



## Major Equipments and Testing Facilities

Sr. No	Name of the Equipment	Manufacturer and Model no	Important Technical Specification	Applications
<b>Electronics &amp; Telecommunication Engineering Department</b>				
1	Antenna System Analyzer	SIGMA -Silicon automation system	Frequency range: 850MHz-1300MHz	Measurement of the input impedance of antenna systems in radio electronics applications.
2	Antenna Training system	AMITECH/ SIGNET -ATS04	System complying to IEEE Standard 149-1979  USB powered, calibrated Vector Signal Generator and Vector Signal Analyzer  Antenna Gain Measurement EIRP and Total Radiated Power Measurement.  Vector Signal Generator in CW, AM, FM, FSK, BPSK, QPSK, 8PSK, QAM, GMSK and various other modes including custom waveforms.  Test with LTE, Wi-Fi and other advanced waveforms Built-in Spectrum Analyzer,  Oscilloscope and Constellation Display  More than 30 different Antennas included.	Establishing a complete RF link with point-to-point connectivity RF Link budgeting and calculations. Antenna Radiation Pattern measurement with plotting software. Measurement of Antenna gain parameter and other characteristics. Experimentation with more than 30 different types of antennas. Custom waveform transmission with 25 MHz of instantaneous bandwidth for advanced experimentation and research such as LTE. Completely configurable frequency range from 30 MHz to 4 GHz can be used for RF path loss and other practical measurements. VSWR and Return Loss measurement of antennas with broadband directional coupler. Vertical, Horizontal and Circularly polarized antennas Polarization discrimination of Linear and Circular antennas. Current distribution of an antennas and comparative study of antennas. EM simulation results of all the antennas included for practical verification. Practical Verification of antennas working in Quad-band GSM, 20 bands of 3G, 40 bands of LTE, GPS, GNSS, WiFi, CDMA and applications such as IoT
3	Antenna Trainer Kit	Hiteck Array antenna trainer PAT-5000	Receiver Synthesized Frequency Range: 50-860MHz Freq range, synthesized with Key-Pad Entry. Freq/Level Resolution: 125KHz & 0.1dB Resolution. Display: LCD display 16 character Level Range: 20-120dBuV, 100dB	To provide useful tools for experimentation of varies antenna in VHF-UHF-Microwave bands.



			<p>measurement range with auto Attenuators.</p> <p>Level Accuracy: 1.5dB typ accy ( 2.5dB max) at 75ohms</p> <p>Level Arrays: Two memory arrays of 360 points each are provided for storing two sets of Polar dBuV readings. Useable for E &amp; H plane measurements or for comparison of two antennas.</p> <p>Positioner Angle: 1 or 5 degree, selectable</p>	
4	Spectrum Analyzer	Agilent-Keysight E4404B/1DR/A4 H/B72/226	<p>1KHz to 3 GHz, Brightest, highest resolution display in its class (21 cm XGA, 1024 x 768),</p> <p>1 dB electronic step input attenuator,</p> <p>10 Hz to 5 MHz RBW standard, 10% adjustable to 200 kHz, 1 Hz to 50 MHz VBW, USB and LAN standard</p>	<p>To measure the magnitude of the input signal versus frequency</p> <p>To measure the power of spectrum of signal</p>
5	RF Spectrum Analyzer	Agilent N9320A	<p>9KHz to 3GHz</p> <p>9 KHz RBW standard,</p>	<p>Measurement of the magnitude of an input signal versus frequency within the full frequency range of the instrument. The primary use is to measure the power of the spectrum of known and unknown signals.</p>
6	Optical Time Domain Reflectometer (OTDR)	Benchmark Enterprises - Benchmark OTDR	<p>Directional Coupler (1 x 2) 50/125micron.</p> <p>XY Rail for mounting the LD unit and post.</p> <p>OTDR Pulse Generator unit</p> <p>LD Modulator</p> <p>650nm LD unit</p> <p>APD module</p> <p>1m ST-ST patch cord</p>	<p>Testing of optical fiber cable.</p> <p>Testing the losses in fiber.</p> <p>Testing dispersion, pulse broadening effect.</p>
7	Optical Detector Characteristics	Benchmark Enterprises - FORX200 Optical Receiver	650nm LD Unit	To plot photodetector (light detector of FOC) characteristics.
8	Electrical & Optical Characteristics of different light sources	Benchmark Enterprises- Benchmark light sources	<p>Eleven usable 64 kbps channels.</p> <p>User definable frame marker (two alternating 8-bit markers - can be set to CCITT compatible).</p> <p>On-board two digitized voice channels, one 8-bit data channel and several user-expansion channels.</p> <p>Demonstrates fully operational</p>	To plot LED (light source of FOC) characteristics.



