

DEPARTMENT OF ELECTRICAL ENGINEERING

A Report on

Industrial Visit for Electrical Department Third Year Students

At

Chandrapur Super Thermal Power Station & Solar Power Plant



Visit Coordinator:

Assi. Prof. P. S. Swami
(Department of Electrical Engineering)

Organized & Managed By:

Department of Electrical Engineering
Government College of Engineering, Yavatmal

Date: 24th November 2023

Introduction:

Department of Electrical Engineering from Government College of Engineering, Yavatmal arranged one day Industrial Visit for Third Year Electrical Engineering students to "Chandrapur Super Thermal Power Station & Solar Power Plant" dated 24th November 2023 for better technical knowledge enhancement of students.

Visit is important especially important in the field of Engineering as the practice of engineering has an inherent (and unavoidable) impact on society. These programs can be a powerful tool to constitute a positive industrial climate. Overall, the aim of all these visit to trains the students to familiar about power generation process. After visit students can identify their own efficiency and performance which important for their career, improving work efficiency and confidence.

Purpose:

Industrial visits are an integral part of Engineering and acknowledgment of technological up-gradation. The purpose of industrial visit for students is to provide technical knowledge with the technological development in the industry and to understand the gap between the theoretical and practical knowledge that could be passed in future. This experience can help students to provided information regarding functioning of various industries and associated problems and limitations.

Interfacing with the industry also provide a chance to build networks and hone their communication skills. Moreover, the participating organizations also gain by getting refined students from the respective institute which could also help in improving their economy

Procedural Steps for Organizing Visit:

Organizing a visit to a place like Chandrapur Super Thermal Power Station (CSTPS) involves several procedural steps which involve:

- 1. **Contact CSTPS Administration:** Reach out to the administration of CSTPS through their official channels. Identify the appropriate contact person or department responsible for handling visit requests.
- 2. **Define Purpose and Objectives:** Clearly articulate the purpose of the visit. Whether it's for educational purposes, research, or industrial exposure, make sure to communicate the objectives of the visit.
- 3. **Submit Formal Request Letter:** Prepare a formal letter on official letterhead from institution requesting permission for the visit. Include details such as the proposed date and time, the number of participants (students and faculty), and the purpose of the visit.
- 4. **Provide Participant Information:** Include a list of participants with their names, designations (if faculty), and any other relevant details. This helps CSTPS in managing and facilitating the visit.
- 5. **Specify Areas of Interest:** Clearly mention the specific areas or departments within CSTPS that you wish to visit. This will help CSTPS in coordinating the itinerary and ensuring that you get the most relevant and educational experience.
- 6. Request Permission for Photography or Recording: If there is a need to take photographs or record during the visit, explicitly mention this in your request. Some industrial sites may have restrictions on photography for security reasons.
- 7. **Inquire About Safety Regulations:** Ask CSTPS about safety regulations and requirements during the visit. Ensure that all participants are aware of and adhere to safety protocols. This might include wearing appropriate safety gear, following specific routes, and attending safety briefings.

- 8. **Coordinate Logistics:** Work with CSTPS to coordinate logistics such as entry points, parking facilities, and any other specific requirements. Confirm whether CSTPS will provide any guides or if your group needs to be self-guided.
- 9. **Arrange Transportation:** If transportation is not provided by CSTPS, make arrangements for transportation from your institution to CSTPS and back. Ensure that the mode of transportation complies with any safety regulations.
- 10. **Confirm Visit Details:** Prior to the visit, confirm all details with CSTPS, including the date, time, meeting point, and any additional instructions. Ensure that all participants are well-informed.



Company Profile:

1. Chandrapur Super Thermal Power Station

Chandrapur Super Thermal Power Station (often abbreviated as CSTPS) is a thermal power plant located in Chandrapur district in the Indian state of Maharashtra. The power plant is one of the coalbased power plants of MAHAGENCO. The coal for the power plant is sourced from Durgapur and Padmapur Collieries of Western Coalfields Limited. The plant was officially inaugurated by the then Prime Minister Indira Gandhi on 8 October 1984.

