

ZOOTAVOZZ

RESEARCH



NUST
Defining Futures



- + NUST has invested heavily on its research facilities and infrastructure including procurement of Hi-Tech lab equipment and expansion / up-gradation of labs. This has resulted in enhancement of our capacity and research capabilities. As a consequence NUST can claim to have the most comprehensive labs compared to other universities in the country. Some of these labs are expected to become the Centers of Excellence in their respective fields in due course. NUST has 18 x constituent institutions spread over Islamabad, Rawalpindi, Risalpur and Karachi with a total of 351 x labs to support Undergraduate (UG), Master of Science (MS) and Doctor of Philosophy (PhD) programs. These labs have been grouped in 4 x categories i.e., Teaching, Research, Final Year Project and General Purpose Labs and NUST invests a handsome amount of its budget to keep these labs updated and 100% functional to maintain the high quality in academics and research.

Of the above mentioned labs, 34 x labs fall under the category of NUST Test Facilities equipped with the hi-tech, state of the art equipment and unique Research / Testing facilities. These labs have the potential for commercial use besides their main functions as academics, teaching or research. The Brochure provides details of these NUST Test Facilities, institution-wise, along with equipment description, testing rates and their focal persons for ease of reference / use. The purpose of sharing NUST Test Facilities details is to show-case our potential / facilities to the public, industry and other universities for optimum utilization.



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 - a. Communication Engineering Lab
 - b. Wind Tunnel Testing Lab
 - c. Atomic Force Microscope Lab

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Research Institute for Microwave & Millimeter- Wave Studies (RIMMS)

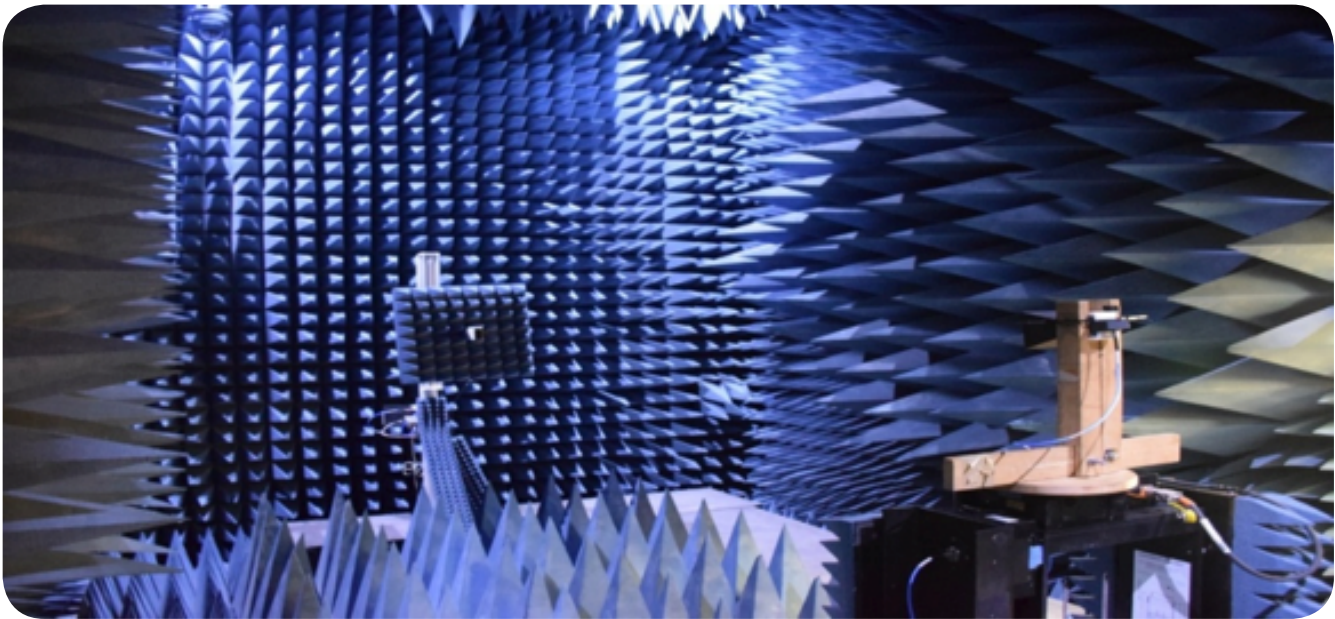
- + Anechoic Chamber
- + Electromagnetic Compatibility / Electromagnetic Interference Lab

Research Institute for Microwave & Millimeter-Wave Studies (RIMMS)

Introduction. RIMMS is a unique post-graduate institute at NUST, offering MS and PhD in Electrical Engineering with special focus on Radio Frequency (RF) & Microwave domain since 2010. The Institute works closely with industrial partners on joint Research & Development and consultancy projects. The aim is to become a Centre of excellence for research and consultancy in the RF and Microwave domain. The Institute holds state-of-the-art facilities for the design, fabrication and testing of microwave circuits and antennas. The institute possesses unique microwave measurement capabilities such as Anechoic Chamber for antenna testing and Electromagnetic Compatibility / Electromagnetic Interference Lab for electromagnetic compatibility and immunity measurements. The key facilities are used in teaching and research, as well as utilized for services to other academic and industrial partners.

+ Anechoic Chamber

This facility is used to characterize antennas in the frequency range from 0.8GHz to 40GHz. The Anechoic Chamber is equipped with a near-field planner scanner and a far-field tower to measure the radiation pattern of a given antenna under test (AUT). The measurement software has the capability to transform the near-field data to far-field data for plotting antenna radiation patterns in 3-D. In addition, antenna arrays, Radar cross-section (RCS) measurements of RFID tags and other applications where isolated environment is required can be supported by the anechoic chamber.



TEST RATE

The lab offer services to the academic and industrial organizations in measuring the radiation patterns and gain of various kind of antennas. The typical Antenna Pattern and Gain Measurement test (Antenna Characterization) cost is Rs 66,500/- (8 hours testing). For specialized testing which may require large data points, changes in the chamber etc., the cost will be estimated based on the number of hours required for the job.

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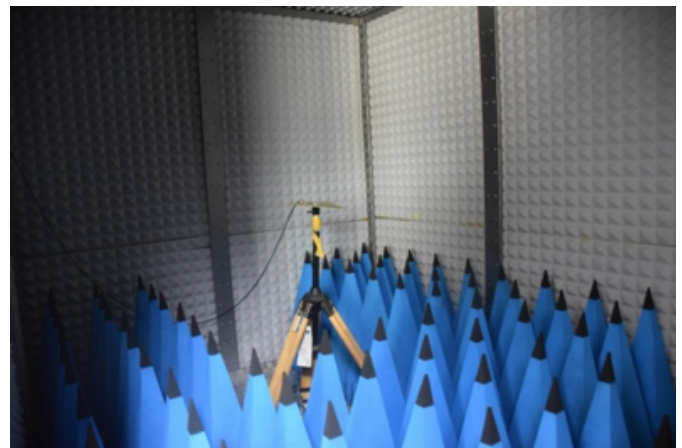
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+ Electromagnetic Compatibility / Electromagnetic Interference (EMC / EMI) Lab

This lab aims at imparting EMC/EMI knowledge to students and researchers both from NUST and other universities and organizations. In addition, the facility is utilized to provide EMC/EMI pre-compliance testing of commercial products. Presently, the lab has the capability to perform testing as per European standards including Conducted Emissions, Radiated Emissions, Radiated Immunity, Harmonic & Flicker, Electrostatic Discharge and Surge, Burst & Power Fail test.

Major Equipment

	Manufacturer	Equipment Description	Model	Technical Parameters
1	Rohde and Schwarz	LISN Four Line V-Network	ENV432	9 kHz to 30 MHz
2	Rohde and Schwarz	Handheld Spectrum Analyzer / VNA	FSH8	100 kHz to 8 GHz
3	Rohde and Schwarz	Spectrum Analyzer	FS300	9 kHz to 3 GHz
4	Rohde and Schwarz	Power Sensor	NRP 185-25	Max 25W (Sensing capability)
5	TESEQ	EM Clamp	KEMZ 801	10 kHz to 1000 MHz, 50 Ω
6	TESEQ	Calibration fixture	CAL KEMZ	Conforms with IEC 61000-4-6 Ed
7	Yokogawa Electric	Digital Oscilloscope	DL9140	DC – 1GHz 5 Gb/s



TEST RATE

1. EMC/EMI Testing for ITE Equipment
Rs 180,000/-
2. Safety Testing as Per IEC 60950-1
Rs 80,000/-
3. Radio Testing
Rs 75,500/-

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U.S. Pakistan Center for Advanced Studies in Energy (US PCAS-E)

- + Advanced Energy Materials & Systems lab
- + Thermal Lab
- + Smart Grid Lab

U.S. Pakistan Center for Advanced Studies in Energy (US PCAS-E)

Introduction. US PCAS-E was established to address some of the outstanding challenges faced by the energy sector in Pakistan and to facilitate applied research and education partnership between USA and Pakistan. The Centre is committed to create an ecosystem for addressing energy requirements by influencing policy makers, developing technologies, human resources and mobilizing communities for energy conservation. US PCAS-E-NUST is determined to make this center a world class Energy Center, whereby pilot plants in the areas of accelerated biofuels, gas to liquid processes, solar modules and thin films, and indigenous development of windmills will be rigorously taken up by the Center. US PCAS-E is destined to be at forefronts in innovative research, technology development, and nurturing the human resources. Center is well prepared to meet the future challenges of Energy, Environment and the Economy (3E) nexus. Center gives an ideal platform to graduate students to fulfill the Pakistan's need for next generation of experts in energy sciences and technology. US PCAS-E has three Test Facilities, which are equipped with state of the art equipment.

+ Advanced Energy Materials and Systems (AEMS) Lab.

The AEMS Lab is currently equipped with state-of-the-art tools for processing and characterization of high quality and high efficiency materials for energy generation, conversion, storage, etc. The lab ultimately aims to develop materials and solutions for environmentally friendly and higher efficiency materials for assortment of applications. The tools available to the lab give researchers an unprecedented control up to Nano-scales in terms of diversified processing and characterization, where the exploration of new science and technology becomes a reality. Moreover, the AEMS lab has the capacity to solve problems of industries such as Steel, Automobile, Chemicals, Petrochemicals, Surgical, Defense, Tool Manufacturing, etc. The lab is equipped with following key facilities:

a. X-Ray Diffractometer (XRD)

PURPOSE OF MACHINE

This machine extracts and analyze the crystal structure and phase information of different materials. It extracts structural information by subjecting the sample to X-rays and analysis of the resulting diffraction patterns. The patterns obtained are then processed using its library of powder diffraction file.

TEST RATE
Rs 2000/-



b. Scanning Electron Microscope with Energy Dispersive X-Ray Spectroscope



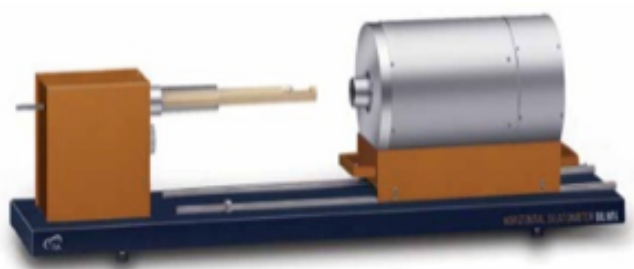
PURPOSE OF MACHINE

Scanning Electron Microscope (SEM) subjects a sample to a beam of accelerated electrons. The interaction of the sample and the electrons provides information about the morphology and composition of the sample. Highly resolved morphological images at the nanoscale are obtainable with system, as well as elemental composition of the sample is traceable with the EDS detector fitted with system.

