

Cost of tender form: Rs. 1,125 (With trade tax)

S No.....

BUNDELKHAND UNIVERSITY, JHANSI

Sealed tenders are invited from reputed manufacturers/suppliers/their-authorized dealers for supply & installation of equipments in various departments of Science, Pharmacy, Engineering & Technology and Management as per detail given below. The tender shall be accepted under two Bid System in two separate sealed envelop with full address of the firm. Technical Bid containing unpriced tender document should consist of complete technical details along with the EMD. The price bid containing prices with detailed break up should be both in figures and in words to avoid any ambiguity.

Last date and time of submission of Tender Document along with EMD: February 09, 2009 (1PM)
Date and Time for opening the tender February 09, 2009 (3PM)

	Name of Item	Specifications	Quoted Price	EMD in INR
1.	Nanodrop- UV-visible Spectrophotometer	Imported Equipment with Full spectrum (220-750nm) Suitable for measurement of small sample size ~1 µl High absorbance capacity With scanning and ratio calculators Compatible with computer interface and printer		15,000/-
2.	PCR Machine/ Thermal Cycler	Imported Equipment with Microprocessor based temperature control Suitable for 0.2 ml, 0.5 ml PCR tubes and 96 well (8 x 12) well plates Rapid temperature change (3-5 °C per seconds) With heated lid to prevent sample condensation With LCD display		5000/-
3.	UV-Visible spectrophotometer	Imported UV- Visible Spectrophotometers, Wave length-190-1100 nm, Spectral bandwidth 1nm, Wave length display 0.1 nm increment, Double beam, Wave length repeatability ± 0.1 nm High absorbance capacity With scanning and ratio calculators Compatible with computer interface and printer		10000/-
4.	On Line UPS Stabilizers	5, 10 KVA 5, 10 KVA		5000/-
5.	Deep Freezer – 40°C	Capacity approximately 265 Lit. inner chamber of stainless steel, temperature upto –40°C with built in digital temp. indicator cum controller having audio-visual alarm with voltage stabilizer.		5000/-
6.	Binocular Microscope with Digital camera system and Image analysis software.	USI optical system,100-240V 50/60Hz universal voltage, Coarse movement stroke 20mm, fine focus graduation 2.5 um, Fixed Quadruple nosepiece, inclined binocular tube, Abbe type of aperture diaphragm, Objective lense with 4X,10X, 40X,100X magnification, eye piece 10X, SLR digital camera (8 mega pixel)		5000/-

7.	Water Purification System	Milli Q type, Variable water output models ranging from 10-60 lts per hour output, Mol. Biology/ HPLC grade water		5000/-
8.	Stability Chamber	i- Outer cabinet S.S.304 grade dull watt finish ii- inner chamber stainless steel warrior finish with dq, iq, oq documentation. iii- capacity four cuft., 120 liter , 45x45x60 (internal size), 65x114x130 cm ² (external size). Optional accessories – Digital pid controller printer interface to connect EPSON dot matrix line printer		10000/-
9.	Sonicator	Operating frequency – 30 KHz Output – max-100 W , Output settings- 20 to 100 % Duty cycle(pulsed operation)- 0 to 100 % , Probes (dia in mm)- 0.5,1,2,3,7,10 , Power consumption-115 W Setting Times- by means of an optional timer PC connection- optional, socket integrated , Operating temperature- + 5 to + 40 degree centigrade		5000/-
10.	Gas Chromatograph	N6649400, GC, 230 VOLT SELECTION CONSISTS OF A. N6640003 BASE UNIT- 220V, 50/60 HZ NO A/S B. N6640010 KEYPAD OPTION ENGLISH C. N6640J00 POWER CORD CHINA D. N6641030 CH A(FRONT) CAPILLARY COLUMN INJECTOR E. N6642010 CH A(FRONT) FLAME-ION DETECTOR (FID) F. N6641002 CH B (REAR) PACKED COLUMN INJECTOR G. N6642002 CH B (REAR) THERM-CONDUCT DETECTOR(TCD) H. N6643020 DOTLINK INTEGRAL LINK TCWS N6120080 DETECTOR MAKEUP GASKIT-1/8 INCH N6101473 PRESET PRESSURE REGULATOR 09903981 GRAPHITE FERRULE 1/8X0.5MM PK/10 09903394 GRAPHITE FERRULE PK/10 N9301376 WAFER-CERMIC CUTTER PK/10 00091357 PTFE/SILICON INJECTOR SEPTA 12/PK N9300057 NUT KIT 1/8 STEEL PK/5, N9316076 COL-ELITE-5-30-.25UM-.25MM, N9305013 COLUMN 8000 PKD 6FT ST/ST		30000/-

11.	HPLC	<ul style="list-style-type: none"> - Three detectors, - UV /visible, RI, Fluorescence - Automatic rinsing kit, - Gradient Mixer - With Installing accessories , - High pressure pump Flow rate: 0.001 to 9.9ml/min in 0.001 ml/min increments, Flow rate precision: 0.1% RSD Repeatability: 0.1%, Pressure Range: 0 to 40 MPa System Protection: Soft start, P min & P max adjustment, -UV-VIS Detector, In detector Grating's turning is realized by SINGLE CHIP MICYOCO (SCM). Wave Length Range: 190 to 740nm Time Constants: 0.1/0.2/0.5/1.0/2.0/5.0/ & 10.0 Precision: +/- 0.1 nm, -Column Oven Control Mode: PID, Temp. Range: Ambient to 100 C 		30000/-
12.	Digital Zoom SLR Camera with microscope adapter (Microphotography)	<ul style="list-style-type: none"> - Cable release , Stand with tilting head - with 75-3000 mm zoom - 9 point AF(AF) , - 8 TO 12 megapixel 		5000/-
13.	Digital Gel documentation system	<ul style="list-style-type: none"> Complete system with , - UV Trans illuminator - Image transfer software - D'gel DAS ID Image analysis software - UV filter , Work station with epi illumination - Computer PIV , Key Board, Photo quality printer - Filter (Ethidium Bromide 600 nm IR Blocking - Max. Viewing Area 10.75" * 8.75" - Min Mounting Area 11.75" * 9.75" 		5000/-
14.	ELISA READER	<ul style="list-style-type: none"> - Wave length - 400 - 750 nm. - Automatic micro plate reader - Method Absorbance - Display LCD 240 (W) x 180 (H) Dimension 400mm x 340 mm x 180 mm - 96 well plate - Measuring range - 0 - 4,000 Abs. 		6000/-
15.	Hollow Fiber Bioreactor	<ul style="list-style-type: none"> - working volume 5 ltr. Capacity - made of pyrex glass with all accessories - Harvest pipe, height adjustable - Exhaust Cooler - Temp. Sensor PT-100 - PA/12, 325 - PO2-Electrode 12, 320 - Foam probe - Level Probe 		10000/-

16.	Ice flacking Machine	<ul style="list-style-type: none"> - Prodi 70 kg/Ce/day - Storage cap.30 kg. - Quality compressor and air cooled condensation - Flake type producer - Auto cut off - Rust free body - with casters for easy mobility 		5000/-
17.	Lyphilizer (Freez dryer)	<ul style="list-style-type: none"> - 4.5 lit. capacity - Console freeze dryer -50 C (18"*48"*24") - Ice cap: 4.5L H2O / day - Sublimation rate : 2 L H2O/ day - Push button control panel - Indicator light - LCD & LED Graphic display - RS 232 Interface 		10000/-
18.	AAS	<ul style="list-style-type: none"> -WL Range: 190 to 900nm -Accuracy: +/-0.25 nm -BandWidth: Auto select in 0.2, 0.4, 1.0 & 2.0 nm -Repeatibility: 0.15 nm -Photometric Range: 0 to 2 Abs -Light Source: HCL -Background Correction: D2 Lamp -Detector: PMT 		20000/-
19.	CO2 incubator	<ul style="list-style-type: none"> - Air jacket direct heating system - 150 ltr. Internal volume - Ted CO2 sensor - HEPA filter for CO2 inlet - inner safety glass door, - 3 shelves - Microprocessor PID temp. Controller - Alarm for over temp. and high/low CO2 inside chamber - relative humidity - / > 95% - Distilled water volume () 4 l. - Electronic, suction pump, cylinder pressure regulator for CO2 cylinders. 		10000/-
20.	Real Time Multiplex PCR	<ul style="list-style-type: none"> - 96 Well Plates Gradient Thermal Block - Sample capacity 96 wells - sample volume 20-50 micro litre - thermal block temperature 4-99o Celsius - light source : UHP short arc lamp - detector : 2D CCD - Memory 99 Program - Battery Backed RAM 		12000/-

