



**DCT'S DHEMPE COLLEGE OF ARTS & SCIENCE  
MIRAMAR – GOA**

**DEPARTMENT OF BIOTECHNOLOGY**

**REPORT OF FIELD VISIT TO CENTRAL SOPHISTICATED INSTRUMENTATION  
FACILITY (CSIF), BITS-PILANI, GOA CAMPUS**

A field visit to Central Sophisticated Instrumentation Facility (CSIF), BITS-Pilani, Goa Campus was organized by the Department of Biotechnology, DCT's Dhempe College of Arts & Science under DBT Star College scheme on 15<sup>th</sup> October 2025 for the students of T.Y.B.Sc. Biotechnology. Mr. Kamlesh Korgaonkar and Mrs. Mrunal R. Phadke, faculty from the Department of Biotechnology accompanied the students. This visit aimed to familiarise students with advanced analytical and imaging instruments that are extensively used in research across biotechnology. The CSIF is a well-equipped interdisciplinary facility that provides access to state-of-the-art instruments, enabling researchers to carry out high-precision molecular and structural analysis.

During the visit, the technical staff and faculty at CSIF gave a detailed overview of various instruments, their principles, and applications. The first one was Nuclear Magnetic Resonance (NMR) Spectrometer operates on the principle that certain atomic nuclei possess magnetic moments and angular momentum (spin). He also emphasised on the use of NMR spectroscopy for elucidating molecular structures, studying protein conformation, and identifying metabolites.

Another sophisticated instrument that was introduced to the students was X-Ray Diffractometer (XRD), which works on Bragg's Law and is used to determine crystal structures and study material properties at the atomic level. The Liquid Chromatography–Mass Spectrometry (LC–MS) system integrates liquid chromatography and mass spectrometry for identifying compounds based on their mass-to-charge ratios. The Laser Confocal Microscope is particularly useful for visualizing fluorescently labelled cells and tissues to study cellular structures and localization of biomolecules. The technician showed the images of cancer tissues stained with fluorophores.

The students were shown the Scanning Electron Microscope (SEM) which provides a three-dimensional appearance of the sample with excellent depth of field and surface detail. SEM images are generally black and white (grayscale) but offer remarkable clarity and texture information, making them invaluable for studying the morphology of biological tissues, microorganisms, and material surfaces.

The recently introduced instrument to CSIF and the first of its kind in Goa, the Transmission Electron Microscope (TEM), which reveals the internal ultrastructure of cells, organelles, and nanomaterials at extremely high resolutions.

Finally, the Raman Spectroscope allows identification and structural characterisation of compounds, was introduced to the students. Raman spectroscopy is a non-destructive technique widely used for studying biomolecules, polymers, and nanomaterials.

Overall, the visit to CSIF was an insightful and enriching experience. The students, as well as the accompanying teachers, gained a comprehensive understanding of the principles and applications of sophisticated instruments used in scientific research. The visit effectively bridged the gap between theoretical knowledge and practical application, enhancing our understanding of how analytical instrumentation drives modern biotechnology and interdisciplinary research.

**Number of beneficiaries: Males (10) and Females (28)**

**Learning outcomes:**

1. Students gained knowledge of the working principles, operation, and research applications of sophisticated analytical and imaging instruments such as NMR, XRD, LC-MS, SEM, TEM, Confocal, and Raman spectroscope.
2. The visit enabled students to connect classroom concepts of bioanalytical techniques with real-world research instrumentation.
3. Students understood how instruments at CSIF are utilized across disciplines like biotechnology, chemistry, and materials science, emphasizing the interdisciplinary nature of modern scientific research.
4. The visit inspired students to pursue research-oriented careers by observing cutting-edge facilities and understanding their role in scientific discovery and problem-solving.



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403726, India  
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Picture Credit: Mrs. Mrunal Phadke



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403726, India  
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Picture Credit: Mrs. Mrunal Phadke

Faculty In-charge  
(Mr. Kamlesh Korgaonkar and Mrs. Mrunal R. Phadke) (In-charge, Dept. of Biotechnology)

Mrs. Mrunal R. Phadke