TEST RATE

Rs 5000/-

c. Thermal Dilatometer



PURPOSE OF MACHINE

The relative change in length as a function of temperature, the coefficient of linear thermal expansion (CLTE), and the elasticity/plasticity limits upto 1500 °C maximum can be studied with the system in air as well as inert atmosphere.

TEST RATE

Rs 5500/-

d. Atomic Force Microscope



PURPOSE OF MACHINE

The system develops a sub Nano-metrically precise topographical image of a surface based on the atomic forces experienced by a cantilever when brought closer to the sample. The system has large sample stage and provides maximum scan range of 100 by 100 square μm in the XY directions. Both Static and Dynamic modes are available. It can provide height profile of the sample surface down to 0.16 nm.

TEST RATE

Rs 4800/-

e. Simultaneous Thermo Gravimetric Analysis / Differential Thermal Analyzer



PURPOSE OF MACHINE

Thermo Gravimetric and Differential Thermal Analysis can be simultaneously conducted for samples upto 1500 °C maximum. Based upon the weight loss as a function of temperature, useful information such as the temperature of crystallization or pyrolysis temperature can be extracted.

TEST RATE

Rs 4000/-

f. Ultraviolet-Visible-Near-Infrared Spectrophotometer



PURPOSE OF MACHINE

Information about the optical response, thickness estimation, electronic band structure, and crystal structure of a sample can be obtained with a standard UV-Vis-NIR spectrophotometer fitted with integrating sphere. Transmission and attenuation behavior of liquids as well as solids can be studied with the system in the range of 200 – 3200 nm.

TEST RATE

Rs 2000/-

g. Laser Particle Size Analyzer



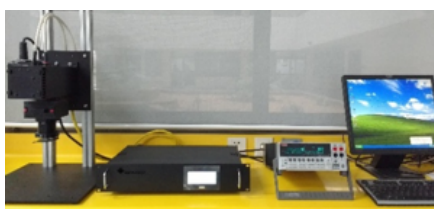
PURPOSE OF MACHINE

It determines the particle size by examining the scattering/interference patterns obtained as a result of interaction between the sample in dispersion/suspension form and the incident laser light. Particles sizes in the range of 0.1 μm to 1000 μm are detectable with this system.

TEST RATE

Rs 1600/-

h. Solar Simulator with Keithley Source Meter



PURPOSE OF MACHINE

For testing of light sensitive devices like photovoltaic cells, solar simulator along with source meter is employed.

TEST RATE

Rs 2000/-

i. Hall Effect Measurement System



PURPOSE OF MACHINE

The Hall Measurement System is a complete system for measuring the resistivity, carrier concentration, and mobility of semiconductors. The HMS-3000 includes software with I-V curve capability for checking the ohmic integrity of the user made sample contacts. The systems can be used to characterize various materials including semiconductors and compound semiconductors.

TEST RATE

Rs 2200/-

j. LCR Meter



PURPOSE OF MACHINE

Electrical parameters such as resistance (R), inductance (L), capacitance (C), dissipation factor (DF), quality factor (Q), and dielectric constant of different materials and circuit elements can be precisely determined with this system.

TEST RATE

Rs 2000/-

k. MTI Multifunction Evaporation & Sputter Coating System



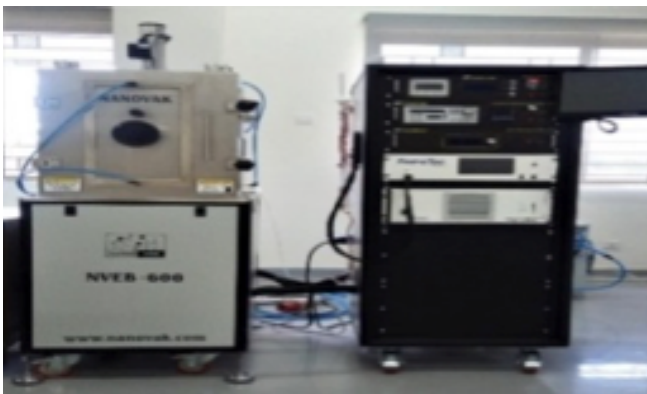
PURPOSE OF MACHINE

Thermal evaporation of different materials especially aluminum, carbon coating from graphite rods and DC sputter deposition of conductive targets (like gold) all can be accomplished with this machine.

TEST RATE

Rs 6000/-

l. Thermal & Electron Beam Evaporation System



PURPOSE OF MACHINE

A fully automated computer controlled system. The Thermal System includes a single source heatable upto 1000 W, whereas, the e-beam has a 10 KV, adjustable power supply, with a maximum 1000 mA adjustable beam current.

TEST RATE

Rs 10000/-

m. DC & RF Magnetron Sputtering, Reactive Sputtering & Thermal Evaporation System



PURPOSE OF MACHINE

Fully automatic PVD unit, controlled with real time touch screen computer panel, has capacity to perform not only Sputtering two magnetron sources, one RF and one DC source but also thermal evaporation (two 2000W independent evaporation sources).

TEST RATE

Rs 10000/-

n. Atmospheric Plasma Spraying System



PURPOSE OF MACHINE

It can spray many kinds of coating materials e.g., refractory metal materials, ceramics and other special functional material. The inert gas can act as working medium, which can reduces oxidation.

TEST RATE

Rs 5000/-

o. High Velocity Oxygen Fuel Spraying System



PURPOSE OF MACHINE

A mixture gas of oxygen and fuel gas (propane) is sent to the burning area of spray gun outlet under high pressure. Then the burning gas is accelerated to form a supersonic flame with the help of external compressed air. The spray powder is sent into burning flame and makes a functional coating.

TEST RATE

Rs 12500/-

p. Wire Arc Spray System



PURPOSE OF MACHINE

Wire Arc Spraying is a technique where two metal wires of different potential are fed into a spray gun. Upon contact, a high current and thus enough heated is generated to melt the wires. This molten feedstock is then deposited onto a substrate with the help of compressed air.

TEST RATE

Rs 8000/-

q. Combustion Powder Spray System



PURPOSE OF MACHINE

The technique is capable of coating powders of different materials over different substrates. The powder from a powder feeder is fed into the combustion chamber through the pressure of dry compressed air. The combustion of acetylene in oxygen generates the heat required for the process. The heated powder/melt is directed onto the substrate using the same compressed air.

TEST RATE

Rs 9000/-

r. Nano Fiber Electro-Spinning System



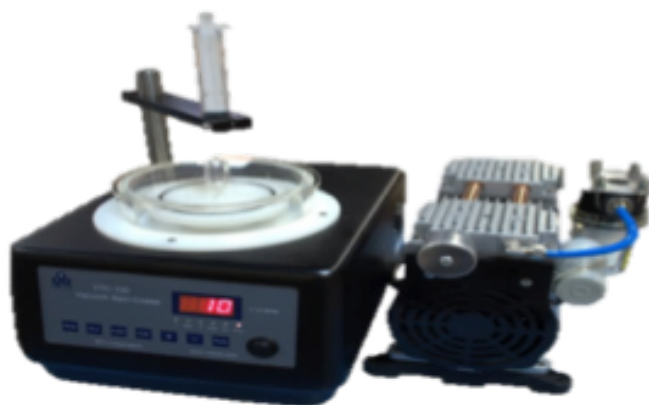
PURPOSE OF MACHINE

Electrosprayed particles and Electrospun fibers can easily be developed from suspensions/solutions of different materials. The applied voltage can be varied upto 20 kV maximum. Different collector geometries are available.

TEST RATE

Rs 2000/-

s. Spin Coater



PURPOSE OF MACHINE

Thin films from solutions/ dispersions of different materials can be deposited using this technique. Rotational speeds of upto 10,000 rpm can be achieved with these devices. Vacuum chucks of different sizes are available. Sample heating of upto 200 °C can be carried out.

TEST RATE

Rs 1500/-

t. Tube Furnace



PURPOSE OF MACHINE

Heat treatment of samples in inert, air or vacuum up to 1800 °C maximum can be carried out in this furnace.

TEST RATE

Rs 2500/-

FOCAL PERSON

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+ Thermal Lab. Thermal Lab is designed to cater current and future applied research needs in Thermal Energy Sector. Research in this lab focuses on industrial applications of Thermodynamics, Fluid Mechanics and Heat & Mass Transport. Using a combined approach of theoretical analysis, numerical calculations and experimental investigations, the lab aims to develop new or advanced knowledge for application in industrial design. The lab is equipped with the following key facilities:

a. Gas Chromatograph Mass Spectrometer

PURPOSE OF MACHINE

Gas Chromatography Mass Spectrometry (GC/MS) is an instrumental technique, comprising a Gas Chromatograph (GC) coupled to a Mass Spectrometer (MS), by which complex mixtures of chemicals may be separated, identified and qualitative analysis is performed. This makes it ideal for the analysis of the hundreds of relatively low molecular weight compounds found in environmental materials. In order for a compound to be analyzed by GC/MS, it must be sufficiently volatile and thermally stable.

TEST RATE

Rs 4000/-



b. High Speed Camera



PURPOSE OF MACHINE

High-speed camera is capable of capturing moving images with frame rates of 1,000,000 frames per second. It is used for recording fast-moving objects such as fluid in a microchannel onto a storage medium. After recording, the images stored on the medium can be played back in slow motion by varying the frame rate, and other indicators.

TEST RATE

Rs 1800/-

c. Bomb Calorimeter



PURPOSE OF MACHINE

Bomb Calorimeter is primarily used for measuring heats of combustion of solid and liquid fuels. The reaction takes place in a closed space in controlled thermal contact with its surroundings, the jacket, at constant temperature.

TEST RATE

Rs 4000/-

d. Viscometer (Temperature Controlled Water Bath)



PURPOSE OF MACHINE

For determination of viscosity of liquids at various temperature.

TEST RATE

Rs 500/-

e. Combined Smoke & Gas Emissions Analyzer



PURPOSE OF MACHINE

A complete Gas & Smoke Emissions Analyzer, combining state-of-the-art technology & simple to operate functionality for highly efficient emissions testing of today's petrol and diesel engines in the fast fit industry, designed to provide the user with complete flexibility.

TEST RATE

Rs 2200/-

f. Thermal Imaging Camera



PURPOSE OF MACHINE

Portable device for determining the thermal image and temperature profile with increased sensitivity to visualize temperature differences with a temperature measurement range upto 1200 o C. It provides an instant in-focus image of designated target with temperature profile.

TEST RATE

Rs 1000/- per hour

g. Ultrasonicator



PURPOSE OF MACHINE

Probe type Ultrasonicator for agitating particles such as in the preparation of nanofluids, by breaking intermolecular interactions as a result of substantial intensity of high ultrasonic vibration amplitudes which leads the cavitation; creation; growth and implosion of bubbles.

TEST RATE

Rs 800/-

h. Multipurpose Water DO/pH/ Conductivity Analyzer



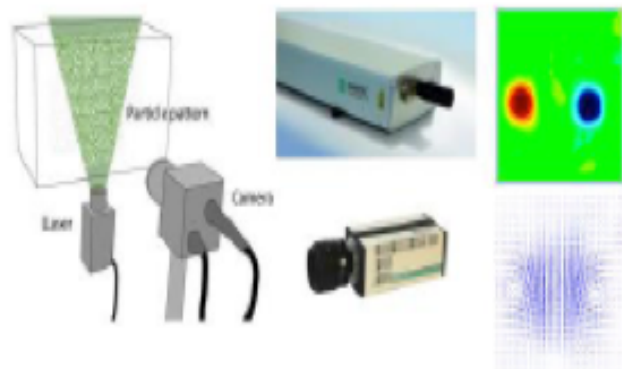
PURPOSE OF MACHINE

Water analysis meter can measure one or more parameters such as pH, Dissolved Oxygen and electrical conductivity of water.

