A Report on the Industrial Visit to the Doppler Weather Radar Station, India Meteorological Department (IMD), Machilipatnam

by

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
KONERU LAKSHMAIAH EDUCATION FOUNDATION
(Deemed to be University estd, u/s, 3 of the UGC Act, 956)
(NAAC Accredited "A++" Grated University)
Green Fields, Guntur District, AP, India – 522 502

Date of Visit: 07/11/2025

DWR RADAR & Radiosonde Industrial Visit
India Meteorological Department Machilipatnam
07 November 2025
INDUSTRIAL VISIT *DWR RADAR, IMD, Machilipatnam*

DATE	:	07.11.2025
SECTION	:	III Year
EVENT	:	Industrial Visit

Faculty Coordinators:

1. *Dr. G. China Satyanarayana,* Associate Professor, ECE
2. Dr. Ushadevi Yalavarthi, Associate Professor, ECE
3. *Dr. Nishant Kumar, Assistant Professor, ECE*

EVENT DESCRIPTION:

An industrial visit was organized by the Department of Electronics and Communication Engineering (ECE) for the III-year students of the Even Semester on 7th November 2025, between 13:00 to 20:00 hours. The visit was conducted to the India Meteorological Department (IMD), Machilipatnam, a premier national organization dedicated to meteorological research, weather forecasting, and atmospheric data analysis.

The primary objective of this visit was to bridge the gap between theoretical concepts learned in the classroom and their practical applications in the real world. Through this industrial exposure, students gained an in-depth understanding of meteorological observations, data collection techniques, and the role of advanced radar and radiosonde systems in weather prediction and analysis.

The IMD, being the national meteorological agency of India, operates under the Ministry of Earth Sciences (MoES) and plays a crucial role in providing accurate weather forecasts, issuing timely warnings about severe weather events, and supporting sectors such as agriculture, aviation, shipping, and disaster management.

This visit provided an excellent opportunity for students to observe firsthand the technologies and methodologies employed in monitoring atmospheric phenomena, thereby enhancing their technical knowledge and appreciation of how engineering contributes to meteorological science.

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The visit was structured into various sessions to provide a comprehensive learning experience:

Introduction to IMD:

The program commenced with an introductory session on the India Meteorological Department, its history, organizational structure, and significance in the nation's socio-economic development. Officials from IMD briefed the students about the department's objectives, data collection networks, and the importance of meteorological observations in day-to-day life and national planning. The discussion also highlighted IMD's role in climate monitoring, disaster preparedness, and scientific innovation within the field of weather forecasting.

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Meteorological Instruments and Equipment:

During the visit, students were introduced to a wide range of meteorological instruments and measuring devices used by the India Meteorological Department (IMD) for systematic data collection. These instruments are essential for recording critical atmospheric parameters such as temperature, pressure, humidity, wind speed, and wind direction, along with rainfall intensity, solar radiation, and sunshine duration. The IMD officials demonstrated how these instruments are calibrated, maintained, and synchronized with automated data loggers to ensure precision and accuracy. Students also learned about the integration of digital technologies and sensors that help in real-time data transmission to centralized monitoring systems.

1. **Observation Stations:** The students had the opportunity to visit multiple observation stations within the IMD facility. These included both manual and automatic weather stations equipped with essential instruments like anemometers, barometers, rain gauges, and thermographs. The tour provided insights into how continuous environmental monitoring is conducted and how data from these instruments are consolidated to form a complete meteorological profile. The session also emphasized the importance of spatial and temporal consistency in meteorological observations and the role of observation networks in maintaining nationwide weather databases.

