Dehankar are explaining students about 220/132/33 kV, MSETCL Baramati Substation