

Key Indicator - 4.1 Physical Facilities (30)

Metric No		Weightage								
<p>4.1.1</p> <p>Q₁M</p>	<p><i>The institution has adequate facilities for teaching - learning. viz., classrooms, laboratories, computing equipment, etc</i></p> <p>Name of the Dept/School (EIED)</p> <p>Major Equipments in departmental laboratories</p> <table border="1" data-bbox="316 568 1315 2024"> <thead> <tr> <th data-bbox="316 568 627 685">Laboratory Description in Curriculum</th> <th data-bbox="627 568 1315 685">Type of Equipment</th> </tr> </thead> <tbody> <tr> <td data-bbox="316 685 627 1279">Analog and Digital Lab</td> <td data-bbox="627 685 1315 1279"> <ul style="list-style-type: none"> • Zealtech Work Bench (10) are fully equipped with: • Cathode Ray Oscilloscope (CRO) 30MHz • DC Regulated Power Supply (0-30V) • Function Generator • Digital Multimeter • AC Transformer Unit • PCB Input Panel • Application Board • PCB Prototype Machine with PCB Design Software (Model: Nvis 72) • Digital IC Trainer Kits (Vinytics Peripherals) • Digital Breadboard Trainer Kits (Advance Technology) </td> </tr> <tr> <td data-bbox="316 1279 627 1738">Biomedical Instrumentation Lab</td> <td data-bbox="627 1279 1315 1738"> <ul style="list-style-type: none"> • Spirometer computer interfacing Hardware Kit • ECG computer interfacing hardware • Polyrite 4 Channel Machine • Ultrasonic Pulsar/Receiver • EEG System and Simulator (Bio Kit EEG) • EMG Biofeedback Back System • Galvanic Skin Resistance unit with Calibrator • Pacemaker with Simulator • Digital Storage Oscilloscope • CROSSMATCH Iris Scanner • EMOTIV EPOC+ EEG </td> </tr> <tr> <td data-bbox="316 1738 627 2024">Biomedical Research Lab</td> <td data-bbox="627 1738 1315 2024"> <ul style="list-style-type: none"> • Wireless ExG measurement module (Nexus-10) • EMG measurement system (MP-45 Biopac) • VR module (Oculus-7) • Mixed Signal Oscilloscope (Tektronix 2014 16ch/100MHz/1GS/s) • Function Generator (Tektronix AFG3021B) • Power Supply device (Tektronix PWS 4323,0- </td> </tr> </tbody> </table>	Laboratory Description in Curriculum	Type of Equipment	Analog and Digital Lab	<ul style="list-style-type: none"> • Zealtech Work Bench (10) are fully equipped with: • Cathode Ray Oscilloscope (CRO) 30MHz • DC Regulated Power Supply (0-30V) • Function Generator • Digital Multimeter • AC Transformer Unit • PCB Input Panel • Application Board • PCB Prototype Machine with PCB Design Software (Model: Nvis 72) • Digital IC Trainer Kits (Vinytics Peripherals) • Digital Breadboard Trainer Kits (Advance Technology) 	Biomedical Instrumentation Lab	<ul style="list-style-type: none"> • Spirometer computer interfacing Hardware Kit • ECG computer interfacing hardware • Polyrite 4 Channel Machine • Ultrasonic Pulsar/Receiver • EEG System and Simulator (Bio Kit EEG) • EMG Biofeedback Back System • Galvanic Skin Resistance unit with Calibrator • Pacemaker with Simulator • Digital Storage Oscilloscope • CROSSMATCH Iris Scanner • EMOTIV EPOC+ EEG 	Biomedical Research Lab	<ul style="list-style-type: none"> • Wireless ExG measurement module (Nexus-10) • EMG measurement system (MP-45 Biopac) • VR module (Oculus-7) • Mixed Signal Oscilloscope (Tektronix 2014 16ch/100MHz/1GS/s) • Function Generator (Tektronix AFG3021B) • Power Supply device (Tektronix PWS 4323,0- 	<p>5</p>
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		<ul style="list-style-type: none"> 32 V,3 A) • Digital Multi meter (Tektronix DMM4040,6-1/2 DPMM) • Spirometer kit (Spirobank, MIR) • Maxon Motors (Swiss made, 360725 1386916) • Mind Alive (David delight) kit • Desktop (i5, 4GB, 1TB HD) 	
	Electric Drives Lab	<ul style="list-style-type: none"> • PSIM professional(digital Control, drive, renewable and SIM Coupler modules) • AC Servo Drive Trainer kit • AC Vector Control Drive Trainer kit • AC Digital Master Drive Trainer kit • Single-phase dual-bridge converter based DC drive • Jones chopper based DC drive • Microcontroller based Inverter drive for Three-phase induction motor • PLC Equipment with electrical panel • PWM based single phase Induction motor control setup BLDC Motor drive • Switched reluctance motor drive • Dual Converter fed DC Motor drive • DSO 60 MH • CRO 30 MHz • DSO 100MHz (4 channel) • Power Analyzer • Stroboscope • Current measuring Clamp 	
	Electrical Engineering Lab I	<ul style="list-style-type: none"> • Kirchhoff's law trainer kit • Network trainer kit • 1kVA, 50Hz, 230V/24V Single-Phase Transformer • 230V, 13A, 2.2kW DC Shunt Motor • Single-Phase, 2.16kVA, 8A, 230V, 50Hz Variac • 50MHz Digital Storage Oscilloscope with inbuilt Function Generator • Single-Phase 5A, 250V Inductor 	
	Electrical Engineering Lab II	<ul style="list-style-type: none"> • Kirchhoff's law trainer kit • Network trainer kit • 1kVA, 50Hz, 230V/24V Single-Phase Transformer • 230V, 13A, 2.2kW DC Shunt Motor 	