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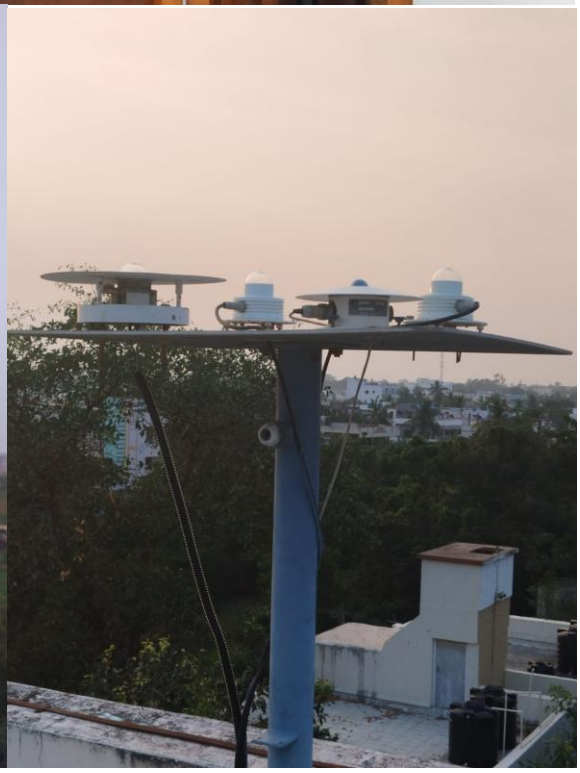
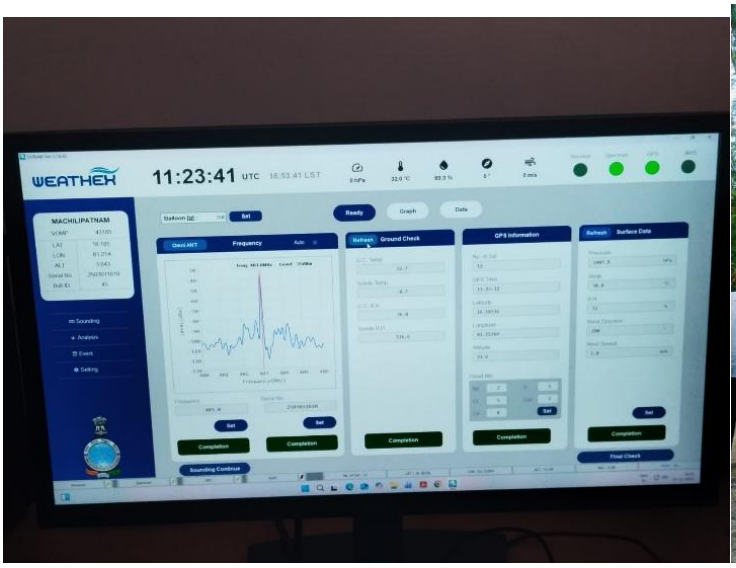


2. **Doppler Weather Radar (DWR):** One of the most fascinating parts of the visit was the exposure to the Doppler Weather Radar (DWR) Station. Students observed firsthand the functioning of advanced radar systems used to detect, measure, and track precipitation, as

well as monitor storm movements and atmospheric disturbances. IMD officials explained the principle of the Doppler effect and demonstrated how radar echoes are processed to determine the intensity, velocity, and movement of rain clouds. The students gained an understanding of how DWR data supports real-time forecasting, cyclone tracking, and disaster management operations across the country.

3. **Radiosonde Observation:** Another key highlight of the visit was the Radiosonde Observation Session, conducted at 4:30 PM on 07 November 2025. Students witnessed the preparation and release of radiosondes sophisticated weather balloons equipped with miniaturized sensors that record atmospheric parameters such as temperature, humidity, pressure, and wind speed across various altitudes. IMD scientists explained the data transmission process through telemetry and how the collected information contributes to upper-air analysis for weather modeling and prediction. The students were fascinated by the complexity and precision involved in launching and tracking these high-altitude instruments.



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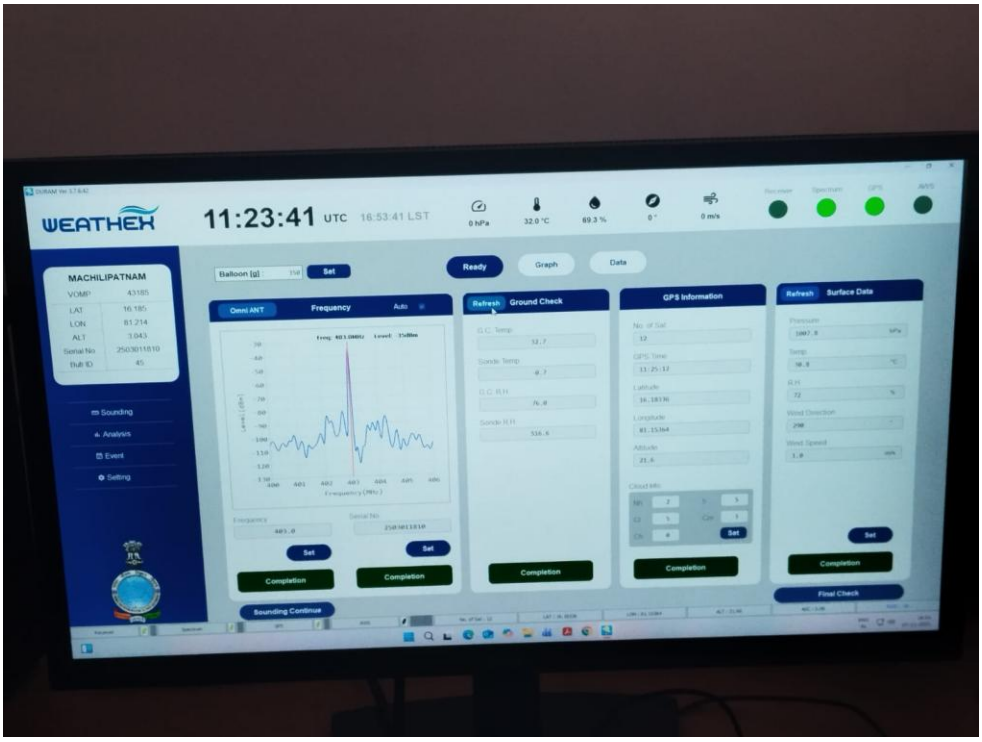
43185 Mapatnam Observations at 00Z 07 Nov 20