21.	Refrigerated constant temp. liquid bath	<ul style="list-style-type: none"> - Microprocessor controlled with automatic voltage stabilizer - temperature range from -25 to 150 Celsius. - 28 ltr. Capacity - PID digital temp. indicator cum controller with an accuracy of ± 0.2 Celsius - LCD Display - Over temp. Cut Off - Low level Cut Off - Drain Valve 		5000/-
22.	Incubator shaker	<ul style="list-style-type: none"> - micro-processor controller - double walled stainless steel construction - microprocessor based PID digital temperature indicator cum controller with an accuracy of ± 0.5 Celsius - shaking speed range 20-250 cycles per minute - temp. range from 5 to 60° Celsius - 9 ltr capacity - shaking tray can hold flasks of 100 ml ,250 ml, 500 ml & 1000 ml 		5000/-
23.	CHNS/O ELEMENTAL ANALYSER (FULLY COMPUTER & MICROPROCESSOR CONTROLLED	<p>It should be based on the principle of Continuous flow Thermo catalytic combustion, followed by Time Resolved True Gas Chromatographic Separation & Thermal Conductivity Detection (TCD) of all five elements C,H,N,S & O in various field upgradeable mode as CHNS/O, CHNS, CHN, CNS, CN, N & O only in sub ppm level (100ppm).</p> <p>Analyser should be operated & controlled through PC using Window based operating software as well as thru its own key board. The software should be capable of full instrument control, data acquisition, processing, reprocessing, reporting & networking.</p> <p>Detector range (for C, H, N, S, O): 0.01% to 100%</p> <p>GC Oven Temperature: 40-170°C</p> <p>GC Column type & Length: Packed Column, 2 Mtr for CHNS : Packed Column, 1 Mtr for Oxygen Furnace/ombustion Temperature: 1100°C/1800°C</p> <p>Analysis Time : CHN – 4min. / CHNS– min./ Oxygen – 3 min.</p>		15000/-
24.	Glass Lab Spray Dryer	Borosilicate (1kg/h) 3x3x3 ft.		10000/-
25.	Multipurpose Machine Make Khoa, Ghee, Panner, Tomato paste Jam etc	<p>AISI – 304 SS</p> <p>C – GMP</p> <p>5-20 Kg/Batch (4x3x4)ft</p>		5000/-
26.	Electric Steam Boiler	<p>AISI – 304 SS , C – GMP</p> <p>10-50 Kg/h (3x3x2)ft</p>		5000/-
27.	Vaccum Tray Dryer	<p>AISI – 304 SS , C – GMP</p> <p>2 – 5 Kg (4x2x4)ft</p>		5000/-
28.	Scraped Surface Heat Exchanger	5-10 lit/h		8000/-

29.	Fruits & Vegetables Canning unit	with Tin Forming, Flanger & Seaming Machine (Double Seamer) & Crown Cork		5000/-
30.	Concentric Tube Heat Exchanger (Plain Tube Type)	-Outer Tube 25mm.N.B.1m.long G.I. -Inner Tube 12mm.O.D.1m.long copper -Geyser to obtain hot jwater.3Kw Capacity		3000/-
31.	Concentric Tube Heat Exchanger (Finned Tube Type)	-Outer Tube G.I.65mm NB,1m Long -Inner Pipe-Copper pipe 20mm.O.D.1m.long 20mm Height longitudinal fins on OD 8 Nos.		3000/-
32.	Shell & Tube Heat Exchanger Apparatus (Air To Water Type)	-Shell -150mm.I.D.750mm long provided with end boxes -Copper tube ¼” O.D. Copper tube for hot water 323 Nos -Centrifugal blower ½ HP to supply air		3000/-
33.	Vapor Absorption Refrigeration Trainer	-Evaporative condenser with water spray arrangement -Pump to Circulate weak solution -Generator with electrical heater Copper piping & coil Pressure Gauges at suitable locations Multichannel digital Temperature Indicator		3000/-
34.	General Cycle Air Conditioning Trainer	-Hermetic Compressor ,having the capacity of 2/3 ton of refrigeration -Pressure gauges for high and low pressure -Energy meter for compressor input measurement		3000/-
35.	Governor Apparatus	-Governor assemblies-Hartnell, porter & proel governor assembly one each with rotating weights -Variable speed F.H.P.d.c. motor to drive the main spindle		3000/-
36.	Journal Bearing Apparatus (with Pressure Gauge Arrangement_	-Journal dia -49.8mm,length 50mm -Bearing dia -50mm Pressure gauge -10Kg/cm ² D.C. motor with variable speed control to five journal		3000/-
37.	Motorized Gyroscope Apparatus	Rotor 250 mm. dia., 10mm. thk. Mounted in bearing for rotation about three axes, driven by a variable speed motor. Dimmerstat to control the rotor speed Weight set of 0.2, 0.5, and 1 kg weights, one each, to apply torque		3000/-
38.	Static And Dynamic Balance Demonstrator	Slotted adjustable discs – 4 nos. Known weights – 8 nos. Small motor to rotate the shaft		3000/-
39.	CNC Mill Trainer	Axes Control : 3 axis (X, Y & Z Simultaneously) Least Count Accuracies : 0.005 mm Resolution : 0.005 mm Positioning Accuracy : 0.015mm Rapid Traverse Rate :700mm/min		15000/-

40.	CNC Lathe Trainer	Spindle Speed : Infinitely Variable Speed Range : 50 to 3000 rpm Spindle Power: 2HP Inside : MT 3 Spindle Bore: 20mm Tail Stock Taper: MT 2		15000/-
41.	Universal Testing Machines	20Ton, 40 Ton, 60 Ton		10000/-
42.	Lathe Machine	4 ½ ft With All exercise 6 ½ ft with all exercise Taper turning attachment , Fixed Steady Rotating center , Spot light Coolant pump with spout assembly Thru chuck with back plate 160mm		3000/-
43.	TIG/ MIG welding set	MIG/ MAG welding machine 2560 A cap. Complete with standard accessories.		3000/-
44.	Pool Boiling exp	With all accessories		3000/-
45.	Heat Pipe Experiment	With all accessories		3000/-
46.	Experiment on critical insulation thickness (Critical radius of insulating material)	With all accessories		3000/-
47.	Turbine experiment on Francis turbine	5 HP cap. With all accessories		10000/-
48.	Turbine experiment on Kaplan turbine	5 HP cap. With all accessories		10000/-
49.	Control System Lab	DC Motor : 12 VDC, Servo Motor : 5 VDC, Temperature Sensor : 10 mV / ° C, Light Sensor : Photo Conductive Cell (LDR), Light Source : Two numbers of filament lamps, V/F Converter : For 0 - 5 V output should be 0 - 50 KHz (approx.), F/V Converter : For 0 - 50 KHz output should be 0 - 5 V (approx) PC based Analog Inputs : 4 Inputs with 0 to 5 V / 0 to 10 V, PC based Analog Output : 1 Output with 0 to 5 V / 0 to 10 V, PC based Digital Inputs : 3 Inputs, PC based Digital Outputs : 3 Outputs, PC based DC Voltmeter : 0 to 10 V range, PC based Frequency counter : 0 to 6 MHz (square wave), DPM : Rang 0-20 Vdc De-Bounced Switch : Monostable (5 V output), Buzzer : 5 V operated, Switches : IR Switch, DIP selector switch, Clock : 0-50 KHz (approx), Power Supply : 230 V ±10%, 50 Hz Experiments that should be performed To study and observe Voltage to Frequency converter To study and observe Frequency to Voltage converter To study and implement Light intensity control using PWM method To study and observe Characteristics of Photoconductive Cell (LDR) To study and implement Motor speed and input characteristics To study and implement Bidirectional motor speed control To study and implement tachogenerator using F/V converter		3000/-