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	Electrical Machine Lab	<ul style="list-style-type: none"> • 3 phase Synchronizing Trainer • DC Shunt Motor: 2.2KW, 230V/13A, 1000 r.p.m • DC Series Motor: 3.7KW, 230V/16A, 2900r.p.m. • Compound generator 5 kW, 230V/13A • Single-phase Induction Motor 1HP, 230V/7.6A • Three-phase Squirrel Cage Induction Motor: 3HP, 440V/4.5A • Three-phase Slip Ring Induction Motor: 5HP, 440V/8A • Salient pole alternator: 10KVA, 230V/43A, 1500 r.p.m. • Cylindrical rotor alternator: 220V/14.5A, 1500 r.p.m. • Reluctance motor: 3.7 kW, 400V, 1500rpm • Three-phase Schrage motor: 10 HP, 400 V, 600/800 rpm • Three-phase Induction motor Cut section • Generalized machine tutor: 0.37KW, 220V/2.4A, 3000 r.p.m. • Single phase autotransformer: 230V/8A • Three phase variac: 42KVA, 400V • Three phase Scott connected transformer: 5KVA, 230V/21A • AC/DC Motor starters: AC 12.5HP, 415V/ DC 5HP, 230V • Switched capacitor banks: 600V, 50μF • Switched resistive loads: 10A • Variable inductive load: 10A • Digital storage oscilloscopes (2-channel): 25MHz, 4-channel • Synchronizing setup • Current Transformer: 5/5A, 10/5A, 20/5A, 50/5A • Stroboscopes 	
	High Voltage Lab	<ul style="list-style-type: none"> • 5-stage impulse generator (500 kV, 12.5 kJ) • Portable C and Tan Delta measuring Bridge (0- 	

		<p>10 kV, 100 mA, 50 Hz)</p> <ul style="list-style-type: none"> • Partial Discharge Detector (up to 100kV) • High Voltage Construction kit for AC, DC, Impulse Voltages (AC 100 kV, DC 140 kV, Impulse 140 kV) • Single Phase Semi-automatic Transformer Oil Testing Set (0-100 kV) • Sphere Gap Assembly • Riken Insulation Tester Series MHT • AC Peak Voltmeter • Impulse peak Voltmeter • Impulse /AC Voltage Divider • Digital Impulse Measuring Scope • High Voltage Test Transformer • High Voltage Detector (Non-Contact type) • All in One Desktop PCs (Dell) 	
	<p>Instrumentation and Control Lab</p>	<ul style="list-style-type: none"> • DC Motor Speed Control Kit; Motor Specifications: Rated voltage: 12V D.C., Rated current: 200mA, Maximum speed: 2400rpm. • DC Motor Position Control Kit Tachometer – Tachometer Constant: 0.5V/1000rpm • Potentiometric Error Detector Kit • Linear System Simulator Kit • Study of Compensators Kit with External RC Unit • Temperature Control using ON-OFF & PID Controller with External Heater Unit • Synchro Transmitter & Receiver Kit • PC based Coupled Tank Trainer Kit for study of interacting and non-interacting systems with USB adaptor • Servo Amplifier Modular Kit • Lloyd Fisher Square Kit Model Specifications: Sectional Area-16.80 square centimeters, Number of turns-630, Weight of core-10.48kg • Varley Loop Bridge Kit (with Galvanometer of 20uA/div. sensitivity) • Maxwell Inductance Capacitance Bridge [ELNO-DMB-267] (with External Bridge Oscillator Unit with freq. 1kHz) • De-Sauty Bridge for comparing capacities [ELNO-CSB-073] 	