PRES hPa	HGHT m	TEMP C	DWPT C	RELH %	MIXR g/kg	DRCT deg	SKNT knot	THTA K	THTE K	T
1009.0	3	25.8	23.7	88	18.69	0	0	298.2	352.7	3(
1002.0	60	26.4	21.4	74	16.30	333	4	299.4	347.2	3(
1000.0	77	26.4	21.4	74	16.33	325	5	299.6	347.5	3(
925.0	762	21.6	16.7	74	13.10	10	10	301.4	340.2	3(
850.0	1490	17.0	11.0	68	9.79	25	7	303.9	333.4	3(
820.0	1796	15.0	8.0	63	8.27	5	11	305.0	330.1	3(
731.0	2754	8.1	4.2	77	7.14	300	23	307.6	329.7	3(
708.0	3021	6.2	3.2	81	6.85	293	17	308.3	329.6	3(
700.0	3114	6.6	0.6	66	5.74	290	15	309.8	327.8	3'
688.0	3256	8.6	-5.4	37	3.74	297	12	313.5	325.7	3'
684.0	3305	9.4	-7.6	29	3.17	300	11	314.9	325.4	3'
678.0	3377	10.0	-9.0	25	2.87	304	9	316.4	326.0	3'
660.0	3600	9.4	-9.6	25	2.82	315	4	318.2	327.7	3'
652.0	3701	9.2	-9.8	25	2.80	320	4	319.1	328.5	3'
581.0	4646	4.4	-13.6	26	2.32	12	7	324.1	332.2	3:
500.0	5850	-2.7	-21.7	22	1.36	80	11	329.7	334.6	3:
496.0	5914	-2.7	-21.7	22	1.37	81	11	330.4	335.5	3:
478.0	6205	-4.1	-17.1	36	2.11	83	10	332.2	339.8	3:
400.0	7580	-14.7	-27.7	32	0.99	95	7	335.8	339.6	3:
300.0	9690	-30.9	-43.9	27	0.26	120	10	341.7	342.8	3-
286.0	10024	-33.4	-47.0	24	0.19	140	14	342.8	343.6	3-
257.0	10771	-39.1	-54.1	19	0.10	164	9	345.1	345.5	3-
250.0	10960	-40.9	-53.9	23	0.10	170	8	345.1	345.6	3-
233.0	11424	-44.9	-58.5	20	0.06	235	4	346.1	346.4	3-
200.0	12430	-53.5	-68.5	14	0.02	195	10	347.9	348.0	3-
191.0	12725	-55.5	-71.5	12	0.01	188	10	349.3	349.4	3-
169.0	13482	-62.4	-84.0	4	0.00	170	11	350.3	350.3	3:
150.0	14220	-69.1	-96.1	1	0.00	150	30	350.9	350.9	3:
142.0	14547	-70.9	-97.9	1	0.00	159	34	353.3	353.3	3:
141.0	14589	-70.8	-97.8	1	0.00	160	35	354.2	354.2	3:
139.0	14673	-70.5	-97.5	1	0.00	159	34	356.1	356.1	3:
134.0	14891	-71.1	-98.1	1	0.00	158	32	358.8	358.8	3:
128.0	15161	-73.7	-99.7	1	0.00	156	30	358.9	358.9	3:
125.0	15299	-74.5	-100.5	1	0.00	155	29	359.8	359.8	3:
118.0	15632	-77.7	-102.7	1	0.00	153	21	359.9	359.9	3:
108.0	16132	-83.7	-106.7	1	0.00	150	8	357.8	357.8	3:
105.0	16289	-84.5	-107.5	1	0.00	130	4	359.2	359.2	3:
104.0	16342	-84.2	-107.3	1	0.00	100	3	360.8	360.8	3(
100.0	16560	-82.7	-106.7	1	0.00	100	8	367.7	367.7	3(
92.0	17026	-82.6	-106.6	1	0.00	125	17	376.7	376.7	3'
81.3	17716	-82.5	-106.5	1	0.00	117	9	390.5	390.5	3:
76.7	18044	-79.3	-104.3	1	0.00	114	5	403.7	403.7	4(
75.6	18126	-76.9	-101.9	1	0.00	113	4	410.4	410.4	4'
72.0	18408	-76.3	-101.9	1	0.00	110	1	417.5	417.5	4'
70.0	18570	-75.9	-101.9	1	0.00	40	7	421.7	421.7	4:
60.7	19403	-70.9	-97.9	1	0.00	63	15	450.4	450.4	4:
58.8	19593	-68.3	-96.3	1	0.00	69	17	460.3	460.3	4(
50.0	20570	-66.1	-94.1	1	0.00	95	26	487.3	487.3	4:
30.0	23730	-57.1	-88.1	1	0.01	90	42	588.4	588.4	5:
21.5	25854	-51.9	-84.9	1	0.01	85	50	662.7	662.9	6(
21.0	26006	-52.1	-84.8	1	0.01	85	51	666.6	666.8	6(
20.0	26320	-52.5	-84.5	1	0.02	80	49	674.7	674.9	6'
14.0	28672	-48.5	-82.0	1	0.03	85	44	760.7	761.1	7(
10.0	30890	-44.7	-79.7	1	0.07	115	6	851.6	852.5	8:
9.9	30957	-44.7	-79.7	1	0.07			854.0	854.9	8:

Radiosonde Balloon observation launching at 4:30PM on 07 November 2027

4. **Data Recording and Analysis:** In this segment, students explored the procedures for recording, processing, and interpreting meteorological data. They learned how raw observational data is digitally archived, validated, and processed using analytical software to generate accurate weather forecasts. The session underscored the importance

of data quality assurance, error correction, and data visualization for decision-making in weather forecasting and climate research.



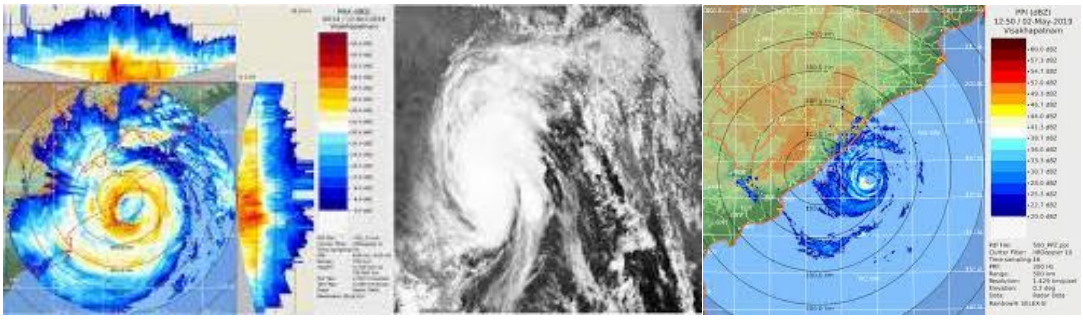
5. **Technology and Innovation:** The IMD staff showcased the technological advancements and automation systems implemented in meteorological observation and forecasting. Students were introduced to modern developments such as Automatic Weather Stations (AWS), satellite-based monitoring, numerical weather prediction models, and IoT

enabled instruments for seamless data collection. The discussion highlighted how continuous innovation and interdisciplinary collaboration drive the evolution of meteorological science and improve forecast accuracy.

6. **Quality Control Measures:** Emphasis was placed on data reliability and integrity, where students were briefed on the standardized quality control protocols followed by IMD. This includes instrument calibration, data validation algorithms, and routine cross-checking procedures to ensure that all meteorological data meets national and international standards. The staff also explained the World Meteorological Organization (WMO) guidelines followed by IMD to maintain consistency and accuracy in global weather reporting.

