

High Voltage Lab

Introduction: In the mid-eighties, high-voltage laboratory development got off to a slow start. Later, this facility was improved with the funding from UGC under COSIST programme from 1994 to 1999. The COSIST program's goal was to construct high-voltage engineering infrastructure. Ever since its inception HVE lab is actively utilized to assist departmental students (UG & PG) in their education and research. Minor equipment has been added from time to time to meet the needs of departmental students. HVE lab is open to provide test facilities to surrounding industries, in addition to supporting education and research in the area of high voltage and electrical insulation.

Major Equipment:



AC Dielectric Testing Transformer, 250 kV, 160 mA, 40 kVA, Phenix Technology, USA



DC Dielectric Test set: 200 kV, 10mA, Phenix Technologies, USA



250 kV, 2-stage, Impulse Voltage Generator, WSTest System, Bangalore



Insulation test set for transformer oil, Neo-Teletronics Calcutta



12kV Insulation Test set, Megger



25 Cm Sphere Gap and 250 kV/250V and R-C Voltage Divider, Rectifier Electronics, New Delhi



Probe Sonicator



Electrometer (6715B), Keithley



Thermal Conductivity Meter for liquid dielectrics

Software: EMTP-RV

The image shows the EMTP-RV software interface. On the left is a product box for EMTP-RV Simulation Software. The main area displays a detailed schematic of a power system simulation, including a network, 765 kV line, lightning strike, air-insulated and gas-insulated substations, open circuit breaker, gas-filled bushing, inductive VT, gas-filled bushing, and power transformer. Text on the right describes the software's capabilities: 'Detailed 3D view', 'Impulse Feeding Resistance of the strikes', 'Tower may be represented by 2D or 3D', 'Usage of 2dC model based on IEEE 500 WG', and 'Frequency-Dependent Line modeling'.

The Electro-Magnetic Transient Program (EMTP) is a powerful off-line simulation tool for modelling electromagnetic transients in large and complex power systems. The EMTP software has been installed in the HVE lab with the goal of performing electromagnetic transient simulation (switching and lightning) and insulation coordination studies. This software, in its installed form, can analyse a complex power system with up to 5000 components.

Experiments for students:

1. Calibration of a voltmeter using standard sphere gap
2. Measurement of voltage distribution and string efficiency in a suspension type insulator string
3. Study the effect of voltage polarity on corona and breakdown in divergent field
4. Generation and measurement of impulse voltage
5. Measurement of breakdown voltage for transformer oil

Thrust Area for Research:

1. Synthesis and characterization of nano-dielectrics/nano-fluids for high voltage power apparatus
2. Overvoltage and insulation coordination studies in electrical power system
3. Electrostatic field computation in various high voltage equipment
4. Condition monitoring and diagnostics of high voltage devices
5. Electromagnetic transients in power system

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