		<p>To study and implement Motor control using PWM method To study and observe Position control of DC Servo Motor To study and implement DC Motor Control-Open Loop To study and observe DC Motor Control-Close Loop To study and implement Temperature Control-Open Loop To study and observe Temperature Control-Close Loop To study and implement Light intensity Control-Open Loop To study and observe Light intensity Control-Close Loop</p>		
50.	Mini Process Control Demonstrator	<p>Vessel Capacity : 2 Litres, Temperature Measurement : RTD (-99 to 850°C), Heater : 230V AC, Temperature Range : from room temperature to 100°C, Temperature Indicator : 0 to 850°C, Control Valve : Manually Operated, Stirrer : 0 or 5V DC, Level Sensor : 0 or 5V DC, Indicators : Level Indicators, Stirrer Indicator, Heater Indicator, Relay Action : Forward for Cooling and Reverse for Heating, PID Controller : Hardware based & Computer based, ON/OFF Controller : Hardware based & Computer based, Computer Interface : USB, Analog Input : One (0 to 5 V DC), Digital Input : Two (TTL), Digital Output : Two (TTL) Switches: Two (TTL), Signal Conditioning : Amplifiers with gain of 1 and 10, PC Based Temperature Indicator: 0 to 100°C</p>		3000/-
51.	Pneumatic Trainer	<p>Air Compressor Pressure Range : 0 to 150 psi and 0 to 10 Kg/cm², Supply : 230 V AC, Motor Type : Single Phase, Motor Power : 0.5 HP, RPM : 1440, Tank capacity : 5 Liters Components Single Acting Cylinder : Stroke length of 54 mm, Operating Pressure range (0.5 - 8 Kg/cm²), Diameter - 32 mm, Port size - 1/8 inch, Double Acting Cylinder : Stroke length of 100 mm, Operating Pressure range (0.5 - 8 Kg/cm²), Diameter - 32 mm, Port size - 1/4 inch, FRL Unit : Operating Pressure 115 psi, Filter size 25 micron Solenoid Valves : 3/2 type, Operating Pressure range (1.5 - 8 Kg/cm²), Operating voltage +24V DC Pressure Gauge : Reads (0 - 150 psi and 0 - 10 Kg/cm²), Manifold : 8 ports</p>		3000/-
52.	RFID Trainer	<p>Operating Frequency : 13.56 MHz, Modulation Type : ASK, Operating Range : Less than 10 cm, Protocol Support : ISO 14443A, ISO 14443B, ISO 15693 Application Software : To understand the attendance records by using RFID technology Supply Voltage : 3.3 V for controller and Reader, 5V for LCD display Micro Controller : with 256 KByte RAM, and 64 KByte ROM Antenna : Inductively coupled coil type, Power Supply : 230 V ± 10%, 50 Hz Required features: Highly integrated analog circuitry to Demodulate, Decode and Respond, 13.56 MHz multi protocol support Provided with LCD and software, RS-232 Interface, On board LED Indication, On board Buzzer indication On board Antenna, Application program software and test points.</p>		3000/-
53.	Radar Trainer	<p>Transmitter Frequency : 10 GHz, Output Power : 10 to 15 mW, Operating Voltage : 8.6 V, Antenna : Horn, IF Output : Audio range, Power Supply : 230 V ±10%, 50 Hz, Alarm : Onboard detected signal indication, About Software: Oscilloscope : Real time/Storage mode with FFT analysis, Display : Peak to Peak Voltage, Time domain window : Display the Doppler Frequency in Time domain Frequency domain window: Display the Doppler Frequency in Frequency domain, Control Panel window : User interface for : a) Measurement of Doppler Frequency, Amplitude b) Measurement of Velocity, RPM Utilities : Start / Stop of Display, Setting of Time base and Amplitude range on display window Printing of Doppler Frequency signal, Cursors for Time & Voltage</p>		3000/-

		<p>measurements, Save, Load</p> <p>Features:</p> <ul style="list-style-type: none"> * Complete hardware and software setup to demonstrate Radar concepts * Signals study on Software / Oscilloscope with the help of test points given on trainer * Object counter provided on trainer * Real time fan RPM measurements and vibrations measurements with the help of tuning forks * Tripod stand provided for height and level matching * LED Indication for Doppler Echo Signal * On board alarm for detected signals 		
54.	Bar code Technology Trainer	<p>Power Supply : +5 V DC provided from computer by, PS/2 Interfacing, Current : 100 mA (while scanning)</p> <p>Scan-Rate : 100 Scans per second (Typical), Scanning distance : 0 to 30 mm, Standards Supports : UPC/EAN, UPC/EAN with supplemental, UCC/EAN 128, Code 39, Code 39 Full ASCII, Code 39 Tri Optic code128, Code 128, Full ASCII, Codabar, Interleaved 2/5</p> <p>Interface supported : PS/2, Ambient Light Immunity : Immune to direct exposure of normal, office and factory lighting conditions, as well as direct exposure to sunlight.</p> <p>Experiments that can be performed</p> <ul style="list-style-type: none"> To study the conversion of Light into an Electrical signal To understand the scanned output of ADC Barcode signal To study Digital Signal Processing Block To understand the generation of Barcodes To understand commercial applications of Barcodes 		3000/-
55.	Blue-Tooth Technology Trainer	<p>Carrier Frequency : 2.40 GHz to 2.48 GHz, Bandwidth : 80 MHz, Modulation : GFSK, 1Mbps, No. of Channels : 79, Channel Intervals : 1 MHz, Frequency Hopping : 1600hops/sec, Transmission Power : +4dBm max (2.5mW), Transmission Range : 10 meter approximate, Output Interface : UART and USB</p> <p>Power Supply : 230V \pm10%, 50 Hz, Operating Voltage : 5V, Operating Temperature Range : - 20°C to 85 C.</p> <p>Antenna : Whip Antenna</p>		4000/-
56.	Single phase transformer lab	<p>Mains Supply : 230V \pm10%, 50Hz, Transformer Rating : 1KVA, Primary Voltage : 0-125V, 0-125V</p> <p>Secondary Voltage : 0-125V, 0-125V, Meters Used:- Voltmeter (MI) : 300 V (2 Nos.), Voltmeter (MI) : 50V</p> <p>Ammeter (MI) : 5A (2 Nos.), Ammeter (MI) : 100 mA, Wattmeter : 100 W, Wattmeter : 500 W, Auto Transformer : 270V, 5A, MCB : 5A</p> <p>List of Experiments to be performed :</p> <ul style="list-style-type: none"> Study of Transformation Ratio in a Single Phase transformer. Study of Polarity Test in a Single Phase Transformer. Study of Open Circuit Test in a Single Phase Transformer. Study of Short Circuit Test in a Single Phase Transformer. Study of Load Test and correspondingly determine the Efficiency and Voltage Regulation in a Single Phase Transformer. 		3000/-
57.	DC Machine Lab (I)	<p>Input : 180V Fixed DC, 0-180V Variable DC,</p> <p>DC Machines</p> <p>Type : DC Shunt, Rating : ½ HP, RPM : 1400 (No Load)</p> <p>Meters used</p> <p>Voltmeter (MC) : 300 V (2 Nos.), Ammeter (MC) : 2 A (2 Nos.), Ammeter (MC) : 5A (2 Nos.)</p> <p>List of experiment to be performed</p> <ul style="list-style-type: none"> Study of No Load Characteristics (OCC) of DC Shunt Generator Study of Load Characteristics of DC Shunt Generator Speed Control of DC Shunt Motor by Field and Armature current variation Load Characteristics of DC Shunt Motor Study of self excited DC Shunt Motor 		3000/-