TEST RATE

Rs 600/-

i. Particle Image Velocimetry (PIV)



PURPOSE OF MACHINE

Particle Image Velocimetry is a non-intrusive laser optical measurement technique for research and diagnostics into flow, turbulence, microfluidics, spray atomization and combustion processes.

TEST RATE

Rs 15000/-

j. Combustion Test Facility



PURPOSE OF MACHINE

Characterization of different liquid and gaseous fuels with effect of the air/fuel ratio can be performed. Assessment of a burner, including: Flame stability, Flame shape, Flame radiation, Firing rate, Turndown range and Smoke emission.

TEST RATE

Rs 4300/-

k. Fuel Atomization Facility



PURPOSE OF MACHINE

A complete jet engine fuel manifold spray system used to demonstrate & verify proper atomization of various fossil and renewable heavy fuels.

TEST RATE

Rs 1900/-

l. Ultrasonic Thickness Gauge



PURPOSE OF MACHINE

An Ultrasonic Thickness Gauge is a measuring instrument for the non-destructive investigation of a material's thickness using ultrasonic waves.

TEST RATE

Rs 1000/-

FOCAL PERSON

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+ Smart Grid Lab. This Lab offers prototyping / testing system based on compact RIO and Lab View. The lab demonstrates modern engineering techniques combined with a cost efficient flexible development platform, and creates opportunities for control and measurement in various parts of power systems. The Lab is capable of real-time simulation / emulation of power systems through Power Hardware in the Loop and Power Grid Simulator. Smart Grids & Electrical Power Systems Lab is currently equipped with the following advanced research tools:

a. FPGA Based Rapid Control Prototyping

PURPOSE OF MACHINE

The machine is to create a prototype of control systems, to be implemented on any system developed externally.

TEST RATE

This equipment is used for research purpose only.



b. Protection Relay Development System



PURPOSE OF MACHINE

The machine is used to develop various schemes for relay protection systems. A specialized equipment in generating control signals in response to the system input which may be introduced by external or internal system.

TEST RATE

Rs 8632/-

c. NI Phasor Measurement Unit Development System



PURPOSE OF MACHINE

Phasor measurement development system specialize in time synchronized output on a same grid network. Can be used to various parameters like voltage and current.

TEST RATE

Rs 4356/-

d. NI Phasor Data Concentrators / Synchro Phasor Development System

PURPOSE OF MACHINE

The system is concurrently used with NI Phasor Measurement Unit Development System to handle high data rates and process the signal output.



TEST RATE

This equipment is a supportive part of PMU.

e. Power Measurement Systems



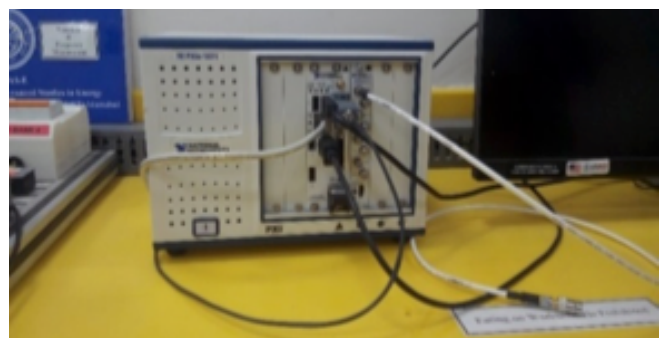
PURPOSE OF MACHINE

This equipment is used to simulate the battery behavior.

TEST RATE

Rs 2100/-

f. Transient & Frequency Measurement Setup



PURPOSE OF MACHINE

Used to measure transient behaviors considering the short time intervals. Overlapping them for enhanced output for periodic wave observation.

TEST RATE

This equipment is used for research purpose only.

g. Power Quality Analyzer



PURPOSE OF MACHINE

Used to analyze data on the grid network on IEC standards.

TEST RATE

Rs 2100/-

h. Programmable Electronic Load, High Voltage Programmable DC Power Supplies & Batteries



PURPOSE OF MACHINE

Can be programmed to act as resistive type of load to any external source.

TEST RATE

Rs 7758/-

i. Smart Grid Automation along with SCADA & DCS System



PURPOSE OF MACHINE

Inherent functionality of the lab is to monitor 3 points and control 4 relays placed inside the lab (for demo purposes only).

TEST RATE

This equipment is used for research purpose only.

FOCAL PERSON

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School of Mechanical & Manufacturing Engineering (SMME)

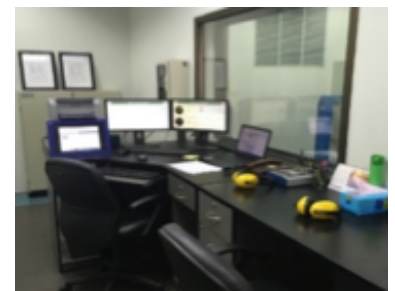
- + Tribology Lab
- + Biochemistry Lab

School of Mechanical & Manufacturing Engineering (SMME)

Introduction. SMME previously known as the Institute of Manufacturing Engineering was established in year 2007 as a postgraduate entity. However, realizing the need of the industry its scope was reviewed and renamed as School of Mechanical and Manufacturing Engineering. Its vision is to prepare top quality technically capable human resource with essential skills in Mechanical Engineering and related disciplines. There is an array of technical disciplines offered at SMME such as Design and Manufacturing Engineering, Mechanical Engineering, Robotics and Intelligent Machine Engineering and Biomedical Engineering. These programs have been prudently developed to address the needs of the dynamic and fast growing industry needs. SMME significantly encourage innovation therefore to foster Research & Development; state-of-the-art labs related to mechanical and manufacturing fields in addition to high-tech labs of Robotics, Biomedical and Manufacturing Resource Center (MRC) have been made a part of its infrastructure.

+ **Tribology Lab.** Tribology lab was created mainly to address the needs of industry to provide cost effective customized solutions in the area of Engine tribology, test beds, test rigs and multi-gauge inspection machines. A group of dedicated faculty members and lab technicians work closely with industry to design complete testing systems. The lab offers expertise in instrumentation, sensor technology, data acquisition systems and mechanical design. This lab has provided solutions to vast range of industry including automotive, defense, pharmaceuticals, sports, oil and gas, etc. Some of the customized solutions delivered to industry are:

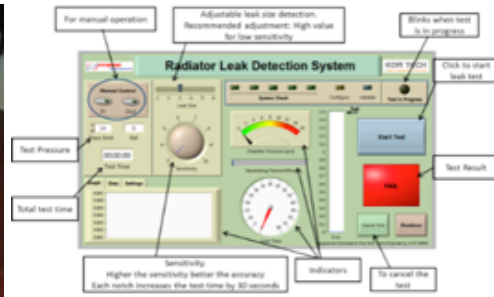
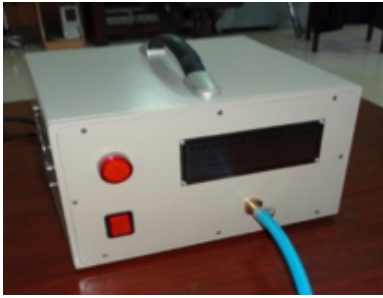
a. Emission Compliant Test Cell with drive-by-wire Mechanism. Wide range of engine tests can be carried out in the test cell. Designed and developed for automotive OEM.



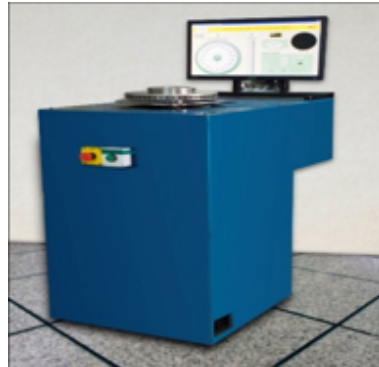
b. Engine Blow By Monitoring System Especially Designed for Diesel Engine. Developed for automotive and defense industry.



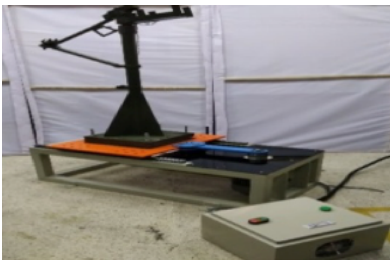
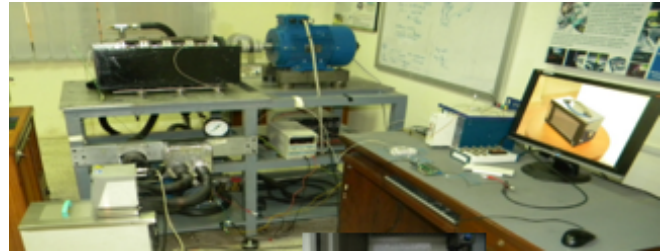
c. Dry Leak Detection System for Automotive Industry. Developed for radiator manufacturers.



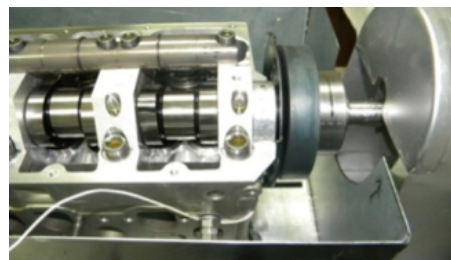
d. Dynamic Vertical Balancing Machine Designed and Developed for Auto Industry.



e. Engine Head Test Rig for Detailed Testing of Engine Head Performance under Realistic Conditions.



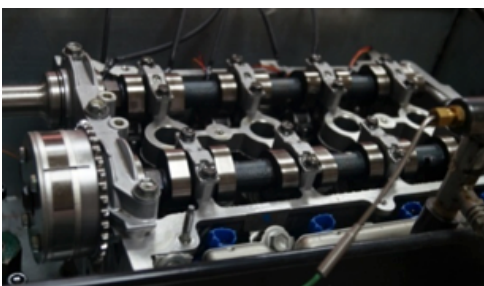
1. Vibration Test Rig for testing military equipment. Single axis vibration test rig with variable amplitude and frequency control.



2. Audi Test Rig for Tappet Performance.



4. Mercedes Benz Valve Train Test Rig for Friction and Film Thickness Measurement.



3. Toyota Prius Test Rig for Roller Evaluation.

FOCAL PERSON

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- + **Biochemistry Lab.** Biochemistry lab is a general purpose lab typically contain chemicals, glassware, centrifuges, spectrometers, laminar flow air cabinets and other equipment. It includes a microbiology section, drug development and Nano-biotechnology section, geneomic and proteomic extraction facility and a mice keeping facility. The research focus is on the natural product extraction, anticancer and antimicrobial Nano carriers and mice disease model designing. The lab is equipped with following facilities:

a. Microbiology Cell Culturing Room.

The microbial cell culturing facility offers a complete array of microbiology laboratory. This room is utilized for the cell culturing of gram positive and gram negative bacteria. Cell culture is the process by which cells are grown under controlled conditions, generally outside their natural environment.



c. Spectrophotometer.

The spectrophotometer is an optical instrument for measuring the intensity of light relative to wavelength. Electromagnetic energy, collected from the sample, enters the device through the aperture (yellow line) and is separated into its component wavelengths by the holographic grating.



b. Nano-biotechnology Section. This facility is used for synthesis of gold and silver nanoparticles. The nanoparticles are prepared under controlled conditions using various optimized protocols.



d. Microscope. Microscopy is the technical field of using microscopes to view objects and areas of objects that cannot be seen with the naked eye. The compound microscope presently available in the lab consists of lens having magnification of LX 400 reflecting a latest design in optical and mechanical advancement with Eyepiece (10x20x40x100).



e. Polymerize Chain Reaction. This method is widely used in molecular biology to make many copies of a specific DNA segment. Using PCR, copies of DNA sequences are exponentially amplified to generate thousands to millions of more copies of that particular DNA segment.



f. Centrifuge. A centrifuge is a piece of equipment that puts an object in rotation around a fixed axis, applying a force perpendicular to the axis of spin that can be very strong.



g. Ultra Low Temperature Freezer. Ultra-Low Temperature Freezers (ULT), are designed first and foremost to protect samples. They're also designed to maximize storage capacity by offering a range of upright and chest models to accommodate a variety of laboratory

footprint requirements.



h. Animal Experimental Room. This is a mice keeping facility where mice are treated to design different disease models for testing in-vivo analysis of different drugs and nano-formulation.