			<p>integrated voice/data fiber-optic communication link.</p> <p>RS - 232C communications module optional - demonstrates computer communications over fiber.</p> <p>Time Division Multiplexing of voice, data &amp; user-defined data streams.</p>	
9	1300nm Optical Power meter	Benchmark Enterprises- Benchmark Optical Power meter	<p>The typical power coupled into 50/125<math>\mu</math> Graded Index (GI) fiber with numerical aperture (NA) of 0.2 by FOPS is -20dBm.</p> <p>This optical power can be varied down to approximately 5dB range.</p> <p>The bit rate can be set to one of 64, 128, 256, 1024 and 2048 Kbps.</p>	To measure optical power generated by light source of 1300nm wavelength
10	He-Ne LASER	SOURAV SANTIFIC	10mW O/P power.	Intense Monochromatic source of Light.
11	Laser Beam Analyzer	VHS Electronics	Micrometre with LC of 0.001cm.	LASER beam width can be determined.
12	6 <sup>1/2</sup> Digit digital Multimeter	GW INSTEK (Silicon Automation)- GDM-8261A	<p>6 1/2 Digit Display : 1,200,000 counts.</p> <p>DCV Basic Accuracy : 0.0035%.</p> <p>Dual Measurements to perform two selected measurements simultaneously</p> <p>Bright Vacuum Fluorescent Display (VFD).</p> <p>Provide AC+DC Voltage or Current Measurement Functions.</p> <p>11 Measurement Functions &amp; 10 Math Functions</p> <p>High Resolution: Up to 100pA with DCI and 1nA with ACI Measurements.</p> <p>Temperature Measurement (RTD &amp; Thermocouple) from -200°C ~ +1820°C.</p> <p>High Transmission Speed: Up to 2,400 readings/sec through the USB.</p> <p>Standard Interfaces : USB, RS232C, Digital I/O</p> <p>Optional Interfaces : GPIB or LAN</p>	Measurement of voltage (RMS, PP), current, frequency, Temperature, capacitance, resistance
13	Arbitrary Function / waveform generator	Rigol - DG1022	Adopt advanced DDS technology; dual channel output; 100 MSa/s maximum sampling rate; 14 bits vertical accuracy.	Used to generate electrical waveforms. These waveforms can be either repetitive or single-shot (once only) in which case some kind of triggering source is required