58.	DC Machine Lab (II)	<p>Input : 180V Fixed DC, 0-180V Variable DC</p> <p>DC Machine Type : DC Shunt, Rating : ½ HP, RPM : 1400 (No Load)</p> <p>Meters used Voltmeter (MC) : 300 V, Ammeter (MC) : 1 A, Ammeter (MC) : 5 A</p> <p>List of Experiments to be performed Speed Control of DC Shunt Motor by Field and Armature current variation. Load Characteristics of DC Shunt Motor, N-I Characteristics of DC Shunt Motor, N-V Characteristics of DC Shunt Motor, Study of self excited DC Shunt Motor.</p>		3000/-
59.	Oscilloscope Demonstrator Trainer	<p>Operating Modes Channel I, Channel II, Channel I & II Alternate or chopped, Controls, provided on PCB. Channel selection signals available at Test points. X-Y, operation 1:1</p> <p>Vertical deflection (Y) (Identical channels), Bandwidth : DC-20 MHz (-3 dB), Risetime : 17.5 ns (approx.), Deflection coefficients : 12 calibrated steps 5 mV / cm - 20 V / cm, (1-2-5 sequence) Accuracy: ±3 %, Input Impedance : 1 MW 30 pF, Input coupling : DC - AC - GND, Maximum Input voltage : 350 V (DC + Peak AC), Pre-Amp, Final Amp Outputs at Test Points.</p> <p>Time base Time coefficients : 18 calibrated steps, 0.5 µs / cm - 0.2 s / cm, (1-2-5 sequence) with magnifier x 5 to 100 ns / cm, with variable control, to 40 ns / cm, Accuracy : ± 3 % (in Cal position), TB generation at Test Points Sweep Output : 5 V (approx.) PP</p> <p>Trigger System: Modes : Automatic or Variable, Source : CH I, CH II, External, Slope : Positive or Negative, Coupling : AC, TV Frame, Sensitivity : Int 5 mm, Ext 1 V (approx.), Trigger Bandwidth : 30 MHz</p> <p>Horizontal Deflection (X) Bandwidth : DC - 2 MHz (-3 dB), X - Y mode : Phase Shift < 5° at 50 KHz Deflection coefficients : 12 calibrated steps 5 mV / cm - 20 V / cm, (1-2-5 sequence) Input Impedance : 1 MW 30 pF,</p> <p>Component Tester : Test Voltage : Max 8.6 V (Open) rms, Test Current : Max 8 mA (Shorted) rms, Test Frequency : 50 Hz, Test circuit grounded to chassis</p> <p>General Information Cathode Ray Tube : 140 mm Rectangular medium short persistence (P31), Accelerating potential : 1.9 KV (approx.), Display : 8 × 10 cm, Calibrator : Square Wave generator 1 KHz (approx.), 0.2 V ± 1% for probe compensation, Z Modulation : TTL level, Stabilized Power Supply : All operating voltages including the EHT</p>		3000/-
60.	Mobile phone Trainer	<p>Cellular System : EGSM/GSM 900</p> <p>Rx frequency band : EGSM 925 ...960 MHz GSM 900 935...960 MHz</p> <p>Tx frequency band : EGSM 880 ...890 MHz GSM 900 890 ...915 MHz</p> <p>Output power : +5 ,+33 dBm / 3.2 mW ...2 W</p> <p>Channel spacing : 200 KHz</p> <p>Antenna : Loop type, 50 W</p> <p>Display : 84 × 48 pixels</p> <p>On board sections : Antenna, Keypad, SIM, Charging Circuit, Clock, User interface such as Buzzer, Vibrator, LEDs, No. of test points : 41, No. of switched fault : 25</p> <p>Features that can be set : Screen savers, Ring tones, Logos, SMS etc.</p> <p>Experiments to be performed</p>		3000/-

		<p>To study and measure frequency band To study and measure the GMSK signals such as Tx I/Q, Rx I/Q To study and observe the system CLK Observation of Audio signal To study and measure the Power supply Study of charging phenomena with fault insertion Study and measure PWM signal of UI circuit such as Vibrator, LED, Buzzer Measurement of LCD with fault insertion Keypad study with fault insertion Observe and measure the SIM Card CLK with fault insertion and many more.....</p> <p><u>Features to be included</u> Real time Mobile Operation, Expanded and open trainer, Full understanding of mobile phone working, Frequency measurement and band verification, Provides study of all sections in mobile phone, TX/RX Frequency measurement, 2G technology & GMSK signals, GSM data rate, Detail study of User Interface Control Signals, Detail study of SIM Operation, Battery identification and charging study, Switched Faults CD containing mobile phone working presentation</p>		
61.	Satellite Communication Trainer	<p>Uplink Transmitter * Transmit 3 signals simultaneously at each up-linking frequency, * 1200/1250/1300 MHz up-linking frequencies selectable by Frequency selections switch and LED indication, * 4 MHz clock frequency, * Wide band RF amplifier. No manual matching required * RISC processor based PLL, * 16 MHz Bandwidth, * Frequency UP-Down switch and LED indication, * FM Modulation of Audio and Video, * 5/5.5 MHz Audio and 8 MHz Video Modulation, * Detachable Dish Antenna, * Radiated Power output 25 mW (approx.) with power control, * Transmit Audio, Video, Digital / Analog data, PC data, Tone, Voice, function generator waveforms etc. * Separate terminals provided for different inputs Power Supply : 220 V \pm10 %, 50 Hz / 60 Hz on request Satellite Link : * Transponder with selectable frequency conversion, * Choice of 3 uplink receiver frequencies 1200/1250/1300 MHz and downlink transmitter frequencies 1100/1150/1200 MHz selectable, Rotary Switch and Tuner for selecting Uplink frequency * Link Fail operation, * Detachable Dish Antennas, * Radiated power 25 mW (approx.) with Variable gain control Power Supply : 220 V \pm10 %, 50 Hz / 60 Hz on request Downlink Receiver : * Receives and demodulate three signals simultaneously, * Based on Eurostar Tuner, * Intermediate Frequency 479.6 MHz (approx.), * 1100 / 1150 / 1200 MHz fix frequency tuning, * -60 dBm sensitivity at tuner input, * Built in speaker for audio and video output, * Detachable Dish Antenna Features to be included * Simultaneous communication of three different signals at each up-linking frequency, * 1100 - 1300 MHz PLL microwave operation * Crystal Control Frequencies, * Communicate Audio, Video, Digital data, PC data, Tone, Voice, function generator waveforms etc. * Communication of external broad band digital and analog data and base band signals, * Choice of different transmitting and receiving frequencies, * Built-in microphone and speaker for Voice and Audio link, * Detachable Dish Antenna at each station Experiments to be performed * Understanding concepts of Satellite Communication, *To set up Direct link, * To set up Active Satellite link, * Study Satellite transponder, * To set up Satellite communication link, * Study Audio-Video transmission through Satellite link, * Study Base Band Analog</p>		4000/-

		signal(voice) in Satellite link, * To transmit and receive function generator waveforms through, * Satellite link, * To transmit Tone through Satellite link, * To establish PC-to-PC Communication using Satellite, * Communication link		
62.	Antenna Trainer	RF generator : 550 MHz - 850 MHz variable, Frequency Display : LCD, RF level variation : 10 dB, Directional Coupler : Forward & Reverse with level adjustment, Matching stub : Slide stub, Antenna rotation : 0-360° Resolution 1° Transmitter & Receiver masts provided, Receiving antenna : Folded dipole with reflector, Detector Display : LCD, Detector Level : Adjustable Power supply : 230 V ±10%, 50 Hz, Inter connections : 4 mm Banana sockets		3000/-
63.	GSM Trainer (with application Module)	GSM capability : GSM 900 / 1800, E – GSM, GSM data services : Asynchronous, Transparent & Non Transparent, modes. 14.4 kbits / s, SIM Interface : 3 V RF characteristics : Receiver EGSM Sensitivity : < -104 dBm, DCS Sensitivity : < -102 dBm, Selectivity @ 200 KHz : >+9 dBc, Selectivity @ 400 KHz : >+41 dBc, Dynamic range : 63 Db, Intermodulation : >-43 dBm, C-channel rejection : ³ 9 dBc Transmitter Maximum output power : 33 dBm ± 2 dB (EGSM), Maximum output power : 30 dBm ± 2 dB (DCS) Minimum output power : 5 dBm ± 5 dB (EGSM), Minimum output power : 0 dBm ± 5 dB (DCS 1800) Noise in 925 - 935 MHz : < -67 dBm, Noise in 935 - 960 MHz : < -79 dBm, Noise in 1805 - 1880 MHz : < -71 dBm, Phase error at peak power : < 5° RMS, Frequency error : ± 0,1ppm max Power supply : 9 V Experiments to be performed * GSM Theory & Standards, * Understanding of GSM technology, its network, GSM capability & data services. * Understanding RF environment & study of GSM network by actually connecting to the GSM environment by any service provider.* Command Level Study, * Real Time study of GSM 07.05 & 07.07 commands in various Categories : - Command concerning modem & sim card hardware - Network registration commands - Call control command - Call setting commands - Call information commands - Phone Book commands - Serial link control commands - Message setting commands - Storing/restoring commands - Error message handling & survey Application Module Features : “Scieterminal” software tool, Description /Explanation/ Visualization of the AT commands on one screen, Study of GSM real time working fundamentals, Appliances switching by SMS using AT commands, Flow chart to be provided for further development		3000/-
64.	VLSI Development Platform with wireless communication	1) Xilinx Family : SPARTAN 2, XC2S200PQ208 2) Device Density : 200K gates, 5,292 Logic Cells 3) On board : +5V, +3.3V, +2.5V supply to FPGA & other hardware circuit. 4) On board : 2 Crystal 8MHz & 25MHz. 5) Master Reset : key for hardware reset, Program Key for FPGA reconfiguration		3000/-