Chandrapur Thermal Power Station is an operating power station of at least 2920-megawatts (MW) in Chandrapur, Maharashtra, India with multiple units, some of which are not currently operating.



Project Details

Table 1: Project-level location details

| Plant name | Location | Coordinates(<u>WGS84</u>) |
|---|-----------------------------------|-----------------------------|
| Chandrapur Super Thermal Power Station | Chandrapur, Maharashtra, India | 20.0063, 79.29 (exact) |

Table 2: Unit-level details

| Unit name | Status | Fuel(s) | Capacity (MW) | Technology | Start year | Retired year |
|--------------|---------------------|----------------------|---------------|-------------|---------------|-----------------|
| Unit 2 | Retired | coal - bituminous | 210 | subcritical | 1984 | 2016 |
| Unit 3 | Operating | coal - bituminous | 210 | subcritical | 1985 | _ |
| Unit 9 | Operating | coal - bituminous | 500 | subcritical | 2016 | _ |
| Unit 5 | Operating | coal - bituminous | 500 | subcritical | 1991 | _ |
| Unit 4 | Operating | coal - bituminous | 210 | subcritical | 1986 | _ |
| Unit 1 | Retired | coal - bituminous | 210 | subcritical | 1983 | 2016 |
| Unit 6 | Operating | coal - bituminous | 500 | subcritical | 1992 | _ |
| Unit 7 | Operating | coal - bituminous | 500 | subcritical | 1997 | _ |
| Unit 8 | Operating | coal - bituminous | 500 | subcritical | 2015 | _ |
| | Total Capacity (MW) | | | | | |

Table 3: Unit-level ownership and operator details

| Unit name | Owner |
|-----------|--|
| Unit 2 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 3 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 9 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 5 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 4 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 1 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 6 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 7 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |
| Unit 8 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |

Project-level coal details

• **Permit(s)**: January 30, 2009 – Environmental Clearance

Background

- The power station is owned by Maharashtra State Power Generation Company (MSPGCL), a Maharashtra government owned company.
- The original power station comprised Units 1-4 (210MW each) and units 5-7 (500MW each) Units 1-2 were retired in 2016, after units 8-9 went online Unit 8-9 Expansion.
- In 2014 a 1000MW expansion of the plant was underway with the addition of 2 x 500MW units (units 8-9). Units 8 & 9 were expected to be commissioned by June 2014 and January 2015 respectively, later pushed to November 2014 for unit 8 and March 2015 for unit 9.
- Unit 8 was synchronized in January 2015 and planned for commissioning in March 2015. Unit 8 completed a trial run in May 2015.
- According to the India Ministry of Power, Unit 9 is planned for June 2015, later pushed to January 2016. It was commissioned in March 2016.



Coal supply

In April 2015 Western Coalfields Limited agreed to supply coal to the new Chandrapur unit 8 on a temporary basis until it gets a permanent linkage. Of the six recently commissioned units by Mahagenco, there is no permanent linkage for five of them, as Mahagenco's captive mines in Odisha - Machchhakatta and Mahanadi - have been de-allocated following the orders of Supreme Court.

2. Ground Mounted Solar Power Station

Ground Mounted Solar Power Station located in Chandrapur district in the Indian state of Maharashtra.

Ground Mounted Solar Power Station is an operating power station of at least 2 megawatts (MW) in Chandrapur, Maharashtra, India.



Project Details

Table 1: Project-level location details

| Plant name | Location |
|------------------------------------|--------------------------------|
| Ground Mounted Solar Power Station | Chandrapur, Maharashtra, India |

Table 2: Unit-level ownership and operator details

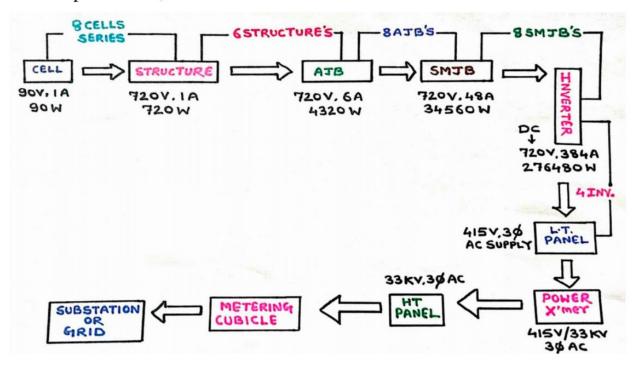
| Unit name | Owner |
|--------------|--|
| Unit 1 and 2 | Maharashtra State Power Generation Co Ltd (MAHAGENCO) [100.0%] |