		<p>(with External Bridge Oscillator Unit with freq. 1kHz)</p> <ul style="list-style-type: none"> • Portable Wheatstone Bridge [ELNO-WBP-238] <p>(with MR-100 Galvanometer of 10uA/div. sensitivity & 4.5V dry battery)</p> <ul style="list-style-type: none"> • Measurement of power in single phase by CT & PT • Calibration of Electronic Energy Meter Kit • DIGIAC 1750 Transducer & Instrumentation Trainer • Temperature Trainer Kit (with LM35, Thermistor, Thermocouple, RTD (JK) type and Furnace Unit) • Proximity Sensor Kit • Instrumentation Tutor Kit 1 and Kit 2 (with external Motor and VARIAC Unit) Motor Specifications: 230V, 0.25A, 1500rpm • Robotic Arm Development Kit • CROMPTON DC Potentiometer • Strain Gauge Kit • Piezoelectric Trainer • Pressure Measurement Trainer • Multi-waveform Signal • Stress & Strain Measurement Dead Weight Pressure Gauge Tester 	
	<p>Instrumentation System Design Lab</p>	<ul style="list-style-type: none"> • CRO 20 MHz Dual Trace built in Function Generator Model 201Scientech • Automation Trainer CDS 10 users Licensed Software • DV 0003001 PIC Start Programmer • DM 16302 PIC DEM2 PIC Demonstration Board • Digital Encoder 360 ZO multiple PPR and Incremental • Universal Programmer (Advantech LT-48*P) • MP Lab ICD 2 with PIC DEM 1.1 Demo board Micro Chip • Portable Real-time Development Kit • Academic Development License for NI Software • Arm Controller Kit KEIL USB JTAG Adapter and Evolution KEIL Arm Development Tools • CPLD Evolution Board 84 PIN PLCC 	

		<ul style="list-style-type: none"> • Universal CPLD - FPGA Proto-board • ADSP - 2181 based kit with ADI 1847 Stereo Codec RS232 Socked ETROM, Stepper Monitor Interface • HMI for PLC Compatible with Delta PLC • 6-Axis Programmable Robotic Arm complete • Software (Window 2000/XP) Example Codes in CD • Universal Embedded Development Pkg. • AVR Microcontroller Kit • PIC Microcontroller Kit • Cross Compiler for PIC Microcontroller (High Tech) 5 User • Embedded System Work Station Including: <ul style="list-style-type: none"> (a) FPGA Based system (b) NI Speedy 33 DSP Board • VMC 850IP 8085 Microprocessor Trainer • VMC 860IP 8086 Microprocessor Trainer • Ultrasonic Range Finder • Universal Op Amp Trainer Kit • Data Acquisition System with Demo Amplifier and Transducer • Dell Desktop Intel Core i5 3.2 GHz TFT, USB Keyboard & Optical Mouse, Ethernet Wi-Fi Window 7 Pro • Digital Storage Oscilloscope TBS-1072-EDU 70 MHz • Soldering & De-Soldering Station Model NAVIS 84T • Function Generator 10 MHz 	
	Network Lab	<ul style="list-style-type: none"> • Multisim software (25 Users) • Digital Storage Oscilloscope • All in One Desktop PCs 	
	Power Electronics Lab	<ul style="list-style-type: none"> • SCR characteristics Ki • MOSFET characteristics Kits • IGBT characteristics Kits • Half controlled Three-phase bridge converter • Full controlled Three-phase bridge converter with firing circui • Half controlled Single-phase bridge converter • Full controlled Single-phase bridge converter • McMurray single-phase bridge Inverter with firing circuit 	