		<p>6) Onboard: PROM (2Mb size) Socket in a PLCC package for FPGA backup</p> <p>7) Configuration Methods: IEEE 1149.1 JTAG Interface, Slave Serial Interface, PROM Interface</p> <p>8) Memory: 1MB (128K X 8) memory interface</p> <p>9) Digital I/O's : 8 Logic Input and 8 Logic Output, 6 Digit Seven Segment Display.</p> <p>10) Peripherals Channel 1 IEEE RS232 Serial Interface, Channel 2 IEEE RS232 Serial Interface, IEEE PS2 Interface for Keyboard, IEEE VGA Interface for Monitor, IEEE Parallel Port Interface for Data transfer.</p> <p>11) 8 Channel ADC for external analog signal interface.</p> <p>12) 2.4GHz Trans-receiver</p> <p>13) 2.4GHz Antenna with SMA male connector.</p> <p>14) 40 pin & 26 pin Connector for external I/O interface.</p> <p>15) Number of I/O's 176</p>		
65.	PLC Trainer	<p>Siemens CPU Type : 224, Digital Input: 14, Digital Output: 10, Analogue adjustments(8-bit resolution): 2, Programme size: 4096</p> <p>Simulation PCB: Toggle Switches: 16, LED Display: 12</p> <p>Internal memory: 256 b, Execution speed: 0.37microsec./instruction, PC/PPI Cable rate: 9.6, 19.2, & 187.5 kbaud, No. of ports: 1</p> <p>Interface: RS485, Input voltage: 24 VDC, Output Voltage: 5 VDC, Potentiometer (10k): 4 Nos.</p>		3000/-
66.	PCB Proto typing Machine	<p>Working area 200 □150 mm</p> <p>Min drill hole size 0.3 mm</p> <p>Min cutting trace/space 0.1 mm (4 mil)</p> <p>X/Y travel speed 50 mm/sec (MAX)</p> <p>Spindle speed (RPM) 25000 rpm</p> <p>Milling depth sensing Micrometer</p> <p>Spindle Motor Brushless Motor</p> <p>Machine base Cast Aluminium</p> <p>Tool change Manual Change</p> <p>Tool holder 1/8 inch</p> <p>Front to back registration By Registration Pin</p> <p>X/Y driver Stepping Motor</p> <p>Sound/Dust Enclosure Integrated</p>		10000/-
67.	RF Training System	<p>* RF Filter (Low Pass): 4th order (Butterworth), cutoff frequency 105 MHz</p> <p>* RF Filter (High Pass): 4th order (Butterworth), cutoff frequency 30 MHz</p> <p>* RF Filter (Band Pass): 3rd order (Butterworth), pass band 50 to 80 MHz</p> <p>* RF Filter (Band reject): 3rd order (Butterworth), reject band 45 to 55MHz</p> <p>* Pierce Crystal Oscillator: Output frequency 45MHz, level -25dbm</p> <p>* Colpitts Crystal Oscillator: Output frequency 12MHz, level -9dbm</p> <p>* Hartley Oscillator: Output frequency 40MHz, level +7dbm</p> <p>* Clapp Oscillator: Output frequency 75-85MHz(tunable), level -7dbm</p> <p>* RF Tuned Amplifier: Center frequency 15-30MHz, Bandwidth 2MHz, Gain 10db</p> <p>* IF Amplifier: Center frequency 35MHz, Bandwidth 5MHz, Gain 15db</p> <p>RF Mixer Circuit: Local Oscillator 40MHz</p> <p>>400mV, RF input – 3 to 10MHz</p> <p>IF Output-30 to 50MHz</p>		3000/-
68.	Spectrum Analyzer	<p>Features and Options</p> <p><i>Functions</i></p> <p>Multiple Marker: Display up to six markers on screen. Each marker</p>		30000/-

	<p>includes a delta marker, effectively allowing up to 12 markers on screen. The user may also set marker 1 to be the reference for 6 delta markers.</p> <p>Marker Table: Display a table of up to six marker frequency and amplitude values plus delta marker frequency offset and amplitude.</p> <p><i>Upper/Lower Limit</i></p> <p>Fixed and segmented: Each upper and lower limit can be made up of between one and 40 segments.</p> <p><i>Measurements</i></p> <p>Occupied Bandwidth: Measures 99% to 1% power channel of a signal.</p> <p>Channel Power: Measures the total power in a specified bandwidth.</p> <p>C/I: Measures carrier to interference ratio.</p> <p>ACPR: Measures power levels in the channels immediately above and below the center channel.</p> <p>Field Strength: Uses antenna calibration tables to measure dBm/meter² or dBmV/meter².</p> <p>Specifications</p> <p><i>Frequency</i></p> <p>Frequency Range: 9 kHz to 7.1 GHz, Tuning Resolution: 1 Hz</p> <p>Frequency Reference:</p> <p>Aging: ±1 ppm per 10 years, Accuracy: ±0.3 ppm (25°C ± 25°C) + aging, Frequency Span: 10 Hz to 7.1 GHz plus 0 Hz (zero span)</p> <p>Span Accuracy: Same as frequency reference accuracy</p> <p>Sweep Time:</p> <p>Zero span: 10 μs to 600s, Spans >0 Hz: Sweep time to be automatically optimized, Can be manually increased</p> <p>Sweep Time Accuracy: ±2% in zero span, Sweep Trigger: Free run, Single, Video, External</p> <p>Resolution Bandwidth: (–3 dB) 1 Hz to 3 MHz in 1-3 sequence ±10%, 10 MHz demodulation bandwidth, 200 Hz, 9 kHz, 120 kHz when quasi-peak detector selected</p> <p>Video Bandwidth: (–3 dB) 1 Hz to 3 MHz in 1-3 sequence</p> <p>SSB Phase Noise:</p> <table border="0"> <tr> <td>Offset from carrier</td> <td>Max</td> </tr> <tr> <td>10, 20 and 30 kHz</td> <td>–100 dBc/Hz</td> </tr> <tr> <td>100 kHz</td> <td>–102 dBc/Hz</td> </tr> </table> <p><i>Amplitude</i></p> <p>Measurement Range: DANL to +30 dBm</p> <p>Display Range: 1 to 15 dB/div in 1 dB steps. Ten divisions displayed.</p> <p>Amplitude Units:</p> <p>Log Scale Modes: dBm, dBV, dBmv, dBμV</p> <p>Linear Scale Modes: nV, μV, mV, V, kV, nW, μW, mW, W, kW</p> <p>Attenuator Range: 0 to 65 dB</p> <p>Attenuator Resolution: 5 dB steps</p> <p>Absolute Amplitude Accuracy:</p> <p>Power levels: ≥</p> <table border="0"> <tr> <td colspan="2">≥–50 dBm, ≥35 dB input attenuation</td> </tr> <tr> <td>9 kHz to 10 MHz</td> <td>±1.5 dB</td> </tr> <tr> <td>>10 MHz to 4 GHz</td> <td>±1.25 dB</td> </tr> <tr> <td>>4 to 7.1 GHz</td> <td>±1.75 dB</td> </tr> <tr> <td colspan="2">40 to 55 dB input attenuation</td> </tr> <tr> <td>9 kHz to 10 MHz</td> <td>±1.5 dB</td> </tr> <tr> <td>>10 MHz to 4 GHz</td> <td>±1.75 dB</td> </tr> <tr> <td>>4 to 6.5 GHz</td> <td>±1.75 dB</td> </tr> <tr> <td>>6.5 to 7.1 GHz</td> <td>±2 dB</td> </tr> <tr> <td colspan="2">60 to 65 dB input attenuation</td> </tr> <tr> <td>9 kHz to 10 MHz</td> <td>±1.5 dB</td> </tr> <tr> <td>>10 MHz to 6.5 GHz</td> <td>±1.75 dB</td> </tr> <tr> <td>>6.5 to 7.1 GHz</td> <td>±3 dB</td> </tr> </table> <p>Preamplifier on, 0 or 10 dB input attenuation</p>	Offset from carrier	Max	10, 20 and 30 kHz	–100 dBc/Hz	100 kHz	–102 dBc/Hz	≥–50 dBm, ≥35 dB input attenuation		9 kHz to 10 MHz	±1.5 dB	>10 MHz to 4 GHz	±1.25 dB	>4 to 7.1 GHz	±1.75 dB	40 to 55 dB input attenuation		9 kHz to 10 MHz	±1.5 dB	>10 MHz to 4 GHz	±1.75 dB	>4 to 6.5 GHz	±1.75 dB	>6.5 to 7.1 GHz	±2 dB	60 to 65 dB input attenuation		9 kHz to 10 MHz	±1.5 dB	>10 MHz to 6.5 GHz	±1.75 dB	>6.5 to 7.1 GHz	±3 dB		
Offset from carrier	Max																																		
10, 20 and 30 kHz	–100 dBc/Hz																																		
100 kHz	–102 dBc/Hz																																		
≥–50 dBm, ≥35 dB input attenuation																																			
9 kHz to 10 MHz	±1.5 dB																																		
>10 MHz to 4 GHz	±1.25 dB																																		
>4 to 7.1 GHz	±1.75 dB																																		
40 to 55 dB input attenuation																																			
9 kHz to 10 MHz	±1.5 dB																																		
>10 MHz to 4 GHz	±1.75 dB																																		
>4 to 6.5 GHz	±1.75 dB																																		
>6.5 to 7.1 GHz	±2 dB																																		
60 to 65 dB input attenuation																																			
9 kHz to 10 MHz	±1.5 dB																																		
>10 MHz to 6.5 GHz	±1.75 dB																																		
>6.5 to 7.1 GHz	±3 dB																																		