Table 3: Unit-level details

| Unit name | Status | Mounting | Capacity (MW) | Type of Solar Panel |
|-------------------|-----------|----------------|---------------|---------------------|
| Unit 1 | Operating | Ground Mounted | 1 MW | Monocrystalline |
| Unit 2 | Operating | Ground Mounted | 1 MW | Monocrystalline |
| Total Capacity MW | | 2 MW | | |

Flowchart

Electrical Connections of First MW Level Ground Mounted Solar Power Plant in Chandrapur District, Maharashtra State



• Cell:

A solar cell or photovoltaic cell (PV cell) is an electronic device that converts the energy of light directly into electricity by means of the photovoltaic effect.

In DC System, P = V * I



Structure

A structure in formed by combining 8 cells in series

Then, by connecting 8 cells in series 90*8 = 720 V (In series connection voltage is added and current as it is i.e. Constant)

$$V = 720 \text{ V}, I = 1 \text{ A}, P = 720 \text{ W}$$

Array Junction Box

In Array Junction box 6 structures are connected in parallel.

Inverter Rating is 250 KW

In order to increase the power we have to increase the current by connecting the structure in parallel.

$$V = 720 \text{ V}, I = 6A, P = 4320 \text{ W}$$

• String Monitoring Junction Box

Now by connecting 8 Array junction box the power of solar power system is get increases

$$V = 720 \text{ V}, I = 48 \text{ A}, P = 34560 \text{ W}$$

Inverter

Inverter rating = 250 W

$$1 \text{ MW} = 1000 \text{ KW}$$

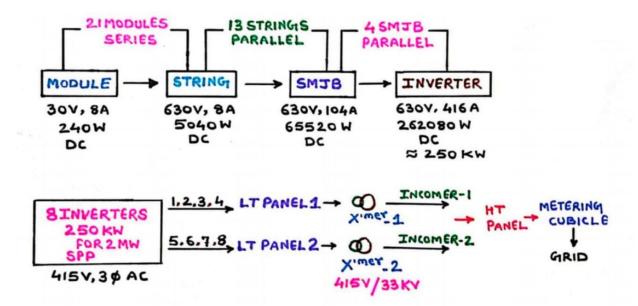
For 1 MW, 4 inverter of 250 W rating is used in solar power station

$$250*4 = 1000 \text{ KW or } 1\text{MW}$$

For 2 MW = 8 Inverters Used

• LT panel

LT Panel is an electrical distribution board that receives power from an solar panels and distributes the same to various electronic devices and distribution boards. Such panels are used in industries both for internal and external use and, therefore, they are quite rugged to withstand different climatic conditions.



Ground Mounted Solar Power Station of 2 MW Capacity



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Permission Letter: 1. College



शासकीय अभियांत्रिकी महाविद्यालय यवतमाळ (GOVERNMENT COLLEGE OF ENGINEERING YAVATMAL)







जा.कः शाअमय/EED Visit/२०२३/३१९१

दिनांक :- २०.११.२०२३

प्रति.

मा.सहसंचालक, तंत्रशिक्षण, वि.का., अमरावती.

> विषय :—धर्मल पॉवर स्टेशन, चंद्रपूर येथे शैक्षणिक सहली करीता जाण्याची परवानगी मिळणे बाबत.

संदर्भ :- धर्मल पॉवर स्टेशन, चंद्रपूर यांचे पत्र क.CE/CSTPS/TRG/02160 Dt. 16/11/2023

महोदय.