			Output 5 standard waveforms; built-in 48 arbitrary waveforms Abundant modulation functions: AM, FM, PM, FSK, linear/logarithm sweep and burst. Abundant output and input: waveform output; synchronous signal output; external modulation source, external 10 MHz reference clock input, external trigger input	
14	Arbitrary Waveform Generator	Protek 9340	Power: 220V 10%, 50~60Hz, Max, 35W; Frequency range: 1Hz ~ 100MHz; Can generate 27 waveforms	Arbitrary waveform generator can output 27 waveforms of standard signals (sine, square, triangle, ramp & pulse, etc) and Arbitrary Waveform signal. It can used to output function signals and AM, FM, FSK, PSK, Sweep and Burst, Frequency Sweep Signal. It can be used to perform academic lab experiments and also for students' projects.
15	Mixed signal Oscilloscope	Rigol - MSO 5000	High quality 4 channel oscilloscopes with 350 MHz Bandwidth, 8 GSa/s sample rate, up to 200 Mpts memory depth and a 22.9 cm touch display 1024x600 pixel. Upgradable to a MSO with a 16 channel logic analyzer incl. MSO5000-BND option bundle.	To accurately time-correlate analog and digital channels
16	Digital Storage Oscilloscope	Yokogava DL-1520	2 input channels; Maximum sampling rate :200MS/s; Vertical sensitivity: 2mV/div to 5V/div; Repetitive waveform: DC to 150MHz	It can be used to display waveforms using auto set up function, also to analyze waveforms. It is possible to print the displayed waveform. It can be used to perform academic lab experiments.
17	CRO (100 MHz)	Aplab Model 3810SD	Surface Mounting Technology DC to 100MHz Bandwidth 1mV/div Sensitivity on Both Channels CH1 & CH2 Independent Channels Algebraic Addition and Subtraction X-Y Operation 5ns/div to 0.2s/div Time Base A ALT B SWEEPS - Max. 4 Traces A and B Delayed Sweep HOLD-OFF Time Adjustable Scale Illumination Z Modulation 8 x 10 cm Display Internal	To provide an accurate time and amplitude measurement of voltage signal over wide range of frequency.



			Graticule Auto Focus TV Triggering Frame (V) & Line (H) Line Trigger	
18	Data Acquisition System	DGP-2311	-5MSPS Throughput Rate -±0.25LSB INL (Typ), ±1LSB INL Guaranteed -Guaranteed 12-Bit, No Missing Codes -8VP-P Differential Inputs with Wide Input Common Mode Range -73dB SNR (Typ) at fIN = 2.2MHz -85dB THD (Typ) at fIN = 2.2MHz	Convert analog waveforms into digital values for processing
19	DAQ Card	National Instrument USB 6009	Multifunction I/O Device; Analog Input Channels:8 single-ended or 4 differential; Analog Output Channels:2; 14 bits resolution	It can be used for performing academic lab experiments, data logging and for portable measurements.
20	Asix Forte Universal in circuit USB Programmer(kit)	DGP - Forte programmer	Very fast programmer (30 MHz out, 15 MHz in/out). Controlled and powered by USB 2.0 High Speed (480 Mbps). Embedded processor for fast execution of complex operations. Both synchronous and asynchronous programming algorithms supported. JTAG support. Supported voltage range 1.8 to 5.5 V without any additional accessories. Able to supply the voltage from 1.8 to 5.5 V to the external target application Programming interface offers 8 inputs/outputs with individually configurable pull-up/down resistors.	Used for programming of microcontrollers, serial EEPROM and Flash memory chips, CPLDs and others.
21	Xilinx , ModelSim XE (EDK Software)	Xilinx License version (9.2)	Very low cost, high-performance logic solution for high-volume, cost-conscious applications Dual-range VCCAUX supply simplifies 3.3V-only design Suspend, Hibernate modes reduce system power Multi-voltage, multi-standard Hierarchical Select RAM	Simulation of HDL such as VHDL, Verilog and System C
22	Xilinx	Xilinx License version (8.1)	Interfacing 7 Series FPGAs High-Performance I/O Banks with 2.5V and 3.3V I/O Standards	To implement Basic digital Gates.