		<ul style="list-style-type: none"> • UJT relaxation oscillator module • R, RC, UJT firing module • AC phase control module • SCR, MOSFET, IGBT & TRIAC characteristic experimental unit Single-phase AC series inverter • SCR parallel inverter • SCR commutation circuits kit • Morgan's chopper circuits kit • Three-phase cyclo converter Kit • 3-phase Shunt active filter with FPGA board • DSO 60 MHz • CRO 30 MHz • DSO 70 MHz (2 channel) • DSO 200 MHz (4 channel) • 3-phase Power logger • Precision LCR meter • Stroboscope • Current measuring clamp • IGBT based buck-boost chopper with PWM controller • 3 level diode clamped inverter (FPGA controller and PWM generator) • Three phase IGBT based inverter module • PSIM professional (digital control, renewable and SIM Coupler modules) • Dspace Microlab box kit • (Power PC, IO board, Development Software and GNU Compiler) • All in One Desktop PCs (Dell) 	
	<p>Power System Protection Lab</p>	<ul style="list-style-type: none"> • Transmission line Simulator with Series Compensator Module and Advanced Distance Relay • Desktop PC (i3 processor 7100, 4GB DDR4, 1TB HD) • Generator Protection Trainer Unit • Transformer Protection Trainer Unit • IDMT Over-current Relay (Static type) Trainer Unit • Percentage biased Differential Relay (Static type) Trainer Unit • Negative Sequence Current Relay (Static type) Trainer Unit • IDMT Over-current Relay (Electro-mechanical type) Trainer Unit 	

		<ul style="list-style-type: none"> • Air Circuit Breaker (Demonstration purpose) • Vacuum Circuit Breaker (Demonstration purpose) • Digital Earth Tester having three & four probe earth testing kit • Thermal Relay and fuse characteristics Trainer Unit • ABCD, Hybrid & Image Parameters Trainer Unit • Single line-to-ground Fault Trainer Unit • Performance of Transmission line under diff. Loads Trainer Unit • Earth fault relay (Electro-mechanical) Trainer Unit • Percentage Differential Relay (Electro-mechanical) Trainer Unit • DC Distribution system Trainer Unit 	
	<p>Power System Simulation Lab</p>	<ul style="list-style-type: none"> • MATLAB and SIMULINK family Software (Academic License) for Window & UNIX • DigSilent software • PSCAD/ EMTDC Software • MiPOWER Software • FEEDMOS Software • HP Z640 Workstation with HP 23F1 Backlit LED -2 • All in One Desktop PCs (Dell) -24 • Desktop (i5, 3.2 GHz, 4 GB RAM DDR3, 500 GB) -19 • Laptop (Lenovo) -1 • LED Projector -1 • Multi-Function Printer -2 • LED Screen (Videocon) -1 	
	<p>Process Dynamics & Control Lab</p>	<ul style="list-style-type: none"> • I/P & P/I Converter • Rotameter with control valves • Multi-process Trainer • Level Loop Control Trainer • Pressure Loop Control Trainer • Electro pneumatic Trainer • Electro hydraulic Trainer • Basic Process Rig • View PAC • Digital Instrumentation Tutor • Control Engineering Trainer 	

	Real Time Lab	<ul style="list-style-type: none"> • Opal-RT Model-OP4510 (20 Users) • DSO • All in One Desktop PCs (Dell) -20 	
	Renewable Energy Lab	<ul style="list-style-type: none"> • Solar PV Grid tie System • Solar PV Emulator • Solar PV Training and Research System • Boost Converter for PV Emulator • Wind Turbine Emulator • Energy Storage Battery System • Dell PCs • Solar Simulator • Fluke 3 phase power analyzer 	
	Thapar Freescale Lab	<ul style="list-style-type: none"> • DELL OPTIPLEX 3600 desktop Intel Core 2 Duo • VMC 850IP 8085 Microprocessor Trainer • VMC 860IP - 8086 Microprocessor Trainer • 89C51 Trainer Board with Power Supply • APS 12xDT5125 SLK Microcontroller Unit • PBM CUSLK with Bread board • AP 52233 SLK Ethernet Module • AP 13192 SLK Zigbee Module • APS 3E SLK JTAG USB Board • Data Projector PGLX 2000 • DSO TBS-1072 70 MHz • ARM based FRDM KL46Z Microcontroller Kit 	
	Virtual Instrumentation Lab	<ul style="list-style-type: none"> • PCI -6024E Multifunction I/O boards • BNC-2120 for 68 PIN AND 100 PIN Devices • PCI-MIO-16E-1 Multifunction I/O and NI-DAQ • PCI-6034E Multifunction I/O board and NI-DAQ • Desktop (Core2 Duo 2.66 GHz,2GB, 160 GB) • Desktop (i5, 3.2 GHz,4GB RAM DDR3,500GB) • NI Academic site license (LabVIEW2014) • NI myrio Hardware with Starter • Lenovo M900ZAIO Desktop 	