KLS VISHWANATHRAO DESHPANDE
INSTITUTE OF TECHNOLOGY, HALIYAL
(Accredited by NAAC with 'A' Grade)
(Recognized Under Section 2(f) of UGC Act, 1956)
Approved by A.I.C.T.E., New Delhi, Affiliated to V.T.U., Belagavi
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Educational Visit to NPCIL Kaiga Nuclear Power Plant: Igniting Curiosity in Nuclear Energy

Date of Visit: January 8, 2026

Participants: 45 enthusiastic students from the Electronics and Communication Engineering (ECE).

Objective: To provide hands-on exposure to nuclear power generation, bridging theoretical knowledge with real-world applications in sustainable energy.

On a crisp morning of January 8, 2026, 45 dynamic students from the First Semister Electronics and Communication Engineering (ECE) set out on an exhilarating educational journey to the Nuclear Power Corporation of India Limited (NPCIL) Kaiga Atomic Power Station in Karwar, Karnataka. Nestled amid the lush Western Ghats, this landmark facility India's first pressurized heavy water reactors (PHWRs) in the country offers a glimpse into the future of clean energy. The visit aimed to demystify nuclear power generation, from uranium fission to electricity output, leaving students thrilled, enlightened, and inspired by the precision and safety of this high-tech marvel.

Warm Welcome and Expert Guidance

The group received a gracious welcome from Shri Goutam and the dedicated NPCIL staff. Leading the session was Shri Shrinivas, a seasoned scientist whose expertise shone through in his engaging presentation. Kicking off with foundational principles, he traced nuclear energy's journey, captivating the audience with visuals, diagrams, and real-time data from the plant's operations. This set the tone for an immersive day blending theory, interaction, and exploration.

In-Depth Exploration of Nuclear Power Generation

Shri Shrinivas delivered a masterclass on the end-to-end nuclear power process, using animations and plant schematics to illustrate each stage. Here's a detailed breakdown of the key topics covered:

Uranium Procurement and Enrichment: Natural uranium, mined globally (with India sourcing from domestic and international suppliers like Jaduguda mines), undergoes enrichment to boost U-235 isotope concentration from 0.7% to 3-5% for PHWRs. Shri Shrinivas explained the gaseous diffusion and centrifugation methods, emphasizing India's self-reliance through facilities like the Rare Materials Project in Mysore—crucial for fuel fabrication into ceramic pellets.

Nuclear Reactor Operation: At Kaiga's 220 MW PHWR units (now expanded to Units 1-4 operational, with Units 5-6 under construction), heavy water (D_2O) moderates neutrons while light water cools. Fission of U-235 releases energy as heat, with control rods (boron or cadmium) regulating the chain reaction. Students learned how Kaiga's design achieves criticality safely, producing ~1,800 MW total capacity.

Heat Generation and Conversion: Thermal energy from the reactor core (operating at ~300°C) transfers via primary coolant to steam generators, producing high-pressure steam (550°C, 6.5 MPa). This drives turbines connected to generators, converting mechanical energy to 50 Hz AC electricity via electromagnetic induction—mirroring ECE principles of power systems. Efficiency hovers at 30-35%, with excess heat dissipated in cooling towers.

Safety Measures and Waste Management: Multi-layered defenses include containment domes, emergency core cooling systems (ECCS), and passive safety features post-Fukushima upgrades. Low-level waste is solidified; high-level vitrified and stored in geologic repositories. Shri Shrinivas highlighted Kaiga's zero major incidents record, underscoring radiation monitoring and ALARA (As Low As Reasonably Achievable) protocols.

These explanations were peppered with live demos, like a reactor model simulating neutron flux, making abstract physics tangible.

Dynamic Interactive Session and Plant Tour

The Q&A session sparked vibrant discussions. Students probed reactor meltdown risks (mitigated by negative void coefficients in PHWRs), nuclear power's role in India's 2070 net-zero goals, and environmental benefits—nuclear emits <12 g CO_2/kWh vs. coal's 800+ g. Shri Shrinivas fielded queries on thorium-based reactors (Kaiga's future focus, leveraging India's vast reserves) with data-backed insights.