7. **Operational Challenges:** The final session provided valuable insights into the operational challenges faced by meteorologists, particularly during extreme weather phenomena such as cyclones, thunderstorms, and heavy rainfall events. Students learned about the decision-making process, coordination with disaster management authorities, and real-time data communication during emergency situations. The discussions offered

an appreciation of the dedication and technical expertise required to ensure timely weather warnings and public safety across the nation.



Conclusion

This industrial visit served as a vital learning experience, allowing students to connect theoretical knowledge with practical field applications. It enriched their understanding of how engineering principles and technological innovation are integrated into meteorological observation and forecasting systems. By witnessing the operations of IMD's advanced facilities, students developed a deeper appreciation for the scientific and societal significance of weather monitoring, forecasting accuracy, and data-driven decision-making in safeguarding the nation from natural hazards.

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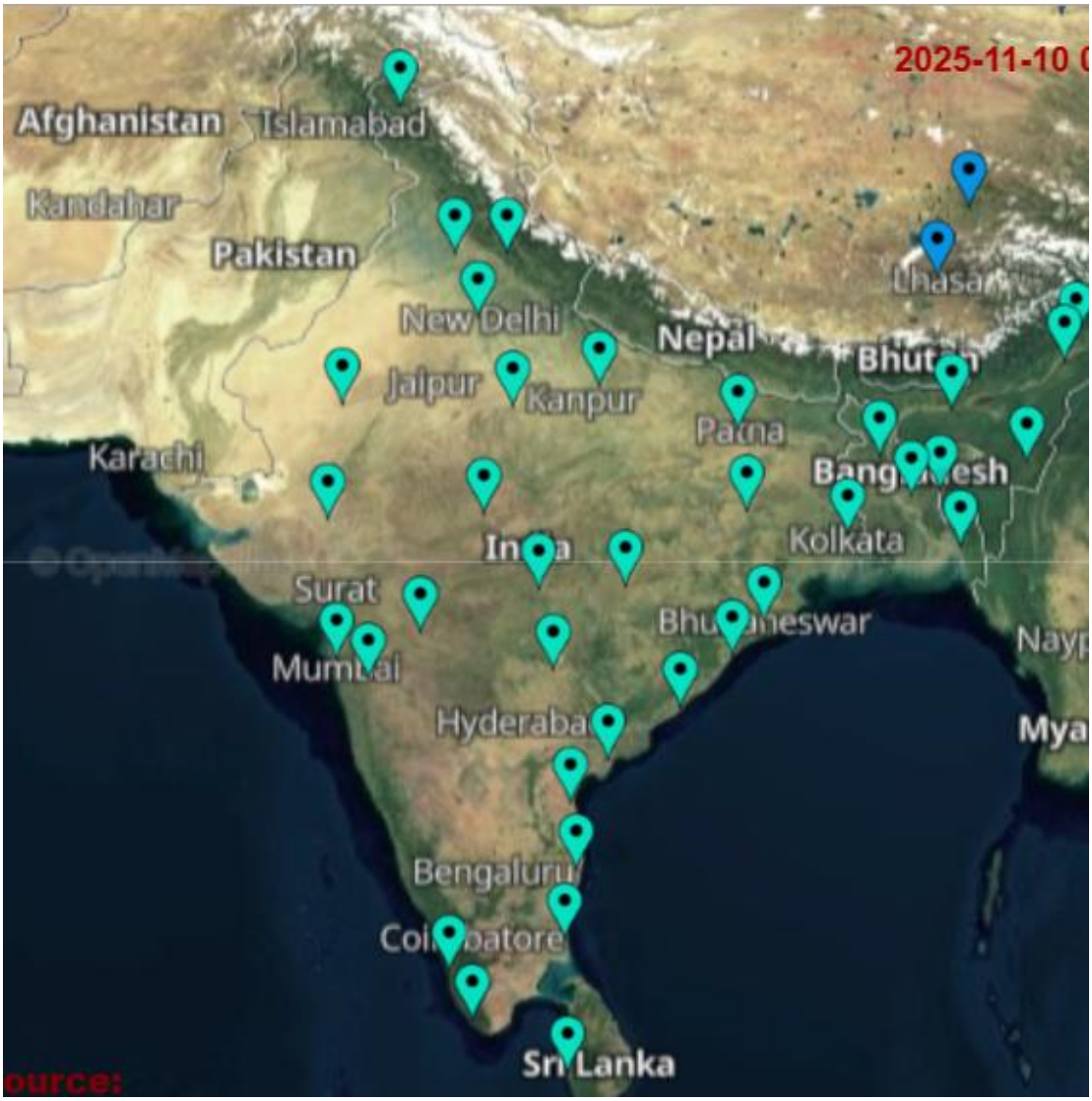