या संस्थेतील तृतीयवर्ष विद्युत अभियांत्रिकी या विभागातील विदयार्थ्यांची दि. २४.११.२०२३ रोजी चंदपूर येथे धर्मल पाँवर स्टेशन व सोलर फांट करीता औद्योगिक शैक्षणिक सहल आयोजित केली आहे. यात ५९ विद्यार्थी व ०५ शिक्षकीय अधिकारी यांचा समावेश आहे. सदर सहल ही महाराष्ट्र राज्य परिवहन महामंडळ यांचे बसने जाणार आहे. तरी सदर शैक्षणिक सहलीला दि. २४.११.२०२३ रोजी जाण्याकरीता परवानगी देण्यात यांवी ही विनंती.

शासकीय अभियांत्रिकी महाविद्यालय यवतमाळ

सहपत्र :-

१. विदयार्घ्यांची यादी

२. धर्मल पावर स्टेशन चंद्रपूर यांचे परवानगी पत्र

प्रत :- १. मा आगार प्रमुख महाराष्ट्र राज्य परिवहन महामंडळ, आगर यवतमाळ यांना माहितीकरीता.



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2. Permission for In Plant Visit at CSTPS, Chandrapur



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Ref: CE/CSTPS / TRG/

W02160

Date

1 5 NOV 2023

To,

THE PRINCIPAL, GOVERNMENT COLLEGE OF ENGINEERING, YAVATMAL,445001

Sub: - Permission for In Plant Visit at CSTPS, Chandrapur.

Ref: - I] LETTER NO. GCOEY/Visiting/EED/2023-24/2879, Date - 18/10/2023 2) GM/HR/Trg./No.01627/Date-16.02.2017.

In pursuance of the powers delegated to the Chief Engineer (Gen), CSTPS, Chandrapur, permission is herby granted to the total 64 students of Electrical Engineering Dept.of. GOVERNMENT COLLEGE OF ENGINEERING, VAVATMAL. Along with staff member as per letter cited above for in-Plant visit at their own risk & cost & as per the rules & regulation laid by the company, as under.

- 1. Date of Visit 24,11,2023.
- Students/Faculties to report first to The Dy Commandant, CISF Unit CSTPS Chandrapur (M.S.), CSTPS & complete Security Formablies.
- 3. Timing of Visit will be 10.00 to 17.00 Hrs.
- 4. The charges to be levied for visit to CSTPS Plant for Trainers/college students/Faculties in Batches Will be Rs.118/- (100-18% GST-118) per student/person. This has to be Deposited in CSTPS, Account Section prior two days of scheduled visit & Xerox of money Receipt should be submitted to Training Section.
- 5. They will have to follow all security / safety norms stringently.
- 6. They will have to follow all security instructions issued by Officer In Charge.
- 7. No conveyance / accommodation will be provided.
- Photography, in any form is strictly prohibited. Mobiles or any other communication device will not be allowed inside the plant.
- Student should come in uniform with formal shoes & college ID card as approved by college/school during the visit.

(Doer)

DY.CHIEF ENGINEER (ADMIN) CSTPS, CHANDRAPUR.

Copy to:

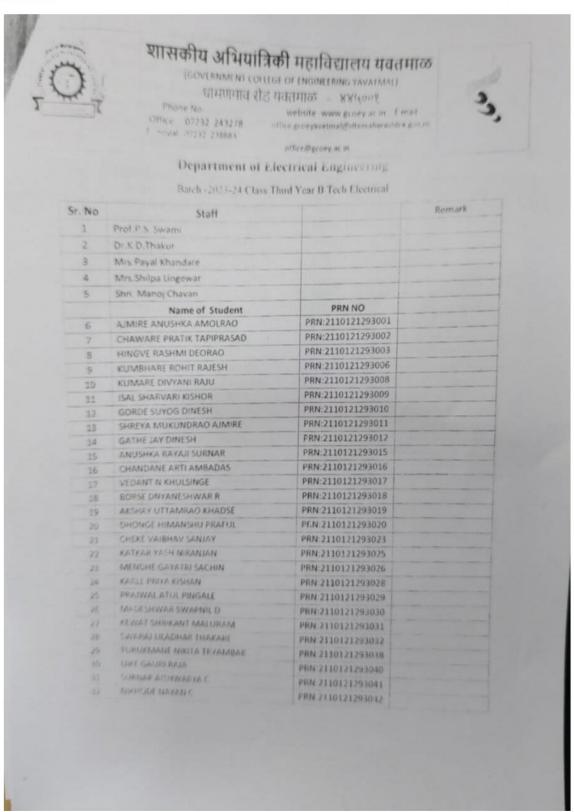
- 1. The AGM, F&A, CSTPS, Chandrapur
- The Dy Commandant, CISF Unit CSTPS Chandragur (M.S.).
- 3 The Safety Officer, CSTPS
- 4. The Sr. Security Manager