TEST RATE

1. Tumor model: Mice group of (10) - Rs 15000
2. Infection model: Mice group of (20) - Rs 30000
3. Antimicrobial testing of nanoparticles: Testing 5 samples = Rs 7000
4. Nanoparticle synthesis (Rate is material dependent)

FOCAL PERSON

Dr Nosheen Fatima Rana

Contact focal person for availability of time slot

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School of Chemical & Materials Engineering (SCME)

- + Atomic Force Microscope Lab
- + Surface Engineering Lab
- + Mechanical Testing Lab
- + Specialized Equipment
 - » Fourier Transform Infrared
 - » High Performance Liquid Chromatography
 - » Thermo Gravimetric / Differential Thermal Analyzer
 - » Refrigerated Table Top Centrifuge
 - » UV-Visible Spectrophotometer

Introduction. The School was established in 2006, SCME offers undergraduate and postgraduate programs in Chemical Engineering and Materials Engineering. The School enjoys reciprocal ties with universities in Europe, China and ASEAN countries, and continues to forge stronger links with academic and research communities across the world. SCME works on several collaborative projects with private sector and strategic organizations, to make a discernible contribution towards revitalizing the industry's capability and strengthen the country's economy.

+ Atomic Force Microscope Lab

a. Scanning Probe Microscope

PURPOSE OF MACHINE

Scanning Probe Microscope (SPM) JSPM-5200 Jeol, Japan is a versatile microscope that scans the sample surface with a very fine probe and images the topographic shape and physical properties of the surface. With recent developments in nanotechnology, the SPM has become widely used in various fields.

TEST RATE

Rs 3000/ sample

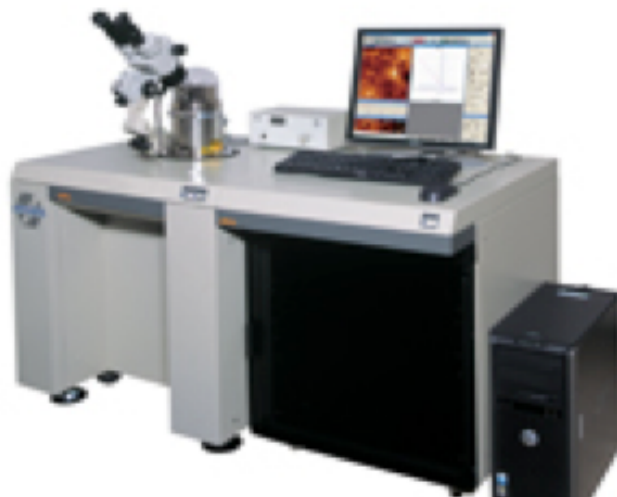
FOCAL PERSON

Dr Aftab Akram

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b. Scanning Electron Microscope (SEM)

PURPOSE OF MACHINE

Produces images for detailed microstructural studies by scanning the surface with a beam of electrons. Mode of detection is secondary electrons emitted by atoms excited by the electron beam.

TEST RATE

Rs 5500/sample

FOCAL PERSON

Dr Khurram Yaqoob

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- + **Surface Engineering Lab.** Surface of material plays an important role in its design and applications. Hence the Surface Engineering Lab is to facilitate students / researchers in surface characterization of materials / coatings to design and develop the material for particular application. Currently, Surface Engineering Lab is well equipped with following key facilities to characterize the fundamental characterization of material surface e.g., surface area, surface porosity, surface roughness, particle size etc.

a. Optical Profilometer



PURPOSE OF MACHINE

This machine measure the surface roughness while keeping the actual topography of the material safe.

TEST RATE

Rs 5000/sample

c. BET Surface Area and Porosity Analyzer



PURPOSE OF MACHINE

This machine determine surface porosity and surface area by analyzing the surface of the sample.

TEST RATE

Rs 5000/sample

b. Particle Size Analyzer



PURPOSE OF MACHINE

This machine determine both the size of particles and their state of distribution, are used for the production control of powders in such fields as ceramics, chemistry, and foodstuffs.

TEST RATE

Rs 5000/sample

d. Impedance Analyzer



PURPOSE OF MACHINE

Dielectric properties (dielectric constant, dielectric loss, dielectric tangent loss factor, AC conductivity, Impedance)

TEST RATE

Rs 5000/sample

e. X-Ray Diffraction (XRD) Analyzer



PURPOSE OF MACHINE

X-Ray Diffraction is a technique most commonly applied to materials which are crystalline in the solid state. It provides information on the arrangement of molecules or other structural units as well as on local structure.

TEST RATE

Rs 2000/sample

f. Melt Flow Index



PURPOSE OF MACHINE

Melt Flow Index (MFI) is a measure of how many grams of a polymer flow through the die in ten minutes. The test is performed at a given temperature depending on the plastic.

TEST RATE

Rs 2500/sample

FOCAL PERSON

Dr Usman Liaqat

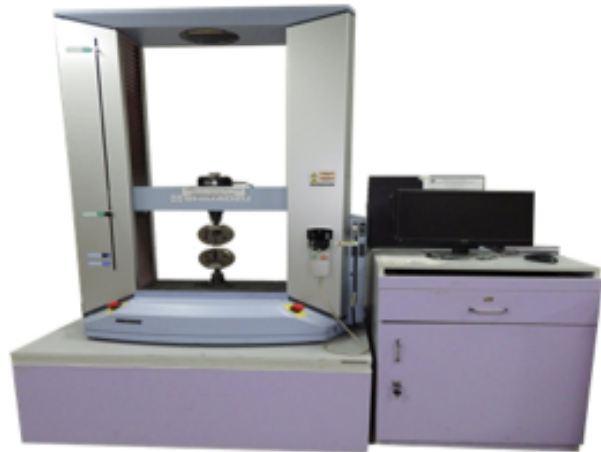
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+ **Mechanical Testing Lab.** In the mechanical testing lab materials can be characterized for their mechanical properties i.e., hardness, strength, impact resistance of material by utilizing following techniques / equipment:

a. Universal Testing Machine



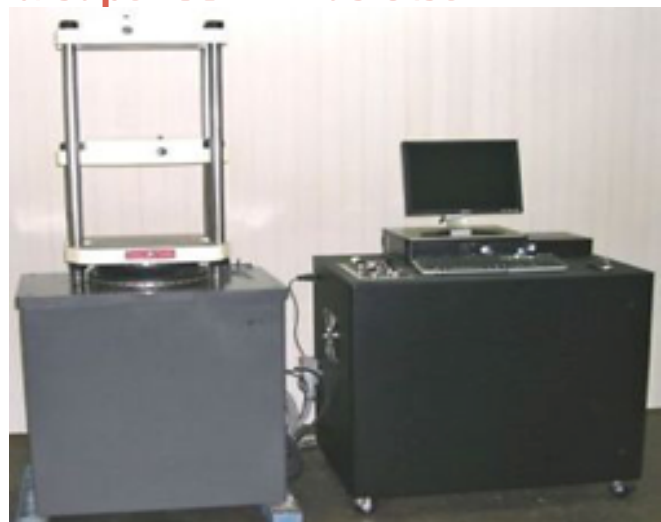
PURPOSE OF MACHINE

The properties that can be obtained from the stress-strain curves include yield strength, tensile strength, fracture strength, percent total elongation, uniform elongation, strain hardening exponent, modulus of resilience, and modulus of toughness. Load capacity of 20 KN.

TEST RATE

Rs 3000/ sample

b. Super 602 Tinius Olsen



PURPOSE OF MACHINE

The properties that can be obtained from the stress-strain curves are yield strength, tensile strength, fracture strength, percent total elongation, uniform elongation, strain hardening exponent, modulus of resilience, and modulus of

toughness. Load capacity of 300 KN.

TEST RATE

Rs 3500/sample

c. Impact Testing Machine



PURPOSE OF MACHINE

This machine provides information on failure mode under high velocity loading conditions leading to sudden fracture where a sharp stress raiser (notch) is present. As plastic deformation capability of a particular material (ductility) increases, the absorbed energy and respectively toughness of sample(s) increase.

TEST RATE

Rs 1000/sample

d. Hardness Tester

(1) Rockwell Hardness Machine



PURPOSE OF MACHINE

Used to evaluate the hardness of Mild Steel, Aluminium Alloy, Copper Alloy, Malleable Cast Iron (on B scale) Quenched Steel, Tempered Steel, Hard Cast Iron (on C scale).

TEST RATE

Rs 500/sample

(2) Vickers Hardness Tester



PURPOSE OF MACHINE

To determine the hardness of samples, its steady and reliable for testing of curved surface.

TEST RATE

Rs 500/sample

(3) Brinell's Hardness Tester



PURPOSE OF MACHINE

Brinell's Hardness Tester has a steel ball indenter. Upon applying force it produces an indent of some specific diameter. Measurement of the diameter of the indenter is indirectly the measurement of hardness.

TEST RATE

Rs 500/sample

FOCAL PERSON

Dr Adeel Umer

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Specialized Equipment

a. Fourier Transform Infrared



PURPOSE OF MACHINE

FT-IR is used to determine the chemical bonds by producing the infrared absorption spectrum that is like a molecular fingerprint. It can be used to identify functional groups and Molecular structure of a material.

TEST RATE

Rs 1500/sample

b. High Performance Liquid Chromatography



PURPOSE OF MACHINE

HPLC is a technique used to separate, identify and quantify each component in a mixture. HPLC is used for qualitative analysis, quantitative analysis & purification of component.

TEST RATE

Rs 1500/sample

c. Thermo Gravimetric / Differential Thermal Analyzer



PURPOSE OF MACHINE

TG / DTA is simultaneous thermo gravimetric (TG) and differential thermal analysis (DTA) apparatus. TGA is used to determine mass loss or gain due to decomposition, oxidation and or loss of volatiles and DTA is an analytical technique to determine thermal and kinetic properties of sample.

TEST RATE

Rs 3000/sample

d. Refrigerated Table Top Centrifuge



PURPOSE OF MACHINE

A centrifuge is a device that is used for the separation of fluids based on density. Separation is achieved by spinning a vessel containing material at high speed; the centrifugal force pushes heavier materials to the outside of the vessel and the radial acceleration causes denser particles to settle to the bottom of the tube, while low-density substances rise to the top.

TEST RATE

Rs 1500/sample

e. UV-Visible Spectrophotometer



PURPOSE OF MACHINE

UV-Vis is a technique used to measure the attenuation of a beam of light after passes through sample.

TEST RATE

Rs 1500/sample

FOCAL PERSON

Dr Erum Pervaiz

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Tel: +92-51-90855113



School of Civil & Environmental Engineering (SCEE)

- + Geotechnical Lab (NICE)
- + Structures Lab (NICE)
- + Specialized Equipment (IESE)
 - » Element Analyzer
 - » Particle Size Analyzer
 - » High Volume Air Sampler
 - » Noise Meter
 - » UV-VIS Spectrophotometer
 - » Drinking Water Analysis
 - » Wastewater Characterization

Introduction. SCEE was established at NUST Islamabad campus in 2008. It comprises three vibrant institutes, namely Institute of Environmental Sciences & Engineering (IESE), Institute of Geographical Information Systems (IGIS) and NUST Institute of Civil Engineering (NICE). The School offers a wide range of programs in Civil & Environmental Engineering. SCEE has advanced postgraduate programs in Structural Engineering, Geotechnical Engineering, Water Resource Engineering & Management, Environmental Engineering, Remote Sensing & Geographic Information Systems, and Construction Engineering & Management.

