Vishnu Waman Thakur Charitable Trust's

VIVA Institute of Technology

Approved by AICTE New Delhi, Recognized by DTE, Govt. of Maharashtra
And Affiliated to University of Mumbai

NAAC "B++" Grade

Department of Electronics & Telecommunication Engineering

Topic Name:	Industrial Visit
Name of the Guest Speaker:	Prof. S S Prabhu and Dr. Dharmadhikari
Designation:	Scientific Officer
Organization/Institution:	Tata Institute of Fundamental Research (TIFR), Mumbai
Date:	August 9, 2024
Time:	11am to 1pm

Programme Summary / Details:

Objective:
The objective of the visit to Tata Institute of Fundamental Research (TIFR) was to explore advanced laser technologies, optical fiber propagation, and material science. Key focuses included laser-based lens fabrication, Chirped Pulse Amplification (CPA), and applications in eye surgery and photonic circuits. The visit also provided insights into ultra-fast lasers, harmonic generation, and advanced machining techniques.

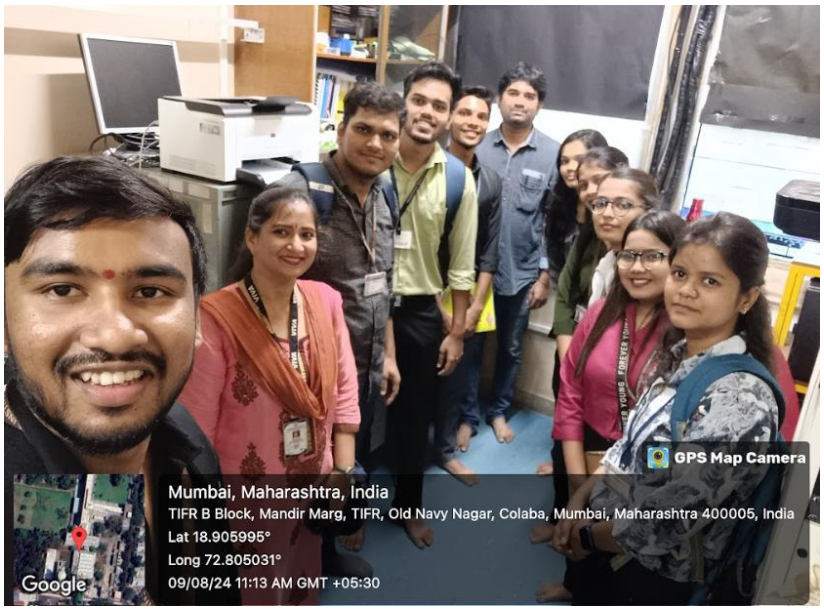
Key Learning Points:

1. **Optical Fiber Light Propagation**: Understanding the techniques used for the controlled spreading of light through optical fibers, crucial for precision communication and sensing applications.
2. **Laser-Based Fabrication**: Observing the creation of lenses in glass using femtosecond lasers and Chirped Pulse Amplification (CPA), demonstrating advanced methods for high precision material processing.
3. **Filamentation Techniques**: Learning about self-focusing and defocusing in filamentation to extend light propagation, with specific applications in wavelength control and energy concentration, such as the 530 nm layer generator.
4. **Applications in High-Tech Fields**: Exploring the use of laser and optical technologies in eye surgery, micromachining, and photonic circuits, with reference to similar setups in leading institutions like IIT Madras, Kharagpur, and Pune.
5. **Ultra-Fast Lasers and Harmonic Generation**: Gaining insights into the generation of THz radiation (0.1 to 10 THz) and the study of exotic material properties, emphasizing the role of ultra-fast lasers in advanced scientific research.
6. **Material Properties and Nonlinear Physics**: Investigating the nonlinear properties of materials, especially in semiconductors, and their implications for condensed matter physics, with a focus on photonic fields and band gap levels.
7. **Advanced Machining Techniques**: Understanding the use of 5-axis machines, drilling machines, and wire cutting technologies in precise material processing, highlighting the importance of efficient material usage and advanced design in manufacturing.

8. **Cooling and Material Preservation**: Learning about the importance of coolant systems, such as using distilled water in machining processes, and techniques like copper and zinc coating for material preservation during wire cutting.

Conclusion:
The visit to the Tata Institute of Fundamental Research provided key insights into advanced laser technologies, including optical fiber light propagation, femtosecond laser fabrication, and Chirped Pulse Amplification (CPA). We explored applications in eye surgery, micromachining, and photonic circuits, along with the importance of ultra-fast lasers and harmonic generation. The visit also highlighted advanced machining techniques and their role in material science and semiconductor research.

Report Prepared By:
Sakshi Mohan More



Vishnu Waman Thakur Charitable Trust's

VIVA Institute of Technology

Approved by AICTE New Delhi, Recognized by DTE, Govt. of Maharashtra
And Affiliated to University of Mumbai

NAAC "B++" Grade