D. Disking Employees File Office New Soider von UNE DAY VISIT PERMISSION AND VI TRAINING PERMISSION LETTER days



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Government College of Engineering, Yavatmal (Affiliated to, Dr. Babasaheb Ambedkar Technological University)

| 33 | Name of Student BHABUTKAR DAKSHANI C | PRN NO | |
|----|--|--------------------------------|---|
| 34 | SAMIKSHA SURVI | PRN 2110121222 | |
| 35 | SAMIKSHA SUNIL ANBHORE | PRN:2110121293043 | |
| 36 | PUJARI RADHESHAM JAKKAPPA | PRN:2110121293044 | |
| | ROHIT BHAGWAN | PRN.2110121293046 | |
| 37 | WANKHADE SAURABH M | PRN:2110121293047 | |
| 38 | OSHI DEVESH DHANRAJ | PRN:2110121293048 | |
| | SAULAT DAMANRAI | PRN:2110121293050 | |
| 40 | SAWANT RAJESH BALASAHL | [2210121293501 | |
| 41 | KHORGADE OMKAR NARAYANRAO | 2210121293502 | |
| 42 | MAPARI VUAY SANTOSH | 2210121293503 | |
| 43 | THAG SHUBHANGI GAJANAN | 2210121293504 | |
| 44 | THORAT VISHAKHA KAILAS | 2210121293505 | |
| 45 | NAPHADE CHINMAY LALIT | 2210121293506 | |
| 45 | AWARE VAIBHAV RANGNATH LANJEWAR JINA BHAGWAT | 2210121293507 | |
| 47 | KADUKAR DIPAK MILIND | 2210121293508 | |
| 48 | DAKHORE MANISHA HARIDAS | 2210121293509 | |
| 49 | MAHAJAN SAGAR PRAVIN | 2210121293510 2210121293511 | |
| 50 | SHEIKH AFATAB HABIB | 2210121293512 | - |
| 51 | BARDE DEEP BHAUSAHEB | 2210121293513 | |
| 52 | PATIL MANISH MAHESH | 2210121293514 | |
| 53 | THAKARE SHREEYA SHYAM | 2210121293515 | |
| 54 | PAWAR REVATI NANDKISHOR | 2210121293516 | |
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Detailed Schedule:

| Date | Time | | |
|---------------------------|--------------------|--------------------------------|--|
| | 5:30 am | Gathered at College | |
| | 6:00 am – 10:30 am | Yavatmal to Chandrapur | |
| | 11:00 am | Reach to CSTPS Training centre | |
| 24 th November | 11:30 am – 1:30 pm | Site Visit CSTPS | |
| 2023 | 2:00 pm | Lunch Break | |
| | 3:00 pm – 4:00 pm | Theory Class | |
| | 4:30 pm | Site Visit Solar Power Plant | |
| | 6:00 pm – 10:00 pm | Chandrapur to Yavatmal | |



What we learn:

On 24th November 2023 we reached at Chandrapur by 11:00 AM. After showing Permission letter to CISF on main gate we got entry at Plant by 11:30 PM.



After wearing safety helmet, we start walk into plant There we meet communicated engineer at department he was came with us and explain detail working cycle of power generation at TPS. Then after he shown us turbine room, generator room, boiler, Economiser, air preheater, ID and FD fan.

By Visiting CSTPS we come to known about

1. Operational Processes:

 A visit to the Chandrapur Super Thermal Power Station would provide a firsthand look at the operational processes involved in power generation. This includes understanding how fuel (likely coal) is handled, burned, and converted into steam to drive turbines.