Geotechnical Lab

Geotechnical lab of NICE is well furnished with all sorts of geotechnical testing equipment including equipment for surface and subsurface exploration. It has basic soil mechanics equipment for tests like Natural Moisture Content, Grain Size Analysis, Atterberg Limits, Compaction, Direct Shear, Unconfined compression, Consolidation as well as advance equipment for tests like Cross Hole Borehole Survey, Geophysical investigations (Electric Resistivity test and Refraction Test) etc.

a. Triaxial Test Apparatus



PURPOSE OF MACHINE

Triaxial Test Apparatus is used to find shear strength parameters (cohesion and angle of friction) of soils in following states:-

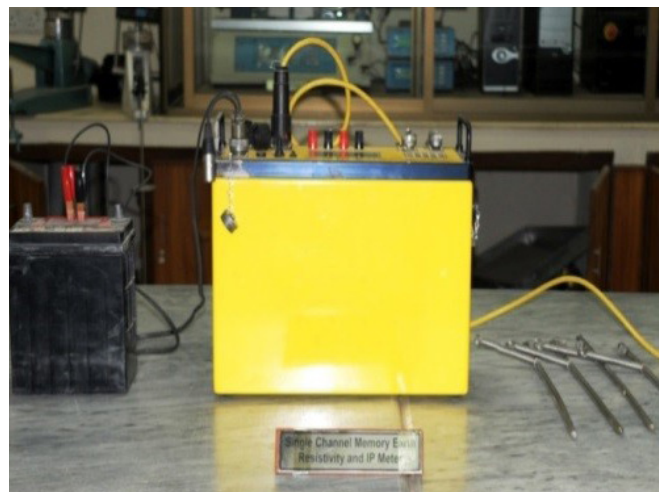
- Unconsolidated Undrained (UU)
- Consolidation Undrained (CU)
- Consolidated Drained (CD)

TEST RATE

Rs 25000/sample

b. Geophysical Testing

(1) Electric Resistivity Test Apparatus



PURPOSE OF MACHINE

Electric Resistivity Test apparatus is used for geophysical site investigations. Soil Properties are determined using the resistance offered by soil to electric current. In this test difference in electric resistivity of different Soil / Rock Layers is measured.

TEST RATE

- Rs 15000/- in Islamabad
- Rs 20000/- Outside Islamabad

(2) Seismic Test Apparatus



PURPOSE OF MACHINE

This machine is used for geophysical site investigations in which difference in stiffness of different soil/rock layer is measured. An elastic wave is generated in the ground and resulting ground motion is measured using vibration detectors (Geophones).

TEST RATE

Rs 25000 in Islamabad

(3) Menard Pressure Meter



PURPOSE OF MACHINE

Menard Pressure meter is used to measure different soil properties. Following properties of soil can be measured by this apparatus:

- i. Total Horizontal Stress
- ii. Limit Pressure
- iii. Young Modulus of Soil

TEST RATE

- i. Rs. 25000/- in Islamabad
- ii. Rs. 40,000/- Outside Islamabad

FOCAL PERSON

Engr Ameer Hamza

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Tel: +92-51-90854583

Structures Lab

Structural lab of NICE is well furnished with all sorts of material testing equipment for construction. It has basic equipment for tests like Initial and Final setting of cement, Soundness of cement, Specific Gravity of Aggregate, Compressive Strength, Tensile strength, Bend Test, Non Destructive Tests (PUNDIT, Rebound hammer, Depth meter, Digital half Cell) as well as advance equipment for tests like Shrinkage Apparatus and Freeze Thaw Apparatus.

a. Freeze-Thaw Apparatus

PURPOSE OF MACHINE

A large Freeze-Thaw Machine having programmable Time and Temperature profiles. The machine is ideal for testing the resistance of concrete to rapid freezing and thawing.

TEST RATE

Research oriented/ based on site condition.



b. Reaction Floor



PURPOSE OF MACHINE

Reaction Floor is used for testing real sized beams against flexure.

- a. Crane Capacity: 5 tones
- b. 4 Load-Cells
- c. Max. Load Application: 40 tones

TEST RATE

Research oriented/ based on site condition.

FOCAL PERSON

Lab Engineer Mati Ullah Shah

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c. Universal Testing Machine



PURPOSE OF MACHINE

An apparatus used to test the tensile and bending strength of steel rebars. The machine can also be used to test the compressive and flexural strength of construction materials / elements.

TEST RATE

- (i) Tensile Test= 1400/sample
- (ii) Bend Test = 800/ sample

d. Cover Meter



PURPOSE OF MACHINE

Used to locate rebars and exact concrete cover.

TEST RATE

Depend on the site and extent of work, to be decided bay NICE team.

FOCAL PERSON

Lab Engr Atif Mehmood

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Tel: 0332-2777543

e. Depth Meter



PURPOSE OF MACHINE

A handheld, battery-powered, non-destructive system for measuring the thickness and integrity of concrete slabs, pavements, tunnel linings, walls and the plate-like structures.

TEST RATE

Depend on the site and extent of work, to be decided by NICE team.

FOCAL PERSON

Lab Engr Mati Ullah Shah

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Tel: +92-51-90854581

f. Half-Cell Corrosion Meter



PURPOSE OF MACHINE

Half-cell meters measure the condition and potential corrosion of rebars and steel structures within concrete.

TEST RATE

Depend on the site and extent of work , to be decided by NICE team.

FOCAL PERSON

Lab Engr Atif Mehmood
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g. Ultrasonic Pulse Velocity Test



PURPOSE OF MACHINE

Used to locate rebars and exact concrete cover.

TEST RATE

Depend on the site and extent of work, to be decided by NICE team

h. Schmidt Rebound Hammer



PURPOSE OF MACHINE

Used to find the compressive strength of existing / built-in structures.

TEST RATE

Rs 5000/- per test

FOCAL PERSON

Lab Engr Mati Ullah Shah
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Specialized Equipment (IESE)

a. Element Analyzer



PURPOSE OF MACHINE

Used to unravel the elemental composition of metals, glass, ceramics, building materials. Provides both qualitative and quantitative information.

TEST RATE

Rs 800/Sample

b. Particle Size Analyzer

PURPOSE OF MACHINE

Calculate the laser scattering particle size distribution analysis.

TEST RATE

Rs 1500/Sample



FOCAL PERSON

Lab Demo Noor Haleem

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Tel: +92-51-90854286



c. High Volume Air Sampler

PURPOSE OF MACHINE

They draw precise volumes of air through a filter paper of known weight for a set period of time.

TEST RATE

Rs 30000/Sample



d. Noise Meter

PURPOSE OF MACHINE

The pressure of the sound waves under study actuates the microphone thus converting the waves energy into electrical current which in turn serve to operate the display device.

TEST RATE

Rs 5000/ sample

FOCAL PERSON

Engr Naveed Ahmad

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Tel: +92-51-90854285

e. UV-VIS Spectrophotometer

PURPOSE OF MACHINE

Single Beam Spectrophotometer, uses light over the ultraviolet range (185 - 400 nm) and visible range (400 - 700 nm) of electromagnetic radiation spectrum.

TEST RATE

Rs 400/sample

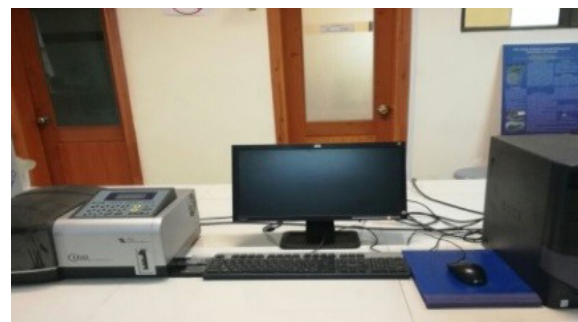
FOCAL PERSON

Engr Malik Irfan

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Email: mirfan@iese.nust.edu.pk

Tel: +92-51-90854282



f. Drinking Water Analysis

PURPOSE OF MACHINE

These are major tests performed to test drinking water quality. These tests are done using different equipment including meters, laminar flow hood, incubator & volumetric analysis.

TEST RATE

Rs 2650/sample

g. Wastewater Characterization

PURPOSE OF MACHINE

The major tests for wastewater analysis include dissolved oxygen, biological oxygen demand, chemical oxygen demand, total solids, volatile solids, fixed solids, total suspended solids, volatile suspended solids, sludge volume index, mixed liquor suspended solids, mixed liquor volatile suspended solids, settleable solids, oil & grease.

TEST RATE

Rs 5100/sample

FOCAL PERSON

Engr Aamir Khan

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Research Centre for Modeling & Simulation (RCMS)

+ Supercomputing Research & Education Centre

Research Centre for Modeling & Simulation (RCMS)

Introduction. Established in 2007, RCMS cuts across various disciplines to integrate modeling and simulation facilities with design and development for specialized research, innovation and dissemination of knowledge. Establishment of RCMS met the need for integrating analytical and computational techniques with advances in computer hardware and software. A truly multidisciplinary faculty allows RCMS to offer two mainstreams for postgraduate education – Computational Science and Computational Engineering, comprising disciplines like Bio-Informatics, Computational & Applied Mathematics, Systems Engineering, Operations Research, etc. Equipped with advanced computational labs, the Centre provides excellent opportunities for students, researchers and organizations to address research-specific problems through analytical and computational techniques.

+ **Supercomputing Research & Education Centre (ScREC)**
RCMS houses the fastest Supercomputer in Pakistani academia. It is the only GPU-based computing facility of its kind. At over 130 T-FLOPS, the facility can handle almost any computational scientific / engineering problems. The Supercomputer is remotely accessible via Internet where users can submit computational intensive jobs from anywhere in the world.



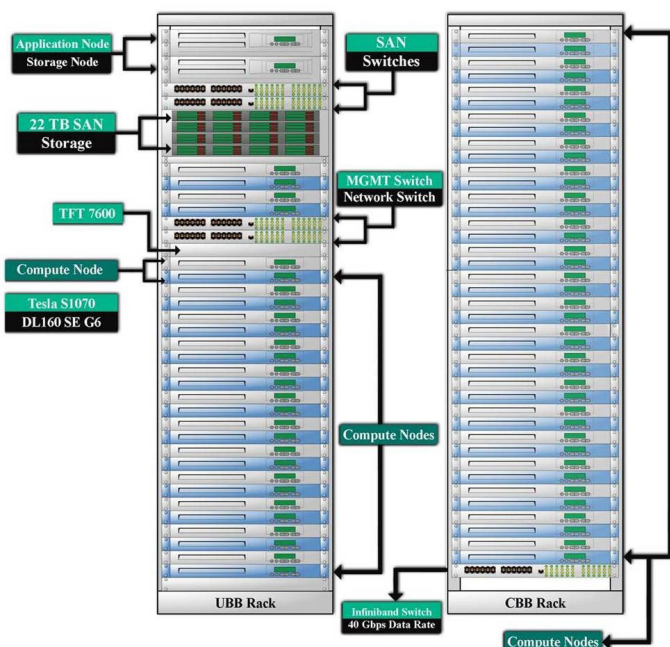
Two Head Nodes
HP DL380 G6
2x Intel Xeon E5520 CPU
16 GB Memory
2x 250 GB Sata Hard Drive
1x Nvidia Dual Core HIC