The highlight was a guided tour of secure facilities:

Control Room: State-of-the-art SCADA panels monitoring 10,000+ parameters in real-time, showcasing PLCs and sensor networks relevant to ECE curricula.

Turbine Hall: Towering 100-ton rotors spinning at 1,500 rpm, demonstrating vibration control and synchronization.

Spent Fuel Storage: Underwater pools with boron shielding, illustrating decay heat management and reprocessing for MOX fuel.

Safety protocols dosimeters, escorted paths ensured a seamless experience.

Lasting Impact and Key Takeaways

This transformative visit bridged classroom concepts like fission physics and power electronics with industry reality, boosting students' appreciation for nuclear tech's 70% capacity factor (vs. solar's 20%). It sparked career interests in nuclear engineering, inspiring queries on NPCIL recruitments and research in advanced reactors.

A resounding success, the trip reinforces sustainable energy's role in India's growth. Gratitude to Shri Shrinivas, Shri Goutam, and NPCIL for this golden opportunity.

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Visit at Regional Science Centre Karwar

Date: January 8, 2026

Participants: 45 First-Semester Electronics & Communication Engineering Students

Theme: "Igniting Scientific Curiosity Through Hands-On Discovery"

On January 8, 2026, 45 excited first-semester ECE students embarked on an inspiring study tour to the Regional Science Centre in Karwar. Amidst the scenic coastal backdrop, this interactive science hub transformed theoretical concepts into thrilling real-world experiences, perfectly aligning with ECE fundamentals like electromagnetism and signal processing.

Engaging Exhibits & Hands-On Learning

The visit featured dynamic, student-centred exploration across key galleries:

Physics Wonderland: Students manipulated eddy current demos, gravity wheels, and parabolic motion exhibits—directly linking to circuit theory and wave mechanics from their curriculum.

KLS VDIT ECE Pioneers Explore Naval Heritage at INS Chapal Warship Museum

Date: January 8, 2026

Participants: 45 First-Semester Electronics & Communication Engineering Students

Venue: Warship Museum, Rabindranath Tagore Beach, Karwar

On January 8, 2026, 45 enthusiastic KLS, VDIT, ECE students discovered naval engineering marvels at Karwar's iconic Warship Museum. Perched along the pristine Rabindranath Tagore Beach, this decommissioned Soviet-era gem offered a thrilling dive into military technology, perfectly blending ECE concepts like radar systems, communication networks, and propulsion electronics.

Star Attractions & Immersive Highlights

The visit showcased engineering precision across two headline exhibits:

INS Chapal (K94) Missile Boat: 1971 Indo-Pak War veteran (Russian Osa-II class). Students explored the compact 38m vessel's nerve centers control room with analog radar/sonar consoles, engine room (2 diesel engines, 2,000 HP), missile launchers (Styx anti-ship missiles), and crew quarters revealing naval life grit.

Tupolev Tu-142M Aircraft: Massive ASW (Anti-Submarine Warfare) & maritime surveillance beast. Key features included sonobuoy dispensers, magnetic anomaly detectors (MAD), dunking sonar, and IL-38May-inspired avionics ideal for ECE discussions on acoustic signal processing and RF surveillance.

Student Impact & Engineering Insights

This 1-hour expedition (5-6 PM) electrified curiosity students linked classroom radar theory to real missile guidance and aircraft comms to satellite relays. "Mind-blowing to see ECE in warships!" exclaimed a first-year.

Prepared by:

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PHOTOGALARY

NPCIL Kaiga Nuclear Power Plant:

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Regional Science Centre
KARWAR

INS Chapal Warship
Museum, KARWAR

(Dr Vinod Naik)

Dr. Mallikarjun Patil