K. K. Wagh Institute of Engineering Education & Research, Nashik

Department of Electronics & Telecommunication Engineering

AY: 2018-19

Industrial Visit Report

Name of Industry Visited:	GMRT (Giant Metrewave Radio Telescope)
Address of Industry Visited:	A/P- Khodad, Tal- Junnar, Dist- Pune, Maharashtra
Date of Industrial Visit:	20th July 2018
Target Participants:	students of BE (E&TC)
Number of Participants:	46 students of BE (E&TC) + 2 staff members
Name of Course for which Industrial Visit Organized:	Radiation & Microwave Techniques
Name of Visit Coordinator:	Prof. Swanand S. Dongare
Name of Instructor:	Mr. D. N. Nanaware (Engineer, GMRT)
Outcome of Industrial Visit:	Students will be able to elaborate structure, operation & applications of GMRT. (This outcome is mapping to PO1, PO2, PO3, PO5, PO6)

About Visited Industry:

NCRA has set up a unique facility for radio astronomical research using the metre wavelengths range of the radio spectrum, known as the Giant Metrewave Radio Telescope (GMRT), it is located at a site about 80 km north of Pune. GMRT is one of the most challenging experimental programmes in basic sciences undertaken by Indian scientists and engineers.

GMRT consists of 30 fully steerable gigantic parabolic dishes of 45 m diameter each spread over distances of upto 25 km. The number and configuration of the dishes was optimized to meet the principal astrophysical objectives which require sensitivity at high angular resolution as well as ability to image radio emission from diffuse extended regions. 14 of the 30 dishes are located more or less randomly in a compact central array in a region of about 1 sq km. The remaining 16 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.

The large size of the parabolic dishes implies that GMRT will have over three times the collecting area of the Very Large Array (VLA) in New Mexico, USA which consists of 27 antennas of 25 m diameter and is presently the world's largest aperture synthesis telescope operating at centimetre wavelengths. At 327 MHz, GMRT will be about 8 times more sensitive than VLA because of the larger collecting area, higher efficiency of the antennas and a substantially wider usable bandwidth because of the low level of man-made radio interference in India.

Apart from the novel low-cost design of the parabolic dishes, the instrument has state-of-the-art electronics systems developed indigenously and consisting of the following main sub units.

- Antenna feeds at 6 different frequency bands between 50 MHz and 1500 MHz, having good polarization characteristics as well as simultaneous multiband operation.
- Low-noise amplifiers, local oscillator synthesizers, mixers, IF amplifiers.
- Optical fibres linking the entire array with the CEB. These are used both for the telemetry signals and local oscillator phase reference communication between the CEB and each antenna base.
- A digital 2,30,000-channel FX-type correlator providing upto 128 spectral channels and covering a maximum bandwidth of 32 MHz

Photos of Industrial Visit:

Prof. Swanand S. Dongare
Industrial Visit Coordinator