	<p>100 kHz to 4 GHz ±1.5 dB >4 to 7.1 GHz ±1.75 dB</p> <p>Second Harmonic Distortion (0 dB input attenuation, -30 dBm input): 0.05 to 1.4 GHz -50 dBc >1.4 to 2 GHz -70 dBc >2 GHz -80 dBc</p> <p>Third Order Intercept (TOI): (-20 dBm tones 100 kHz apart, -20 dBm Ref level, 0 dB input attenuation, preamplifier off)</p> <p>Frequency Min 600 MHz +7 dBm 3.5 GHz +9 dBm</p> <p>Frequency Typical 50 MHz to 300 MHz >8 dBm >300 MHz to 2.2 GHz >10 dBm >2.2 to 2.8 GHz >15 dBm >2.8 to 4.0 GHz >10 dBm >4.0 to 7.1 GHz >13 dBm</p> <p>Dynamic Range 2/3 (TOI-DANL) in 1 Hz RBW: 600 MHz 95 dB min 3.5 GHz 96 dB min</p> <p>Displayed Average Noise Level (DANL) in 1 Hz RBW:</p> <table border="1"> <thead> <tr> <th rowspan="2">Frequency</th> <th colspan="2">Preamplifier On</th> </tr> <tr> <th>Typical</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>10 MHz to 1 GHz</td> <td>-163</td> <td>-161</td> </tr> <tr> <td>>1 GHz to 2.2 GHz</td> <td>-160</td> <td>-159</td> </tr> <tr> <td>-136 -133</td> <td></td> <td></td> </tr> <tr> <td>>2.2 to 2.8 GHz</td> <td>-156</td> <td>-153</td> </tr> <tr> <td>-130 -126</td> <td></td> <td></td> </tr> <tr> <td>>2.8 to 4.0 GHz</td> <td>-160</td> <td>-159</td> </tr> <tr> <td>-139 -136</td> <td></td> <td></td> </tr> <tr> <td>>4.0 to 7.1 GHz</td> <td>-158</td> <td>-154</td> </tr> <tr> <td>-131 -127</td> <td></td> <td></td> </tr> </tbody> </table> <p>(0 dB input attenuation, RMS detection, Reference level = -20 dBm for preamplifier off and -50 dBm for preamplifier on)</p> <p>Equivalent Noise Figure, 23°C: (Preamplifier on, 0 dB input attenuation)</p> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Typical</th> </tr> </thead> <tbody> <tr> <td>10 MHz to 1 GHz</td> <td>11 dB</td> </tr> <tr> <td>>1 GHz to 2.2 GHz</td> <td>14 dB</td> </tr> <tr> <td>>2.2 to 2.8 GHz</td> <td>18 dB</td> </tr> <tr> <td>>2.8 to 4.0 GHz</td> <td>14 dB</td> </tr> <tr> <td>>4.0 to 7.1 GHz</td> <td>16 dB</td> </tr> </tbody> </table> <p>Input-Related Spurious: (-30 dBm input, 0 dB input attenuation, Span <1.7 GHz) -70 dBc typical -60 dBc max</p> <p>Residual Spurious: (Preamplifier on, RF input terminated, 0 dB input attenuation) -100 dBm max</p> <p>(Preamplifier off, RF input terminated, 0 dB input attenuation) -90 dBm max**, 100 kHz to <3200 MHz -84 dBm max**, 3200 to 7100 MHz</p> <p>Frequency Max Spur Level (Typical) 250, 300, and 350 MHz -85 dBm ~4010 MHz -80 dBm (-90 dBm) ~5084 MHz -70 dBm (-83 dBm) ~5894 MHz -75 dBm (-87 dBm) ~7028 MHz -80 dBm (-92 dBm)</p> <p>GPS Location Indicator: Latitude, Longitude and Altitude on display Latitude, Longitude and Altitude with trace storage</p> <p>GPS High Frequency Accuracy when GPS antenna is connected:</p>	Frequency	Preamplifier On		Typical	Max	10 MHz to 1 GHz	-163	-161	>1 GHz to 2.2 GHz	-160	-159	-136 -133			>2.2 to 2.8 GHz	-156	-153	-130 -126			>2.8 to 4.0 GHz	-160	-159	-139 -136			>4.0 to 7.1 GHz	-158	-154	-131 -127			Frequency	Typical	10 MHz to 1 GHz	11 dB	>1 GHz to 2.2 GHz	14 dB	>2.2 to 2.8 GHz	18 dB	>2.8 to 4.0 GHz	14 dB	>4.0 to 7.1 GHz	16 dB		
Frequency	Preamplifier On																																														
	Typical	Max																																													
10 MHz to 1 GHz	-163	-161																																													
>1 GHz to 2.2 GHz	-160	-159																																													
-136 -133																																															
>2.2 to 2.8 GHz	-156	-153																																													
-130 -126																																															
>2.8 to 4.0 GHz	-160	-159																																													
-139 -136																																															
>4.0 to 7.1 GHz	-158	-154																																													
-131 -127																																															
Frequency	Typical																																														
10 MHz to 1 GHz	11 dB																																														
>1 GHz to 2.2 GHz	14 dB																																														
>2.2 to 2.8 GHz	18 dB																																														
>2.8 to 4.0 GHz	14 dB																																														
>4.0 to 7.1 GHz	16 dB																																														

		<p>±25 ppb with GPS ON, 3 minutes after satellite lock in the selected operating mode</p> <p>Internal High Accuracy, when GPS antenna is not connected: Better than ±50 ppb for 3 days from a High Accuracy GPS Lock and within 0°C to 50°C ambient temperature</p> <p>Connector: Reverse polarity BNC</p>		
69.	Data Communication Trainer	<p>With application board for serial and parallel port</p> <p>Serial Communication : Two RS-232 ports, Parallel Communication : Two 25 pin LPT ports</p> <p><u>Fiber Optic Communication</u> Transmitter : Two numbers. Fiber optic LED's having peak wave length of emission 660nm, Receiver : Two numbers. Fiber optic photo detector, Core type : Step indexed multimode PMMA plastic cable, Baud rate : 115200 bps, Fiber Length : 0.5 & 1m</p> <p><u>Wireless Communication</u> Infrared Transmitter : IR LED, Infrared Receiver : Direct TTL output, Baud rate : 2400 bps, Carrier Frequency : 38 KHz/40KHz</p> <p><u>Modem Communication</u> Modem type : Data, Interface type : Serial-RJ 11 Connector, RJ 11 Connector : Two, Modulation : FSK Modulation Mark Frequency : 340 KHz, Space Frequency : 280 KHz, Demodulation : PLL Detector, Mark Frequency : 340 KHz Space Frequency : 280 KHz, Baud Rate : 57600 bps</p> <p><u>Features to be included</u> * Pin to pin study of serial and parallel port, * Different methods of serial communication, * Different methods of parallel communication, * Wireless communication (IR/RF), * Full duplex fiber optics communication, * FSK modem communication Software & hardware based data flow controls, * Protocols of parallel port, * Protocols of serial port, * High speed data transmission * Visual indication by LED's for displaying data, status & control pins of port, * Printer interface, * Windows based operating software Switch faults in both hardware & software, * Student friendly software</p> <p><u>Experiments to be performed</u> * To Study of Serial Port, * Study of Parallel Port, * Study of Synchronous Serial Communication, * Study of Asynchronous Serial Communication, * Study of PC-PC Serial Communication using RS-232 cable, * Study of different Modem used in Serial Communication, * Study of Flow controls in Serial Communication, * Study of Protocols in Serial Communication, * Study of Fiber Optic Communication, * Study of Modem Communication, * Study of Wireless Communication, * Study of PC-PC Parallel Communication using DB25 cable, * Study of printer interface using parallel port</p>		3000/-
70.	Spectrum Analyzer application demonstrator trainer	<p>Housing : All experiments are housed in a single attractive box which is self contained, ready to use having built- in DC power supplies.</p> <p>Experiments :</p> <p>Application I Filter Responses : Four filters, very precisely designed for checking filter responses on Spectrum Analyzer. Types of filters are : 1. Low pass Filter (Cut off 115 MHz approx.), 2. High pass Filter (Cut off 100 MHz approx.) 3. Wide Band pass Filter (Cut off 25 MHz - 280 MHz approx.) 4. Notch Filter or narrow band reject filter (Cut off 95 MHz-160 MHz approx.)</p> <p>Application II DC Amplifier Frequency Response : A well designed DC Amplifier having 3 dB cut off bandwidth of approx. 130 MHz</p> <p>Application III Harmonic Display & Analysis : A Function Generator of frequency range approx. 40 KHz - 400 KHz (Low) and 200 KHz - 2 MHz (High) having sine, square, & triangular output with frequency variation and</p>		3000/-