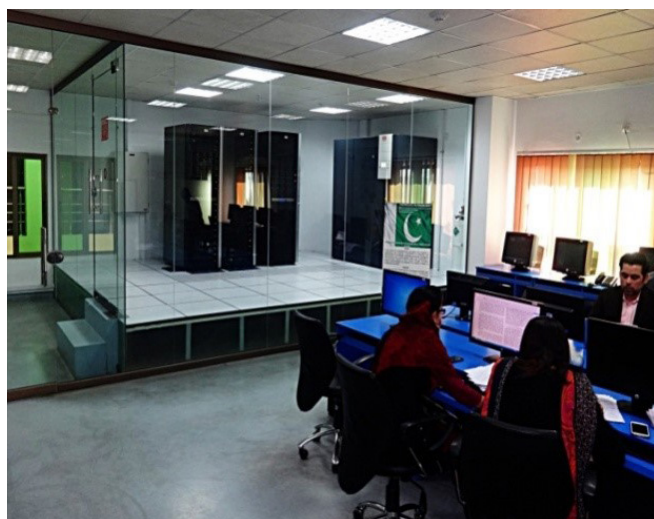
32x compute Node
HP DL160se
2x Intel Xeon E5520 CPU
24 GB Memory
2x 250 GB Sata Hard Drive
1x Nvidia Dual Core HIC



SAN Storage
HP Storage Works P2000
48x 450 SAS Drives
Total 22 Terabytes



infiniband Switch
HP Voltaire IB x QDR 36 Ports
Managed Rack Mountable Switch
40 Gbps Data Rate



TEST RATE

Rs 5/core/hour to Rs 100/core/hour depending upon the nature & category of user

FOCAL PERSON

Engr Muhammad Usman

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Phone: +92-51-9085-5717



School of Electrical Engineering & Computer Science (SEECs)

+ Neuro-Informatics Lab

School of Electrical Engineering & Computer Science (SEECs)

Introduction. SEECs offers postgraduate and undergraduate programs in the fields of Electrical Engineering, and Information Technology. These programs – blending computers, communication technologies and other information retrieving / processing tools – equip the youth with the requisite know-how for solving real-life problems and cope with the challenges of the professional world. The School is ideally suited for those aspiring to pursue research in hi-tech areas such as Internet of Things, Cloud Computing, Cyber Security, Big-Data Analytics, Wireless and Photonic Networks, and Smart Grids.

Neuro-Informatics Lab.

Home to Pakistan's first Electroencephalography (EEG) Research Lab, Neuro-Informatics Lab at SEECs has enabled Pakistani researchers and members of the faculty to actively participate in the global efforts to understand the human brain. EEG is the technology that enables scientists and neurologists to peer into the human brain. The lab collaborates with leading international institutions to develop highly skilled human resource in this field. It facilitates neuroscientists and computer scientists to conduct experiments, and analyse data using state-of-the-art neuro-tech equipment without having to invest in establishing their own experimental neuroscience facilities. The key goal of this lab is to provide latest experimental facilities to all beneficiaries, including higher education institutions, medical researchers/practitioners, and technology industry. The lab is being used for Brain Computer Interfaces (BCI / BMI), Neuro-marketing, Neuroscience, Diagnostic Research, and Neural Engineering, by neurologists, psychologists, computer scientists, and biomedical engineers.

TEST RATE

- (i) Standard Test: Rs 15,060/- Fixed for 2-hour test
- (ii) Custom Test: Rs 15,060 Base for first 2-hours + 5,400 per additional hour

FOCAL PERSON

Dr Hassan Aqeel

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School of Social Sciences & Humanities (S³H)

- + TV Studio
- + Radio Studio (FM 100.40)
- + Nonlinear Editing Lab

School of Social Sciences & Humanities (S³H)

Introduction. Initially three social sciences departments namely Department of Economics, Department of Government & Public Policy, and Department of Mass Communication were launched and housed under the umbrella of NUST Business School offering graduate and postgraduate programs in Business Administration, Economics, Mass Communication and Government & Public Policy. The School of Social Sciences and Humanities (S³H) was established offering different programs in Economics, Behavioral Sciences including Psychology & Sociology, Mass communication and Media Management etc. The aim is to develop leaders in social sciences by advancing professional values, knowledge, and skills through programs & policies. The vision is to create, disseminate and apply knowledge in the social, behavioral and economic science in collaboration with engineering, natural and biological sciences.

TV Studio.

The TV Studio is one of the top facilities at the S³H designed for the advancement of learning techniques pertaining to film making, broadcast journalism, photography, music production and experimental max media videos. The TV Studio is a multi-purpose room which is used for teaching, and developing hands on experiences. It is a practical playground for students and faculty to use professional lights, digital video cameras and industry standard equipment for Editing, Production, Post- Production, Storytelling and Photography.



FOCAL PERSON

Salman Nasir

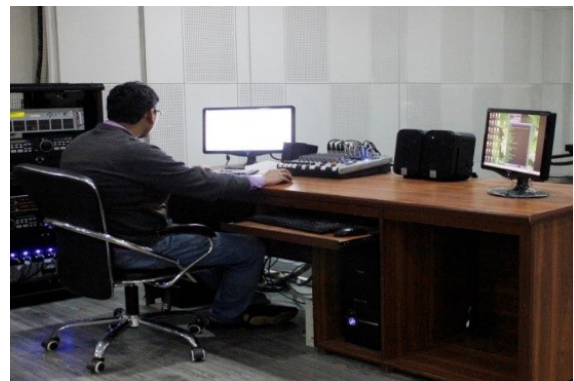
Contact focal person for availability of time slot

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Radio Studio (FM 100.40).

The Radio Studio is another facility at S³H with a special educational license for broadcasting non-commercial content. The Radio Studio has an aerial coverage of about 10 km, which covers half of Islamabad and Rawalpindi area. This facility enables students to develop a sound and technical understanding for broadcasting and complexities of radio production. The Studio can also be used for multiple discussions, talk show programs, motivational talks, music recording, behaviour change, communication and show casing of student projects (broadcast journalism). The facility is not available for commercial use as this facility operates under an educational license issued by PEMRA.



FOCAL PERSON

Salman Nasir

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Tel: +92-51-90853633

Nonlinear Editing Lab.

The lab is available for Nonlinear Editing. It is equipped with 50 Apple machines / iMac for video editing facility. Students of Broadcast Journalism of Film studies, TV& Radio production gets the benefits from this lab. Two professional editors are available for the support of faculty and students.

FOCAL PERSON

Taimoor Shehzad

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School of Natural Sciences (SNS)

Specialized Equipment

- + Powder X-Ray Diffraction
- + Gas Chromatography Mass Spectrometry (GC / MS)
- + Attenuated Fourier Transform Infrared Analysis (ATR-FTIR)
- + Thermo Gravimetric Analysis (TGA)
- + Diffuse Reflectance Ultra Violet Spectroscopy (DRS-UV)
- + Laser Lithography
- + Laser Induced breakdown Spectrometer (LIBS)
- + Potentiostat
- + Battery Testing System
- + Multiferrotic Testing System
- + Network Analyzer

Introduction. Established in May 2004, SNS currently consists of four departments namely Department of Mathematics, Department of Physics, Department of Chemistry and Department of Statistics. SNS offers both under graduate and postgraduate programs leading to the degrees of Master of Science (MS) and (Doctorate of Philosophy) PhD. SNS is a young and thriving school that contributes vitally to the research output of not only NUST but also of the country. The research carried out at SNS is regularly published in international journals of repute. About 650 students are currently enrolled at SNS. The faculty of SNS has authored / co-authored more than 900 research articles and with every passing year research out-put is increasing with the development of good research infrastructure and hiring of expert faculty. Following specialized equipment is available with SNS.

Specialized Equipment

a. Powder X-Ray Diffraction

PURPOSE OF MACHINE

Identification and phase formation of metal/ metal composite or other crystalline materials.

TEST RATE

Rs 1000/- sample

FOCAL PERSON

Dr Manzar Sohail

Contact focal person for availability of time slot

Email: manzar.sohail@sns.nust.edu.pk

Tel: +92-51-9085-5596



b. Gas Chromatography Mass Spectrometry

PURPOSE OF MACHINE

Measurement of qualitative and quantitative analysis of composition of different organic materials.

TEST RATE

Rs 8000/- sample

FOCAL PERSON

Dr M. Arfan

Contact focal person for availability of time slot

Email: marfan@sns.nust.edu.pk

Office: +92-51-90855598



c. Attenuated Fourier Transform Infrared Analysis

PURPOSE OF MACHINE

Measurement of qualitative analysis of organic and inorganic compounds for functional groups identification.

TEST RATE

Rs 1000/- sample

FOCAL PERSON

Prof Habib Nasir

Contact focal person for availability of time slot

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Tel: +92-51-90855550



e. Diffuse Reflectance Ultra Violet Spectroscopy

PURPOSE OF MACHINE

Determination of absorbance of liquid and solid materials identification and band gap calculations.

TEST RATE

Rs 1000/- sample

FOCAL PERSON

Dr Asad Mumtaz

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Tel: +92-51-90855596



d. Thermo Gravimetric Analysis

PURPOSE OF MACHINE

A method for the determination of thermal stability of samples.

TEST RATE

Rs 4000/- sample

FOCAL PERSON

Dr Faheem Amin

Contact focal person for availability of time slot

Email: faheem.amin@sns.nust.edu.pk



f. Laser Lithography

PURPOSE OF MACHINE

Fabrication of micro-patterns for PCB (electrical) boards etc.

TEST RATE

Rs 4000/- sample



g. Laser Induced Breakdown Spectrometer



PURPOSE OF MACHINE
Elemental analysis of materials.

TEST RATE
Rs 1000/- sample

FOCAL PERSON
Dr S. Rizwan Hussain
Contact focal person for availability of time slot
Email: syedrizzwan@sns.nust.edu.pk
Tel: +92-51-90855599

h. Potentiostat

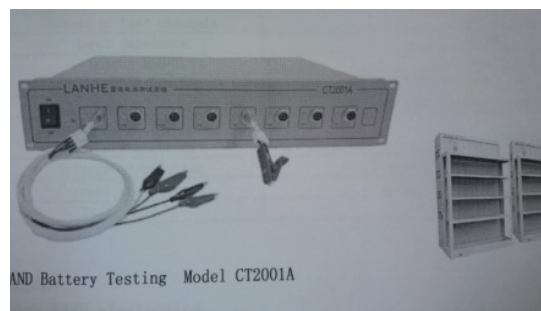


PURPOSE OF MACHINE
Determination of electrochemical properties, electrochemical sensing, energy generation and energy storage studies etc.

TEST RATE
Rs 3000/- hour

FOCAL PERSON
Prof Habib Nasir
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Tel: +92-51-90855584

i. Battery Testing System



PURPOSE OF MACHINE
It is used to test a material for electric charge/discharge capacity. Material can be determine whether or not suitable to be used as anode or cathode in a battery.

TEST RATE
Rs 3000/- hour

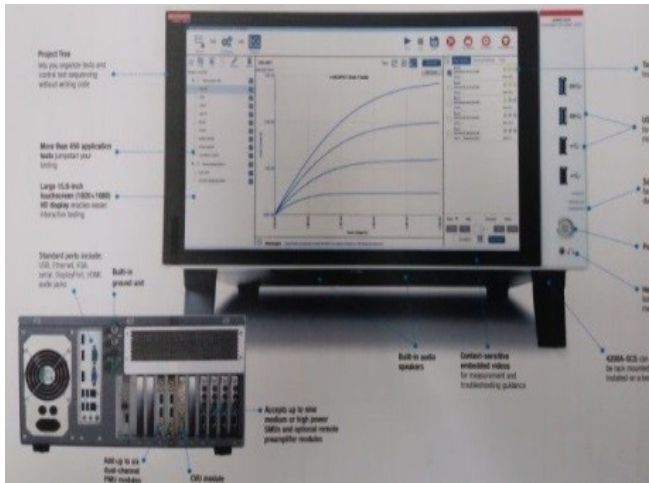
j. Multiferrotic Testing System



PURPOSE OF MACHINE
Multiferrotic system is used for measurement of pyroelectric properties, magnetoelectric properties, transistor characteristics, cryogenic properties, and bulk and / or thin film piezoelectric properties of materials.