			The I/Os in Xilinx® 7 series FPGAs are classified as either high range (HR) or high performance (HP) banks. HR I/O banks can be operated from 1.2V to 3.3V, whereas HP I/O banks are optimized for operation between 1.2V and 1.8V. In circumstances that require an HP 1.8V I/O bank to interface with 2.5V or 3.3V logic, a range of options can be deployed. This application note describes methodologies for interfacing 7 series HP I/O banks with 2.5V and 3.3V systems.	
23	Microwind DSCH software	Microwind License version (3.1)	Microwind3 unifies schematic entry, pattern based simulator, SPICE extraction of schematic, Verilog extractor, layout compilation, on layout mix-signal circuit simulation, cross sectional & 3D viewer, Netlist extraction, BSIM4 tutorial on MOS devices and sign-off correlation to deliver unmatched design performance and designer productivity. The package contains a library of common logic and analog ICs to view and simulate.	To implement gates using MOSFETs. To implement Flip Flops. To implement CMOS inverter.
24	Sparten-6 FPGA Board	Xilinx LX4TQG144	500 k system gates 3840 logic cells 4800 flipflops 75K distributed RAM 216 Kb block RAM FPGA-IC in a TQG 144 Pin package with 102 I/O lines I/O tolerant 3.3 V Volatile device	To implement Digital circuits ALU
25	MATLAB software (15 users)	Mathworks License version (15 users)	Basic Matlab, Simulink, Communication Toolbox, Control System Toolbox, Image Processing Toolbox, Signal Processing Toolbox, Sim Power System, RF Toolbox	To integrate Computation, Visualization and programming in an easy to use environment. For data Visualization and analysis and research studies.
26	Multisim Software	NI License Version (10.1)	Ability to Reinforce Theory with Interactive Circuit Simulation NI Grapher showing the results of an AC Analysis Ability to Compare Simulated Data and Real Measurements from NI ELVIS inside Multisim	To provide simulation, analysis and PCB tools to improve prototype performance.



27	PCB Prototype Machine	Scientech Technologies Pvt. Ltd - Nvis 72	Setup Include : -Working area : 220x200 mm -Min.drill hole size : 0.3 mm -Min. Cutting trace/space : 0.2 mm -Spindle speed (Max.rpm) : 25000 rpm spindle -Motor : BLDC Motor -Miling depth sensing : Automatic -Tool change : Manual -Tool Holder : 1/8 inch -X/Y/Z driver : Stepping -Software CD Online Learning Material	PTH for double sided PCB PCB Design Software PCB Prototype Machine
<b>Electrical Department</b>				
1	Power Quality and Energy Analyzer	Fluke 435 - II	Class A, Accuracy: $\pm 0.1\%$ voltage/ $\pm 0.5\%$ $\pm 5$ counts Current, Harmonics 50, Flicker	Power Quality measurement and Audits
2	Power Quality Logge	Fluke 1748	IEC 61000-4-30 Ed 3, Class A, Accuracy: $\pm 0.1\%$ voltage/ $\pm 0.5\%$ $\pm 5$ counts Current, Harmonics 50, Flicker	Power Quality logging and Audits
3	Earth Leakage Clamp	Atandra / Chauvin Arnoux CA 6417	1500 $\Omega$ / 500 $\mu$ H / 40A	Earthing audit
4	High Voltage Testing Unit, oil immersed 0-80Kv, 100mA,	HV (India)	0-80kV, 100mA	Measurement of dielectric strength of air under uniform field and non-uniform field
5	Vertical Motorized Sphere Gap unit with control Panel	HV (India)	Sphere of 100mm diameter 99.9% pure copper	Use of shpere gap as voltmeter.
6	C and Tan Delta Measuring System	HV (India)	10kV , 1microF std capacitor,	Measurement of unknown capacitance and tan delta.
7	Synchronous motor Motor-Generator set -Control panel for M-G set -Non- contact type digital indicator	Ben	Motor: 3-Ph, Auto Synchronous motor, 5HP, 415Volts, 1500RPM, 50Hz, Salient pole -Generator : 3kW, 220Volts, 13.6Amp, 1500RPM, Compound wound , Loading arrangement gives better scope for testing of motor. V curve characteristics can be determined	Power factor improvement
8	Motor generator set slip ring I. M. m/c. coupled to Compound m/c.	Ben	Induction Motor 7.5 HP,415 volt,1440 rpm DC Generator-220 Volt,20 Ampere, Loading arrangement gives better scope for testing of motor	Testing of water pumping motors used for agricultural purpose
9	Motor generator set squirrel cage I. M. m/c. coupled to shunt m/c.	Ben	3 Phase Induction Motor-7.5 HP, 415 volt,1440 rpm, DC Shunt Generator-220 volt, 20Ampere , Loading arrangement gives better scope for testing of motor	Testing of water pumping motors used for agricultural purpose