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S.No	ID No	Name	Signature	
1.	2300040172	N. Geethika	Geethi	D
2.	2300040176	N. Priyanka		D
3.	2300040188	J. Rishitha	J. Rishitha	D
4.	2300040212	Hussubasha. Sompur		D
5	2300049154	K. Sohil Sathwik	K. Sohil Sathwik	H
6	2300049098	B. Deepak		D
7	2300049124	K. Vamsi	K. Vamsi	D
8	2300049062	G. Manikanta		D
9	2300040215	Revanth Babu		D
10	2300040344	venkat sai	Venkat Sai	D
11.	2300040326	J. Sai Santhosh Pavan	J. Sai Santhosh J	H
12.	2300040150	P. GANESH	P Ganesh	H
13.	2200049002	A. ACHYUTH KRISHNA	A. Achyuth Krishna	D
14	2300049191	Bhargavi	Bhargavi	D
15	2300049102	Vidya	Vidya	D
16	2300049188	A Indu vardhini	A Indu	D
17	2300040407	A. Nimp Sai ram		H
18	2300040343	A. Dhanush		H
19	2300040094	S. Shruthi		D.
20	2300040117	D. Snibala.		D.
21	2300040123	J. Pavani		H.
22	2300040427	G. Sravani		D.
23.	2300040428	K. Harshini	Harshini	H

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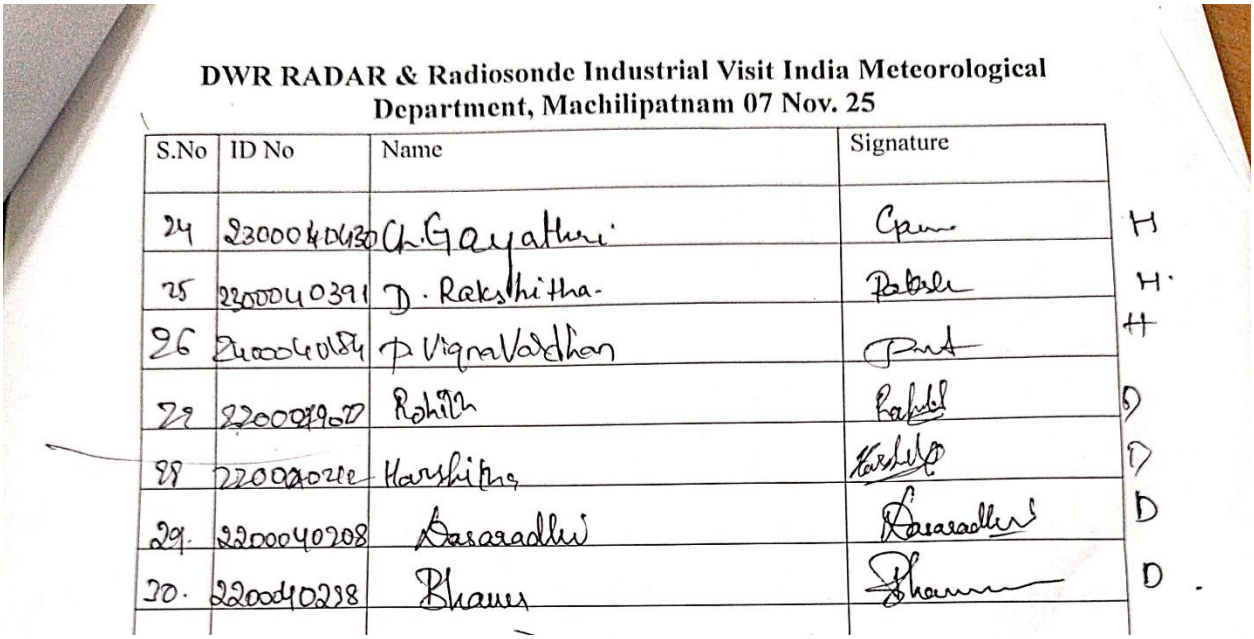

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S.No	ID No	Name	Signature	
24	2300040430	Ch. Gayathri		H
25	2300040391	D. Rakshitha		H
26	2400040154	P. Vigna Vardhan		H
27	2200040207	Rohith		D
28	2200040216	Harshitha		D
29.	2200040208	Dasaradhi		D
30.	2200040238	Bhanu		D