A

REPORT ON

INDUSTRIAL VISIT AT

" GMRT - National Centre for Radio Astrophysics"

Submitted By

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Class: TE-64

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UNDER THE GUIDANCE OF

Prof. V. V. JADHAV

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

TSSM's Bhivarabai Sawant Collage of Engineering and Research

ACADEMIC YEAR 2022-23

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

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CERTIFICATE

This is to certify that the Industrial Visit report entitled "GMRT - National Centre for Radio Astrophysics - Tata Institute of Fundamental Research, Khodad, Pune"

Submitted by Nikita Namdev Salunkhe

has satisfactorily completed the curriculum-based industrial visit under the guidance of

Mr. Sougat Chatterjee and Mr. Anand Vawhal

(Plant Engineer)

`To GMRT towards the partial fulfilment of third year Electronics and Telecommunication Engineering Semester VI, Academic Year 2022-23 of Savitribai Phule Pune University.

Industrial Visit Details:

- **Company Details**: GMRT - National Centre for Radio Astrophysics - Tata Institute of Fundamental Research, Khodad, Pune.
- **Day and Date**: Friday 24th March 2023.
- **Visiting Time**: 10.00 AM to 1.00 PM

Activity:

Event Activities

- 1. GMRT role in research.
- 2. Observe the 45 meter antenna structure.
- 3. Locations of 30 antennas
- 4. Understand importance of multi antenna system
- 5. Observe control mechanism of large Antenn System

- **GMRT Officials**: Sougata Chatterjee and Anand Vawhal, GMRT-NCRA-TIFREngineers (FE-Group)
- **Number of attendees for the visit** : 67 (Students) & 04 (Faculty)

Industrial Visit Introduction

Photo 1: GMRT (World's largest Radio Telescope)

The Industrial visit was carried out at GMRT on 24th March, 2023 for SEM VI Electronics and Telecommunication Engineering Students. Prof. V. V. Jadhav, Prof. S. R. Badiger, Prof. Sneha Bhore, facilitator of ETSA along with 67 students visited GMRT.

The main objective of this visit was that, as a part of the Electronics and Telecommunication Engineering, the students need to know practical fundamentals, implementation, functionality, and mechanism of antennas as also to get the knowledge of the Radio Telescope, different components involved, hardware software co-design, etc.

The site for GMRT, about 10 km east of Narayangaon town on the Pune-Nasik highway, was selected after an extensive search in many parts of India, considering criteria such as low man-made radio noise, availability of good communication, vicinity of industrial, educational and other infrastructure and, a geographical latitude sufficiently north of the geomagnetic equator in order to have a reasonably quiet ionosphere and yet be able to observe a good part of the southern sky as well.

Photo 2: Faculty and Students while departing from the college campus for industrial visit

GMRT - National Centre for Radio Astrophysics

Photo 3: GMRT Project Represented in Small Architecture Design

The Giant Metrewave Radio Telescope

(GMRT) is a one-of-a-kind facility for radio astronomical research that makes use of the metrewave length range of the radio spectrum. It is situated about 80 kilometers north of Pune. Each of the 30 fully steerable gigantic parabolic dishes in GMRT has a diameter of 45 meters and can span distances of up to 25 kilometers.

One of the most difficult basic science experimental programs undertaken by Indian scientists and engineers is GMRT GMRT will have a collecting area three times larger than that of the Very Large Array (VLA), which is located in New Mexico, USA. VLA has 27 antennas with a diameter of 25 meters and is currently the largest aperture synthesis telescope in the world that operates at centimeter wavelengths.

Photo 4: Mr. Anand Vawhal giving information about GMRT

After reaching their students were guided by the staff member towards one of the big antennas. It was great to know that GMRT consists of 30 fully steerable gigantic parabolic dishes of 45m diameter each spread over distances of up to 25 km.

After introduction all students were shown the big antenna and were told about how it works and were guided about its various functionalities. The metre wavelength part of the radio spectrum has been particularly chosen for study with GMRT because man-made radio interference is considerably lower in this part of the spectrum in India. Fourteen of the thirty dishes are located more or less randomly in a compact central array in a region of about 1 sq. km. The remaining sixteen dishes are spread out along the 3 arms of an approximately 'Y'shaped configuration over a much larger region, with the longest interferometric baseline of about 25 km.

Photo 5: In front of Gaint Metrewave Radio Telescope

The GMRT is the largest radio telescope in the whole world and hence has great appeal in astrophysics research. Astronomers from all over the world regularly use this telescope to observe many different astronomical objects such as galaxies, pulsars, supernovae, and sun and solar winds.

The visit concluded with an interactive session for the students, where they got an opportunity to interact with the concerned authorities and gain more knowledge. It was a great learning experience for one and all.

Photo 6: Group photo after successful completion of industrial visit Places visited nearby GMRT

After the industrial tour went off without a hitch, we went to Ozar to see the Vigneshwara Temple. One of the eight well-known Ashtavinayaka Ganesh temples in Maharashtra, India, is this one. The legend that Ganesha defeated the obstacle demon Vignasura is linked to the revered Ganesha form at this location, which is called Vigneshwara. Ozar Vignewshwara gives his endowments to the entirety of the staff and understudies.

Photo 7: Students and Faculty at Vigneshwara Temple, Ozar

Ozar's Vigneshwara Temple was a once-in-a-lifetime experience. As I moved toward the sanctuary, the entrancing engineering and unpredictable carvings promptly grabbed my eye. The sanctuary committed to Ruler Ganesha, otherwise called Vigneshwara, radiated a heavenly emanation.

My visit to the Vigneshwara Sanctuary in Ozar left me with a significant feeling of otherworldliness and recharged confidence. The heavenly energy and the commitment of individuals reverberated profoundly inside me, and I left with a feeling of appreciation and peacefulness, conveying the gifts of Master Ganesha with me.

Outcomes

Learning and Knowledge: You can learn about radio astronomy, telescope technology, and how a world-class facility works when you go to GMRT. Guests can acquire bits of knowledge into the standards and strategies utilized in radio stargazing, for example, interferometry and signal handling.

Utilization of Cutting-Edge Technology: With cutting-edge technology, GMRT is a cutting-edge facility. The intricate engineering and instrumentation required to construct and operate a radio telescope array can be seen and comprehended by visitors. They learn about cutting-edge scientific instruments and equipment used in astronomical research as a result.

Grasping Exploration and Information Examination: GMRT assumes a pivotal part in galactic exploration, adding to different logical revelations. Visitors may get an overview of ongoing research projects and the data collection, analysis, and interpretation methodologies during the visit. It can widen how they might interpret logical examination processes.

Motivation for Science and Designing Professions: Visiting GMRT can motivate understudies and youthful experts to seek after professions in science, designing, and cosmology. Interacting with engineers and scientists as well as seeing the intricate infrastructure can pique one's interest in and drive for scientific inquiry.

Systems administration and Joint effort Open doors: Modern visits frequently give an opportunity to meet and cooperate with specialists in the field. At GMRT, visitors can talk to scientists, engineers, and researchers about potential collaborations, mentorships, and sharing of knowledge.