		<p>output level variation (Max.1 V). Any one output can be given to Spectrum Analyzer for harmonic display.</p> <p>Application IV Cable TV application : Three channel modulator (channel 4, channel 8 & channel 12) & one mixer is cascaded. Channel modulations have Audio and Video inputs. The output of modulators and mixer can be seen on Spectrum Analyzer.</p> <p>Application V Live signal Application : Four types of signal can be seen on Spectrum Analyzer 1. Mobile phone forward and reverse link frequency, 2. Cordless phone Transmitting and receiving frequencies, 3. FM Radio Reception (Demodulated Audio output), 4. TV signal Reception (Demodulated Audio output) Demodulated output from Spectrum analyzer is given to the built- in speaker via Audio amplifier.</p>		
71.	GPS Trainer	<p>GSM capability : GSM 900 / 1800, E – GSM, GSM data services : Asynchronous, Transparent & Non Transparent, modes. 14.4 kbits / s, SIM Interface : 3 V RF characteristics :</p> <p>Receiver EGSM Sensitivity : < -104 dBm, DCS Sensitivity : < -102 dBm, Selectivity @ 200 KHz : >+9 dBc, Selectivity @ 400 KHz : >+41 dBc, Dynamic range : 63 Db, Intermodulation : >-43 dBm, C-channel rejection : ³9 dBc</p> <p>Transmitter Maximum output power : 33 dBm ± 2 dB (EGSM), Maximum output power : 30 dBm ± 2 dB (DCS) Minimum output power : 5 dBm ± 5 dB (EGSM), Minimum output power : 0 dBm ± 5 dB (DCS 1800) Noise in 925 - 935 MHz : < -67 dBm, Noise in 935 - 960 MHz : < -79 dBm, Noise in 1805 - 1880 MHz : < -71 dBm, Phase error at peak power : < 5° RMS, Frequency error : ± 0,1ppm max Power supply : 9 V</p> <p>Experiments to be performed * GSM Theory & Standards, * Understanding of GSM technology, its network, GSM capability & data services. * Understanding RF environment & study of GSM network by actually connecting to the GSM environment by any service provider.* Command Level Study, * Real Time study of GSM 07.05 & 07.07 commands in various Categories : - Command concerning modem & sim card hardware - Network registration commands - Call control command - Call setting commands - Call information commands - Phone Book commands - Serial link control commands - Message setting commands - Storing/restoring commands - Error message handling & survey</p> <p>Application Module Features : “Sciterminal” software tool, Description /Explanation/ Visualization of the AT commands on one screen, Study of GSM real time working fundamentals, Appliances switching by SMS using AT commands, Flow chart to be provided for further development</p>		3000/-

72.	Laser Fiber Optic Trainer	<p>Transmission Module: Laser 660 nm, Mode: ACC & APC, Receiver Module: 1) Photo transistor 2) Pin Diode, Power Supply : 6 V DC Adaptors (plug to 230 V Mains), Transmitter 1 No., Receiver 1 No., Fiber optic cable (Plastic) 1 No., Fiber optic cable (glass) 1 No., Power Adopter 2 Nos., NA measurement Jig 1 No.</p> <p>Experiments to be performed :</p> <ul style="list-style-type: none"> * Characterization of a laser diode: a) Optical Power Output vs LD Forward Current. b) Monitor Photodiode Current vs Optical Power Output * Study of ACC and APC modes of operation: a) Comparison of ACC & APC modes of operation * Design and Evaluation of an LD analogue IM system: a) V_o vs V_{in} at specified Optical Carrier Power level P_o <ul style="list-style-type: none"> b) Determination of V_{in} (max) at specified P_o for Distortion free V_o. c) Comparison of ACC and APCIM systems * Design and Evaluation of LD digital transmission system: a) Rise time and fall time pulse width distortion. * Transmission of Laser through an Optical Fiber: a) Study with step-index Multimode Plastic Fiber Patchcord b) Study with Graded-Index , Multimode Glass Fiber Patchcords. c) Study with One Mechanical Splice Connecting the above Two Patchcords. * Laser free space communication: a) Analogue Free Space Communication System. b) Digital Free Space Communication System * For numerical aperture measurement: a) NA of PMMA Fiber. 		3000/-
-----	---------------------------	---	--	--------

73.	Advance Fiber Optics Trainer	<p>Transmitter : 2Nos. Fiber Optics LED having peak wavelength of 660nm & 950nm. Receiver: 2 Nos. Fiber optics Photo detector. Modulation Technique: 1) AM, 2) FM, 3) PWM Drivers: 2 Nos. with Analog & Digital Modes. PLL Detector: 1 No. Comparator: 2 No. Filters: 2 No., 4th Order Butterworth, Cutoff Frequency : 3.4 KHz Analog Bandwidth: 350KHz Digital Bandwidth: 2.5MHz Function Generators: 1) 1KHz Sine Wave (Amplitude Adjustable) 2) 1KHz Square wave (TTL) Voice Link: F. O. Voice Link using Microphone & Speaker (Built in) PC –PC Communication: using 2 Channel through RS 232 Port. Baud Rate: 19200 baud Switch Faults: 4 In Transmitter & 4 In Receiver Fiber Optics Cable: Connector Type Standard SMA Cable Type: Step Indexed Multimode PMMA Plastic Cable Core Refractive Index: 1.492 Clad Refractive Index: 1.406 Numerical Aperture: Better Than 0.5 Acceptance Angle: Better Than 60 deg. Fiber Diameter: 1000 Microns Outer Diameter: 2.2mm Test Point : 50 Accessories Included: Line Cord, Manuals, NA Measurement, Jig, Mandrel, Fiber Cable, Microphone, Headphone, set of Patch cords, Software for PC Communication.</p>		3000/-
74.	Temperature Transducer Trainer	<p>Transducers: 4 nos. a) N.T.C. Thermistor b) Platinum R.T.D. c) Type K. Thermocouple d) IC Temperature sensor. Heating Element: Wire wound resistance 47 Ω, 7w. Signal conditioning: 1) Instrumentation Amplifier, 2) X100 Amplifier 3) DC Amplifier 4) Comparator 5) Electronic Switch Input Circuits: Rotary & Slide potentiometers.</p>		3000/-

		<p>PC Interface: RS 232 Interface (Facility provided for real time determination of characteristics of above transducers.)</p> <p>Output Circuits:</p> <ol style="list-style-type: none"> 1) Relay 2) Buzzer <p>Interconnections: 4/2 mm banana sockets.</p> <p>Power supply (SMPS): 220V±10%, 50/60Hz</p> <p>Accessories: Line cord, Interactive e-Manual, set of patch cords, Software for PC Interface.</p>		
75.	LVDT Trainer	<p>Measurement Range: 20mm (± 10mm)</p> <p>Excitation Frequency: 4kHz (approx.)</p> <p>Excitation voltage : 4 Vpp (approx.)</p> <p>Sensitivity: 10mV DC/mm</p> <p>Signal conditioner output: 0.1 VDC for maximum displacement.</p> <p>Display: 3 ½ Digit LED with polarity indicator.</p> <p>Micrometer Scale: 25mm.</p> <p>PC Interface: RS 232 Interface (Facility provided for Simulation and real time determination of Input & Output Characteristics.)</p> <p>Test Points: 8</p> <p>Power Supply (SMPS): 220V ± 10%, 50/60 Hz</p> <p>Accessories included: Software, Mains cord, Interactive e-Manual.</p>		3000/-
76.	Strain Gauge Trainer	<p>Strain Gauge (350): 04 Nos.</p> <p>Gauge factor: 2.1</p> <p>Maximum bearable weight: 500gms</p> <p>Cantilever material: Stainless steel</p> <p>Cantilever width: 2.5 cm</p> <p>Cantilever thickness: 0.16 cm</p> <p>Cantilever length: 20 cm</p> <p>Bridge Voltage: +8 V DC</p> <p>Bridge configuration: Full Bridge</p> <p>Display: 3 ½ Digit LED</p> <p>PC Interface: RS 232 Interface (Facility provided for Simulation and real time determination of Strain gauge using appropriate software.</p> <p>Test Points: 8 nos.</p> <p>Power Supply (SMPS): 220V± 10%, 50/60Hz, 3VA</p> <p>Accessories included: Mains cord, Interactive e-Manual, standard weights and Software.</p>		3000/-
77.	A/D Convertor Trainer	<p>A/D Conversions:</p> <ol style="list-style-type: none"> 1) 4 bit discrete (ramp) 2) 8 bit Monolithic converter <p>Signal Source: Uni polar & Bipolar DC voltages</p>		2000/-