2. Power Generation Technologies:

 We also got the opportunity to see the advanced technologies employed in power generation, such as high-efficiency boilers, modern turbines, and sophisticated control systems.

3. Scale and Capacity:

 Super thermal power stations are large-scale facilities. A visit would help you comprehend the sheer scale of the infrastructure and the significant amount of electricity they generate.

4. Environmental Controls:

 Thermal power stations, including super thermal power stations, often implement environmental controls to reduce emissions. This could include measures to capture and mitigate pollutants. Understanding these controls is crucial in the context of environmental sustainability.

5. Safety Measures:

 Safety is a top priority in power stations. During your visit, you might learn about the safety measures in place, including protocols for handling high-pressure steam, emergency shutdown procedures, and measures to protect workers.

6. Efficiency Considerations:

• Efficiency is a key aspect of power generation. You may learn about how the power station maximizes the conversion of heat into electricity and minimizes waste through concepts such as heat rate.

7. Integration with the Grid:

 Chandrapur Super Thermal Power Station, like any other major power plant, is likely integrated into the broader power grid. Understanding how it synchronizes with the grid, manages load fluctuations, and contributes to grid stability is essential.

8. Maintenance Practices:

 Power plants require regular maintenance to ensure the reliable and efficient operation of equipment. Observing maintenance practices during your visit can provide insights into the efforts involved in keeping the facility in optimal condition



Conclusion:

From this visit, we got the information and practical knowledge about Power generation by coal fired plant. Students got the knowledge about boiler operation, working of condenser and cooling towers, different mountings and accessories used in thermal power plant. also got the idea about working of different cycles like coal and ash cycle, water and steam cycle, ash handling cycle, cooling water cycle.



About 59 students of Electrical Engineering Department, Govt. College of Engineering, Yavatmal & faculty named Prof. P. S. Swami & Dr. K. D. Thakur benefited from this visit as they got chance to discussion with In-charge officer and other engineers working at power plant. Students were eagerly to say organizing this type of industrial visit for practical exposure which is shows the success of this visit.



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Photos:









Student Feedback:

I **Afatab Habib Sheikh** as a representative of the students from the Department of Electrical Engineering to express our heartfelt gratitude for the incredible opportunity we were given the recent industrial visit to Chandrapur Super Thermal Power Station (CSTPS). This experience has left an indelible mark on our understanding of electrical engineering, and we are immensely thankful for the support and guidance we received from the department.

First and foremost, I would like to extend our sincere appreciation to our esteemed faculty members who orchestrated this educational excursion. Your commitment to enriching our academic experience and exposing us to real-world applications has been truly invaluable. You have not only imparted theoretical knowledge within the classroom but have gone above and beyond to ensure that we witness the practical aspects of our field.

To the department staff who meticulously organized the logistics of the visit, thank you for your tireless efforts. From coordinating transportation to ensuring our safety during the trip, your attention to detail and dedication did not go unnoticed.

Our sincere gratitude also goes to the authorities at Chandrapur Super Thermal Power Station. The warm welcome and hospitality extended to us made our visit both educational and enjoyable. We are grateful for the openness with which your team shared insights into the cutting-edge technologies and operational processes at CSTPS. It was a privilege to witness firsthand the complex machinery and systems that drive power generation on such a massive scale.

The industrial visit has not only broadened our knowledge but has also inspired us to delve deeper into the intricacies of electrical engineering. Witnessing the application of theoretical concepts in a real-world setting has ignited a passion within us, motivating us to strive for excellence in our academic pursuits.

As students, we understand that such opportunities are not only a testament to the department's commitment to our education but are also instrumental in shaping our future careers. The exposure to industry practices has provided us with a unique perspective that goes beyond textbooks, and we are grateful for the investment made in our learning journey.

In conclusion, thank you, once again, to the Department of Electrical Engineering for making this industrial visit to CSTPS possible. We are truly fortunate to be part of a department that not only values academic excellence but also actively seeks avenues to bridge the gap between theory and practice.

We look forward to more such enriching experiences and are committed to applying the knowledge gained to contribute meaningfully to the field of electrical engineering.

Thank you.

Afatab H. Sheikh