10	Transformer Protection Demo Panel	Xtreme Engineering Equipment (P) Ltd (XEEPL)	Transformer 3-Ph, 3KVA,415/230V (L-L), Delta/Star connected transformer with tapings on primary at 0-10-20-100% & on secondary at 0-10-20-100% on each phase of windings, Natural air cooled. Protective relay 3-phase, percentage biased differential, solid state relay	To study % differential protection under various fault conditions.
11	Alternator Protection Demo Panel	Xtreme Engineering Equipment (P) Ltd (XEEPL)	Alternator 3 KVA,3 Phase, 415V, 1500 rpm, Star connected Alternator winding Coupled to 3 HP, 220V, 1500 RPM DC Shunt Motor Protective relay 3-phase, 1A, CT operated percentage biased differential solid-state relay.	To study % differential protection under various fault conditions.
<b>Instrumentation Department</b>				
1	Universal Process Control Trainer	APEX INNOVATIONS PVT. LTD.  Apex 330	DCS and SCADA, Hybrid controller, AI 8, AO 4, DI 16, DO 16, Control loops 8 with RS232, RS485, Ethernet, i) DCS: Hybrid Control Designer ii) SCADA: Wondware In touch 64 Tags, PT100, Type 2 wire, DPT, Type 2 wire, Range 0–200 mm H <sub>2</sub> O, Output 4–20 mA, Sq. root, Type: Pneumatic, Size:1/2", Input: 3–15psig, Linear & Equal % (2Nos)	To demonstrate wide range of experiments, applications and advanced control techniques using industry standard instrumentation and controls
2	Micrologix PLC Allen Bradley 1766-L32BXX.	Rockwell Automation  1766-L32BXX	Number of Inputs 20, Number of Outputs 12, Input Type Digital Output Type Relay, Interface Ethernet, Mounting Type DIN Rail, Maximum Operating Temperature +60°C, Supply Voltage 24 V dc, Input supply voltage is 24VDC Configurable program memory is 10k 12 fast/8 normal digital inputs 6 relay/3 fast/3 normal digital outputs	Industrial automation Robotics Automobile industry
3	Allen Bradley Programming Logic Controller (PLC) with software	Rockwell Automation-1766-L32BWAA	20DI & 12DO, 2AI,& 2AO 120/240Volt AC /24V DC, 10K memory PLC Software : RSLogix500 SCADA Software : factory Talk View Studio	For projects in automation





4	VWSB015AENE: Factory Talk	Rockwell Automation  VWSB015AENE	Factory Talk View Site Edition (SE) is an integrated software package	Factory Talk View Site Edition (SE) is an integrated software package for developing and running human-machine interface (HMI) applications that can involve multiple users and servers, distributed over a network.
5	VWSTENE: Factory Talk Enterprise	Rockwell Automation 9701-VWSTENE	Configuration software for developing and testing machine and site-level human-machine interface (HMI) applications. (Includes): RSLinx Classic for Factory Talk View and KEP Server Enterprise	It contains editors for creating complete applications, and contains Client and server software for testing the applications you create.
6	Temperature and Pressure Feedback control loop	SAP Engineers  PCST	Temperature and pressure Transmitter having output 4-20mA PID control setting (P, P+I, P+D and PID mode), Auto/Manual Tuning of PID E/P Converter- Input: 4-20 mA, Output: 3-15 psi, Connection: ¼” NPT / BSP Pneumatic Control Valve Size: ½”, Type; Two way Globe type (Air to Close), Equal Percentage Type, Cv: 5 US GPM, with diaphragm actuator. Flange connection: PCD: 60 mm, ID16 mm, OD: 90 mm.	It's application is in process industry. It's a prototype model of feedback control loop. To study the effect of different control actions on process,
7	ECG Machine	Bio Medical System  CM300	Three-Channel ECG, with standard LCD screen, Resolution: 320 x 240, Thermal Recorder (80mm)., Built-in Li-ion Battery, 150 Digital ECG Records, PDF Prints.	For Performing Practical of ECG Measurement, Pulse measurement and observing the output on Computer screen
8	Lab-VIEW Software	National Instrument	NI lab-VIEW 8.5 10 user	Lab-VIEW is a visual programming language. Lab-VIEW can be used for data acquisition, instrument control, and industrial automation. It can be used for performing academic lab experiments and students' projects.
9	LABVIEW Elvis prototype board	National Instrument Elvis prototyping Board N114	Analog Input Channels 0 through 7 ; Positive supply voltage: between 0 and +12 V; Negative supply voltage: between 0 and -12 V; Facilitated with: DMM Connectors, Oscilloscope (Scope) connector.	Elvis prototyping board N114 can be used for circuit design and analysis for Learning Analog and Digital Electronics. It can be used for performing academic lab experiments.
10	Defibrillator demo kit	Pamtron 121	Simulator with 4 modes of fibrillation, capacitor based,	Simulator to show functioning of defibrillation
11	UV spectrophotometer	SYSTRONICS CS-119	PC Based Automatic source optimization & base line	To perform the experiment based on chemical analysis