TEST RATE
Rs 4000/- sample

k. Network Analyzer



PURPOSE OF MACHINE

Measurement of Current-Voltage characteristics for two and three terminal devices.

TEST RATE

Rs 3000/- sample

FOCAL PERSON

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FOCAL PERSON FOR ALL INSTRUMENTS

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Military College of Engineering (MCE)

- + Geotechnical Lab
- + Concrete Lab
- + Transportation Lab
- + Strength of Materials Lab

Introduction. The journey that started in 1948 from Sialkot spans over 69 years of rich history and success. The College is committed to the pursuit of knowledge and professionalism. MCE has the honor of producing 3,780 engineering graduates including around 60 international students. Later, 253 students completed their Masters and over 50 did their PhD's from renowned universities of the country and abroad. MCE is one of the premium institutions of the country providing an excellent environment of learning for the students with focus on innovation, sustainability and diversity in the field of Civil Engineering, Combat Engineering, Explosives Ordnance Disposal and Military Engineering Services. Aim is to develop MCE into a centre of excellence for advanced scientific and technological education and research.

Geotechnical Lab.

Geotechnical is a well-furnished lab with all sorts of geotechnical testing equipment for surface and subsurface exploration. The tests being carried out include Soil Investigation & Lab Testing e.g., Bearing Capacity, Density, Core Extraction & Evaluation, Designing of Retaining Walls & Flood Protection Bunds / Embankment and Stability Analysis for Slopes & Landslides & Remedial Design Measures. The lab is equipped with following key facilities:

a. Tri-axial

PURPOSE OF MACHINE

The tri-axial test allows the shear strength and stiffness of soil and rock to be determined for use in geotechnical design.

TEST RATE

Rs 4000/- sample



b. Consolidation Apparatus

PURPOSE OF MACHINE

The main purpose of consolidation tests is to obtain soil data which is used in predicting the rate and amount of settlement of structures founded on clay.

TEST RATE

Rs 12,000/- sample

c. CBR Apparatus

PURPOSE OF MACHINE

The CBR Apparatus is used for California Bearing Ratio (CBR) in labs (or in-situ) testing method to estimate the bearing value and the mechanical strength of soil.

TEST RATE

Rs 10,000/- sample



d. Electric Oven

PURPOSE OF MACHINE

These ovens generally provide uniform temperatures throughout. Process applications for lab ovens can be for annealing, die-bond curing, drying, and other industrial labor functions. It is also used to determine the moisture content of the soil.

TEST RATE

Rates included in other tests.



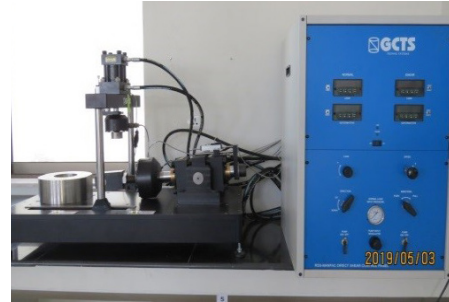
e. Direct Shear Panel

PURPOSE OF MACHINE

A direct shear test is a lab or field test used by geotechnical engineers to measure the shear strength properties of soil or rock material, or of discontinuities in soil or rock masses.

TEST RATE

Rs 3000/- sample



FOCAL PERSON

Lecturer Samreen Musaddiq

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Concrete Lab.

Concrete lab helps in determining properties of construction materials, their physical and mechanical properties, testing of materials for quality control and quality assurance etc. The lab is equipped with following key facilities:

a. Los Angeles Machine

PURPOSE OF MACHINE

Los Angeles abrasion is used to measure aggregate toughness and abrasion resistance such as crushing, degradation and disintegration. Wear and tear of aggregate is correlated with these properties of aggregate.

TEST RATE

Rs 3000/- sample



b. Electric Oven

PURPOSE OF MACHINE

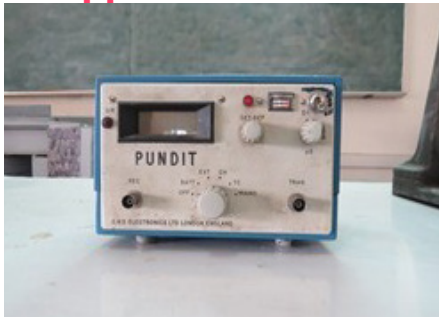
It is used to dry the samples (sand, aggregate) used in any test. Temperature controls of oven available in our lab is up to 120 degree centigrade.

TEST RATE

Rates included in other tests.



c. Pundit Apparatus



PURPOSE OF MACHINE

It is a non-destructive test used to measure the quality of hard concrete. It gives a velocity value which is correlated with strength and quality of concrete.

TEST RATE

Rs 4500/- sample

d. Slump Cone



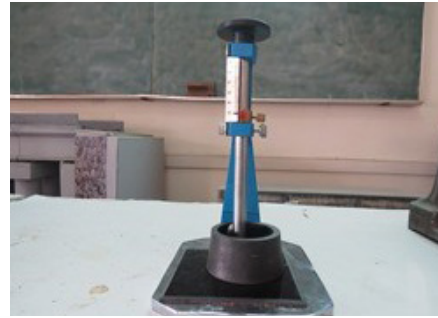
PURPOSE OF MACHINE

It is cone used to measure the workability of concrete. Slump is checked for fresh concrete during mixing which shows the workability of concrete. Workability means how easily one can mix, transport, compact and handle concrete on site.

TEST RATE

Rs 800/- sample

e. VCat Niddle Apparatus



PURPOSE OF MACHINE

Vicat apparatus is used to find the consistency of cement. It is also used to find initial and final setting time of cement.

TEST RATE

Rs 1500/- sample

f. Schmidt - CT



PURPOSE OF MACHINE

Used to find the compressive strength of existing / built-in structures.

TEST RATE

Rs 2500/- sample

FOCAL PERSON

Mr. Muhammad Nadeem Iqbal

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Transportation Lab.

Transportation is a state of the art Lab, primarily deals in material testing of Asphalt Pavements. The lab is engaged in R&D projects related to roads as well as quality testing of construction industry. Transportation Lab is capable of Traffic Survey & Transportation Planning Studies, Pavement Structural and Geometric Design and Evaluation of Motorways, Highways Rural and Urban Roads, Pavement Management System, Runway/Design/Rehabilitation, Evaluation & Remedial Measures, Pavement Material Testing, Rapid Mass Transit System and Intelligent Transportation System. The lab is equipped with following key facilities:

a. Extraction Machine

PURPOSE OF MACHINE

This apparatus is used to determine the bitumen %age in bitumen mix. Paving Mixture is tested to determine conformity with bitumen content requirement.

TEST RATE

Rs 4000/- sample



b. Ductility Machine

PURPOSE OF MACHINE

This apparatus is used to determine the bitumen %age in bitumen mix. Paving Mixture is tested to determine conformity with bitumen content requirement.

TEST RATE

Rs 2500/- sample



c. Flash & Fire Point Test Apparatus

PURPOSE OF MACHINE

This apparatus is used is designed to determine the temp to which an asphaltic material can be heated safely without the hazard of its catching fire.

TEST RATE

Rs 2000/- sample



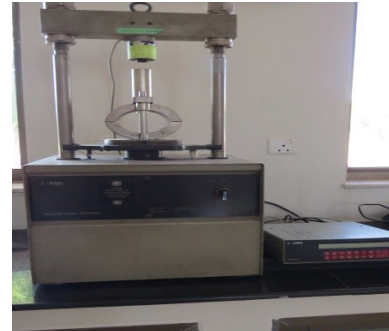
d. Marshal Stability Apparatus

PURPOSE OF MACHINE

The Marshall Stability apparatus is used is carried out for design and testing of bituminous mix. In this test to obtained optimum asphalt content for the type of agg. Mix.

TEST RATE

Rs 10,000/- sample



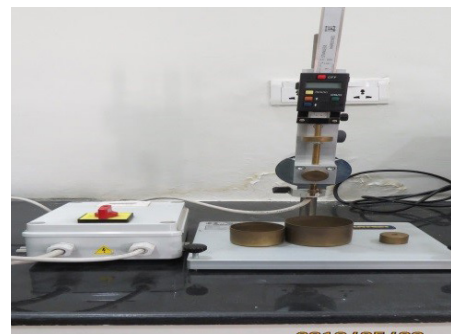
e. Penetrometer

PURPOSE OF MACHINE

This apparatus is used to identify an asphalt material and ensure that proper grade of binder is used for specific job.

TEST RATE

Rs 2000/- sample



f. Softening Point Test Apparatus

PURPOSE OF MACHINE

This apparatus is used to identify an asphalt material and ensure that proper grade of binder is used for specific job.

TEST RATE

Rs 2000/- sample



FOCAL PERSON

Engr Tabraiz Tehami Khan

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Strength of Materials Lab.

SOM Lab helps in determining construction material properties. The lab is equipped with UTM used for compression, flexure and tensile testing and plays a vital role in developing concepts of students related to structures. The lab is equipped with following key facilities:

a. Universal Testing Machine

PURPOSE OF MACHINE

To carry out tensile test on machined specimen of a metal to determine yield stress, tensile strength, elongation, reduction in area and limit of proportionality to ascertain the quality of the metal.

TEST RATE

Rs 2400/- sample



b. Torsion Testing Machine

PURPOSE OF MACHINE

To carry out torsion test in order to determine Modulus of rigidity, Shear stress at limit of proportionality, The general characteristics of torque and angle of twist of metals.

TEST RATE

For student use.



c. Data Logger

PURPOSE OF MACHINE

It is used to measure the strain in different projects of the students.

TEST RATE

For student use.



d. Thin Cylinder

PURPOSE OF MACHINE

To determine young's Modulus and Poisson Ratio of a Material and study the behavior of thin cylinder under internal pressure.

TEST RATE

For student use.



e. Straight Bridge Machine



PURPOSE OF MACHINE

For strain measurement. Used in conjunction with thick and thin cylinder.

TEST RATE

For student use.

FOCAL PERSON

Lab Demonstrator Akbar Ali

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FOCAL PERSON FOR ALL LABS

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Military College of Signals (MCS)

+ Image Processing Lab

Introduction. MCS was raised immediately after partition of the Indo-Pak Sub Continent in 1947 as School of Signals. MCS is the pioneer in starting some programs in Pakistan i.e., BE Telecom Engineering in 1960, BE Software Engineering in 1996 and MS in Information Security in 2001. MCS also started its PG programs (3 x MS & 3 x PhD programs) in 2001. MCS maintains a very conducive academic environment through community of highly educated and qualified academicians, skilled administrators and dedicated support staff.

Image Processing Lab.

The Image Processing Lab was established in 2007. It focuses on research activities related to analysis, coding, simulation and implementation of image and video processing techniques. The areas of interest are, but not limited to image and video enhancement, fusion, identification, tracking, multi resolution analysis, mosaic, compressed sensing probabilistic modeling and wavelet based compression. Distinct research work has been carried out in this field by MS and PhD students under the supervision of faculty of Electrical engineering and Computer software engineering. The lab is dedicated to undertake outstanding problems in image and video processing at National level with a view to provide near optimal solution. Two international conferences on image processing and computer vision have been conducted besides over hundred impact factor publications.



FOCAL PERSON

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College of Aeronautical Engineering (CAE)

- + Structures Lab
- + Aerodynamics & Fluid Mechanics Lab
- + Radar Lab
- + Communications & Avionics System Design Lab
- + Guidance Navigation & Controls Lab
- + Microwave Lab

Introduction. CAE was established by Pakistan Air Force in 1965, and became part of NUST in 1994. It is a postgraduate institute offering BE, MS and PhD in the disciplines of Aerospace and Avionics Engineering. The unique lab facilities of CAE, such as wind tunnel testing, radar and communications lab etc., provide excellent opportunity to work closely in collaboration with industry partners through R&D and consultancy projects.

Structures Lab.

The purpose of Structures Lab is to impart knowledge about basic and advanced aircraft structures and testing. The lab is used for teaching and research projects being carried out at CAE. The lab is equipped with following key facilities:

a. Universal Testing Machine

PURPOSE OF MACHINE

To test the ultimate tensile strength, yield strength of metals and composite materials.

TEST RATE

Rs 500/- specimen



b. Hardness Tester

PURPOSE OF MACHINE

It can test Rockwell hardness of metallic parts as ASTM standard.

TEST RATE

Rs 500/- specimen



c. Charpy Impact Testing Machine

PURPOSE OF MACHINE

Impact testing of materials samples as per ASTM standards.

TEST RATE

Rs 500/- specimen



d. Torsion Testing Machine

PURPOSE OF MACHINE

Torsion testing from 00 Nm upto 150 KNM as per ASTM standards.

TEST RATE

Rs 500/- specimen



e. Focal Person

Squadron Leader Shahzeb Irfan

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Cell: 0320-4432841

Aerodynamics and Fluid Mechanics Lab.

The main purpose of Aerodynamics lab is to visualize and investigate different types of flows for training and project/ research work. The lab is equipped with one supersonic and two subsonic wind tunnels. Flow visualization apparatus (Smoke Tunnel), Free/forced vortex Apparatus, Laminar/ Turbulent flow apparatus and Hydrogen Bubble Flow visualization System are some of other main equipment. Recently, the lab has been upgraded with Air Bench Apparatus, Axial Air flow Apparatus and Fan Performance Apparatus. The lab is equipped with following key facilities:

a. Closed Circuit Subsonic Wind Tunnel

PURPOSE OF MACHINE

Wind tunnel testing and analysis of aircraft and other aerodynamic equipment at subsonic speeds for the purpose of evaluating lift, drag and moments calculations.

TEST RATE

Rs 5000/- Each Run



b. Supersonic Wind Tunnel

PURPOSE OF MACHINE

Supersonic flow test on various aerodynamic surfaces and to study the shape and behavior of shock wave at various operating conditions.



c. Smoke Tunnel

PURPOSE OF MACHINE

To visualize the flow around various airfoils and other objects placed in the wind tunnel.



d. Air Bench Apparatus

PURPOSE OF MACHINE

To capture pressure and velocity profiles around the objects subject to incoming flow. To measure the boundary layer at various operating conditions.



e. Fan Performance Apparatus

PURPOSE OF MACHINE

To study the performance of axial flow through fan with different types of blades and through different Nozzles.

TEST RATE

Rs 2000/- Each Run



f. Focal Person

Squadron Leader Shahzeb Irfan

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Radar Lab.

The state-of-the-art semi-automatic probe station allows on-wafer DC and RF measurements for wafer size upto 200mm. The probe-station is equipped with both DC and RF probes (GSG, GSGSG) that allows common and differential mode RF measurements up to 50 GHz. The probe-station is placed on optical test bench, a 400 x microscope with integrated camera to assist in device characterization. Radar lab has Radar Training System 8095 which is the key equipment available in this lab.

PURPOSE OF MACHINE

Lab Volt Radar Training System is a table top radar which is used to demonstrate basic and advanced functions of a modern radar system. It is capable to detect and track passive targets at very short range. It necessitates very low transmitter power that allows for safe operation.

TEST RATE

Rs 7000/- Hr

FOCAL PERSON

Squadron Leader Farrukh Pervez

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Communications and Avionics System Design Lab.

Communication and Avionics System Design play an important role in aviation technologies. This lab provides an opportunity to teach and carryout research for aviation technologies in the domain of Communication and Avionics System Design. The lab has WinFACET Computer-Based Communication Trainer. It is used to build communications system by connecting a generator to a receiver using a coaxial cable. Individual system modules offer applications in the generation, transmission, and reception of amplitude, double sideband, single sideband, frequency, and phase (AM, DSB, SSB, FM, and PM) modulated signals. Following key software are also available:-

- Python.
- Proteus 8 professional.
- MATLAB.
- HFSS.

FOCAL PERSON

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Guidance Navigation and Controls Lab.

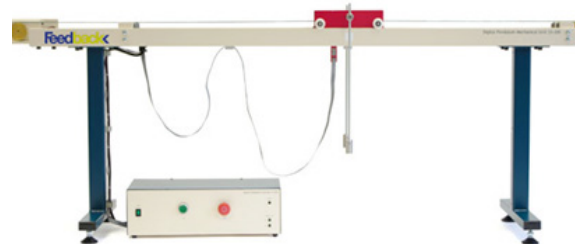
This lab is used for study and analysis of automatic control systems. Automatic controls are vital part of aerial vehicles. The lab facility is used for teaching and research projects being carried out at CAE. The lab is equipped with following key facilities:-



a. Inverted pendulum

PURPOSE OF MACHINE

To demonstrate control of a SIMO (Single Input Multiple Output) system. It is used to demonstrate an inverted pendulum, which illustrates control of an unstable system. Unstable systems are found in controlling rockets at take-off and in humanoid research.



b. Twin Rotor MIMO Control

PURPOSE OF MACHINE

To demonstrate control of a MIMO (Multiple Input Multiple Output) system. It consists of a vertical and a horizontal rotor fixed to an arm which can rotate about in a vertical axis and a horizontal axis.



c. Magnetic Levitation System

PURPOSE OF MACHINE

It demonstrates control of a metal sphere suspended in a magnetic field counteracting the force of gravity. It is an example of a system which is linear between the lower and upper limits of the sphere's vertical travel. Outside of these limits the system becomes highly non-linear and impossible to control.

FOCAL PERSON

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Microwave Lab.

This facility is used for teaching microwave and radar design related courses and carrying out research projects. Key equipment available includes:-



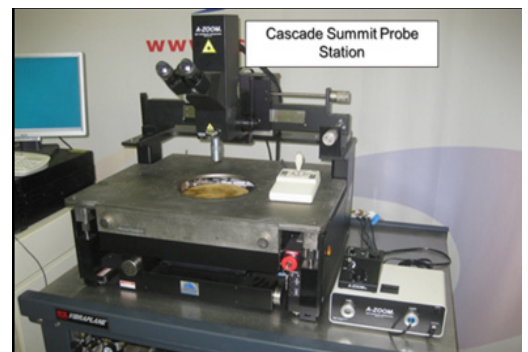
a. Cascade Summit (12651B) Probe Station

PURPOSE OF MACHINE

To access the full range of test instruments for 200 mm wafers. It leads the industry in on-wafer measurements. The probe station is easy to configure with choice of measurement performance, manual or semi-automated operation, chuck size, thermal range and microscope options.

TEST RATE

Rs 7900/- Hr



b. ATC-5000 Antenna Trainer

PURPOSE OF MACHINE

It is completely computerized antenna trainer that performs PC based automated rotation of receiving antennas at predefined angles and GUI-based polar plots of radiation patterns of each antenna. It is also used as a design tool for those engaged in research and development of projects in communication.



FOCAL PERSON

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Pakistan Navy Engineering College (PNEC)

- + Communication Engineering Lab
- + Wind Tunnel Testing Lab
- + Atomic Force Microscope Lab

Introduction. PNEC is one of the constituent colleges of National University of Sciences and Technology (NUST). It is the sole representative campus of NUST in Sindh - Baluchistan region. Established in 1962, PNEC offers BE, MS and PhD degree programs in the disciplines of Electrical, Mechanical, Industrial & Manufacturing Engineering and Management Information Systems. The academic departments at PNEC comprise of purpose built academic blocks with state-of-the-art classrooms, well equipped teaching and research labs and other student oriented facilities.

Communication Engineering Lab.

The lab houses state-of-the-art equipment in the field of RF Communication. It fulfils the requirement of both academia and industry. With the capabilities of Software Defined Radio platforms, rapid communication system prototyping is possible within the lab environment. Lab provides tools to design and measure RF devices with the help of Vector Network Analyser, Spectrum Analyser and RF signal generators. Major equipment available includes:

a. Spectrum Analyzer

PURPOSE OF MACHINE

A spectrum analyzer is a device that displays signal amplitude (strength) as it varies by signal frequency. The frequency appears on the horizontal axis, and the amplitude is displayed on the vertical axis. To the casual observer, a spectrum analyzer looks like an oscilloscope, and in fact, some devices can function either as oscilloscopes or spectrum analyzers.



b. RF Generator

PURPOSE OF MACHINE

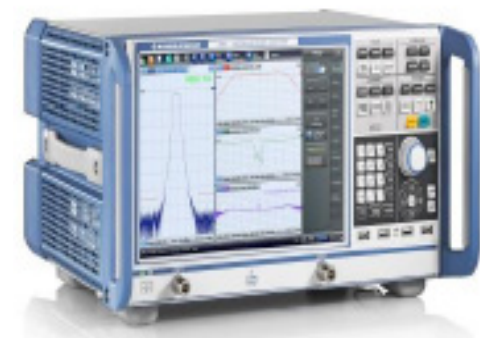
RF signal generators are an essential item of test instrumentation for any area where RF or microwave test and development is undertaken. The Microwave or RF signal generator provides a signal source that can be used to test the operation of the circuit being tested or developed.



c. Vector Network Analyzer

PURPOSE OF MACHINE

The RF Vector Network Analyzer, VNA is an RF test instrument that is able to measure the response of a network as vector or real and imaginary parameters.



d. USRP Software Define Radio

PURPOSE OF MACHINE

Universal Software Radio Peripheral (USRP) is a range of software-defined radios designed and sold by Ettus Research and its parent company, National Instruments. Most USRPs connect to a host computer through a high-speed link, which the host-based software uses to control the USRP hardware and transmit/receive data.

TEST RATE

1. Rs 2000/- per hours for students of other Universities.
2. Rs 5000/- per hours for Industries/ R&D Institutions.

FOCAL PERSON

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Wind Tunnel Testing Lab.

The supersonic wind tunnel (P3290) is an open, continuously operating supersonic wind tunnel with a rectangular measuring section. Supersonic flow and the occurring shock waves can be directly observed with the supplied Schlieren optic apparatus. The continuous operation can allow enough time to take measurements and to observe the phenomena. Four aerofoil models are supplied: a wedge, a double wedge, a bullet and a rocket. A flow straightener at the inlet ensures a low degree of turbulence. The tunnel is driven by a vacuum pump (included). The pump is effectively silenced so it can be placed in the same room as the wind tunnel.

TEST RATE

Rs. 50,000/-

FOCAL PERSON

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Atomic Force Microscope Lab.

The AFM is an important lab in Industrial & Manufacturing department at PNEC.

PURPOSE OF MACHINE

The AFM is to analyse the learning gap from theory to practical for graduate programs while collaborating with industry on R&D and consultancy projects.

TEST RATE

Rs. 10,000/- sample

FOCAL PERSON

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CONCLUSIONS

This is the first attempt to compile and highlight the NUST Test Facilities in the form of a Brochure. NUST expends a huge amount of its recurring budget for upgradation / replacement of lab equipment to remain in pace with the latest trends and technologies. NUST labs have a variety of modern equipment in Engineering, Natural, Environmental & Applied Biosciences fields as well as Modelling & Simulations to facilitate the researchers. Any suggestion, comment, addition or amendments to improve the quality and use ability of this Brochure will be highly appreciated.





National University of Sciences & Technology

📍 ISLAMABAD 📍 RAWALPINDI 📍 RISALPUR 📍 KARACHI 📍 QUETTA