			correction, 200 – 1000 nm Range, 1 nm Bandwidth, %T, Abs, Conc. (K factor, Multi standard up to 5) measuring modes, Single Wavelength, Multi Wavelength, Scan (with multi scan facility), Time Scan operating modes, Automatic 5 position sample changer, Single Position 50/100 mm Cuvette Holder (Optional)	
12	Dialysis Machine	Fresenius 4008H	Volumetric UF, Acetate Bicard Dialysis, Arterial Pressure Monitor, Venous Pressure Monitor, Conductivity & Temp Monitor, Hot Rinsing & Hot Disinfection, Na Modeling. Auto Rinse and Auto ON Programmes, Isolated UF, RO Plant (50 LHP), Fresenius F6 Dialyser, Blood Line Tubing, Hemodialysis, Variable Transformer	To Demonstrate the working of Dialysis Machine
13	Hydraulic Trainer	Adtron 4033	Pump 3LPM, Pressure 20 bar, Motor ½ HP, Single and double acting cylinder, 4/2 directional valve, check valve, pressure line manifold	Study of different hydraulic components Its sequencing, Hydraulic components are used in industry for process control. Generally in manufactured industry on assembly line.
14	Electro Pneumatic Trainer Kit	Adtron 4030	Hand Slide Valve 01 No. Single Acting Cylinder 01 No. Double Acting Cylinder : 01 No. Double Acting Cylinder ( with reed switch ) : 01 No. 2/2 Way Direct Acting Solenoid Valve : 01 No. 3/2 Way Disc Rotary Valve 01 No. Air filter, Regulator & Lubricator Unit ( FRL Unit ) : 01 No.  * Pressure Manifold with Four ON / OFF	Study of different Pneumatic components Its sequencing, Pneumatic components are used in industry for process control. Generally in manufacturing industry on assembly line for automation
<b>Information Technology Department</b>				
1	Application firewall	Cyberoam / Sophos	8×10/100/1000 Ethernet ports. 18000 Mbps Firewall Throughput.	Layer 8 Identity-based Security / Application Visibility & Control. Web Filtering / Web Application



		CYBEROAM CR 500iNG-XP	3250 Mbps NGFW Throughput. 1650 Mbps Fully Protected Throughput.	Firewall.
2	Tower Server	Dell POWEREDGE T430	Intel Xeon processor E5-2600 v4 product family 12 DIMM slots: 4GB/8GB/16GB/32GB DDR4 up to 2400MT/s Support for a maximum of 1 internal controller and 1 external controller PERC H730, PERC H730P and PERC H830 SAS, SATA, Nearline SAS, SSD	Central Server for Application, web server, online exam server, FTP server etc.
<b>Engineering Science Department (FE)</b>				
1	Gauss View05	SCUBE scientific software solution	Software to study, analyze and calculate various parameters of Cosmic Molecules.	Study and analysis of Cosmic Molecules.
2	Gaussion 09 Windows with installation	SCUBE scientific software solution	Software to study, analyze and calculate various parameters of Cosmic Molecules.	Study and analysis of Cosmic Molecules.