		<p>D/P Indication: By LEDs separate for each type</p> <p>Inter connections: 4/2 mm banana socket.</p> <p>Power supply (SMPS): 220 V \pm 10%, 50/60Hz, 3VA</p> <p>Accessories Included: Line cord, Interactive e-Manual and set of patch cords.</p>		
78.	D/A Converter Trainer	<p>D/A Conversion:</p> <p>1) 4 bit weighted resistor</p> <p>2) 4 bit R-2R ladder network</p> <p>3) 8 bit monolithic D/A convertor</p> <p>Signal: DC supply with toggle switches.</p> <p>D/P indication: On DMM or Oscilloscope</p> <p>Inter Connections: 4/2 mm banana sockets.</p> <p>Accessories included: Line cord, Interactive e-Manual and set of patch cords.</p>		2000/-
79.	Heart Rate Monitor cum ECG Trainer	<p>Measuring Range: 30-180 heartbeats/minute</p> <p>Accuracy: \pm 2 heartbeats/minute</p> <p>Gain Adjustment: 800-2000 variable</p> <p>Heart Rate Display: 3 ½ Digit seven segment</p> <p>Tachycardia limit Range: 0-180 heartbeats/min</p> <p>Adjustable through potentiometer</p> <p>Bradycardia limit Range: 0-100 heartbeats/min</p> <p>Adjustable through potentiometer.</p> <p>Display: 3 ½ Digit LED</p> <p>PC Interface: Through Sound Card (Facility provided for real time analysis of heart rate.)</p> <p>ECG acquisition module: Real time ECG acquisition with 200 samples per second. 8-bit A/D Converter with Sound card Input</p> <p>Power Supply (SMPS): 220 V\pm10%, 50Hz/60Hz.</p> <p>Accessories: Mains Card, Operating Manual, Software for PC Interface, ECG electrodes, ECG Gel, Banana to 5 pin Din connections, Mains cord.</p>		2000/-
80.	Electro-Myograph Trainer	<p>No. of channels: 1</p> <p>Gain control: Variable</p> <p>Frequency response: 1Hz-10Khz</p> <p>CMRR: Better than 80dB</p> <p>Filters: 1Hz-2 KHz, 1Hz-4 KHz, 1Hz – 10 KHz.</p> <p>Simulator Output: Standard EMG signal output</p> <p>Differential output for EMG Amplifier</p> <p>Adjustable Output level.</p> <p>Biomedical Electrodes :Silver Surface Electrodes.</p> <p>Power Supply: 220 V \pm 10%, 50Hz</p> <p>Accessories Included: Silver surface electrodes, Gel, Manual, 2mm to 5 pin Din Connectors, Mains cord.</p>		2000/-

81.	Electro-Encephalograph Trainer	<p>No. of channels: 1 Gain control : Variable Frequency response: 0.1Hz – 3Khz CMRR: Better than 80db Output: Compatible with oscilloscope Compatible with EEG simulator EEG Simulator Output : Standard EEG Signal Output Alpha, Beta, Delta and Theta wave generator Differential output for EEG Amplifier Adjustable output level. Biomedical Electrodes : Silver surface electrodes Power supply : 220 V \pm 10%, 50Hz Accessories Included: Silver surface electrodes, Gel, Manual, 2mm to 5 pin Din connectors, Mains cord.</p>		2000/-
82.	Microcontroller with built-in power Supply	<ul style="list-style-type: none"> * 8051/89C51 CPU operating @ 11MHz. * 8K user RAM with Battery Backup RAM expandable up to 64k * 16K bytes of powerful monitor EPROM * 48 I/O lines using 2 Nos. of 8255. * Three Ch. TIMER/COUNTER using 8253. * 20x2 LCD Display & 101 ASCII Keyboard. * Two External interrupts INT0 & INT1 * RS-232C interface using 8251 * Auxiliary RS-232C using RX/TX of 8051. * On-board Line Assembler * On-board 12Bit ADC using AD574 (OPTIONAL) * On-board 1Ch.DAC using DAC0800 (OPTIONAL) * On-board Real Time Clock (RTC) (OPTIONAL) * All address, data & control lines are available on 40 Pin & 10 Pin FRC * Facility for Downloading/Uploading files from/to PC. * Power Supply of +5V/1.5A, \pm12V/250mA 		2000/-
83.	MICROPROCESSOR TRAINING KIT WITH LCD DISPLAY & 101 ASCII KEYBOARD	<ul style="list-style-type: none"> • 8086/8088 CPU operating at 2.5/5MHz • 8086 Processor can be replaced by 8088 Processor • On-board sockets provided to facilitate the use of 8087 Co-processor and 8089 I/O Processor • 16K bytes of RAM with Battery Backup expandable up to 256KB. • 16K bytes of powerful monitor EPROM • 72 I/O lines through 3 nos. of 8255 • 16 bit Timer/Counter through 8253 • RS-232C interface through 8251. • Interrupt controller 8259. • PRINTER INTERFACE (OPTIONAL) • 20x2 LCD DISPLAY • 101 ASCII Keyboard 		2000/-

		<ul style="list-style-type: none"> • Two modes of operation: <ul style="list-style-type: none"> - Keyboard Mode, - Serial Mode • All address, data & control lines are available on 50 pin FRC • Facility for Downloading/Uploading files from/to PC. • Power Supply of +5V/1.5A, ±12V/250mA 		
84.	Power Electronics Lab Trainer	<p>Size of Breadboard : 172.5 mm × 128.5 mm</p> <p>DC Power Supply on board :</p> <p style="padding-left: 40px;">+ 5 V, - 5 V 500 mA ,</p> <p style="padding-left: 40px;">+ 12 V, -12 V 500 mA,</p> <p style="padding-left: 40px;">+ 15 V, 250 mA</p> <p style="padding-left: 40px;">+ 35 V, -35 V, 250 mA</p> <p>AC Power Supply on Board: 18 V - 0 V - 18 V, 0V-15V</p> <p>Triggering Circuit on Board : 5 gate signal output.</p> <p>Frequency range : 30 Hz to 900 Hz Variable.</p> <p>Amplitude : 12 V</p> <p style="padding-left: 40px;">PWM control of G1, G2, G3 and G4.</p> <p style="padding-left: 40px;">Duty cycle control of “Gate”</p> <p style="padding-left: 40px;">Signal is 0 to 100%.</p> <p>Single Phase Rectifier : Firing angle control 0° - 180° variables.</p> <p>Firing Circuit on Board : Four gate signal output with isolation.</p> <p>SCR Assembly : 4 SCRs 2P4M, 600 V, 2 A</p> <p>Power Devices : IGBT-G4BC20S, MOSFET-IRF Z44N, SCR TYN 616 UJT-2N2646, DIAC -DB3, TRIAC -BT136, PUT-2N6027</p> <p>Circuit Components on Board : MET CAP 0.1 μF, 163 V, Electrolytic Capacitor 1 μF, 63 V Met. Capacitor 0.33 μF, 63 V, Diode 1N4007, Inductor 68 mH, 10 mH</p> <p>Pulse Transformer on Board : 2 nos. PT4502 1:1 and one is PT4503 1:1:1</p> <p>Load selector : 6 load resistances - 47 E / 5 W, 1K / 1W, 1K/10 W, 270 E / 5 W, 120 E / 5 W, 2K2 / 2W</p> <p>Test points : 10 nos.</p> <p>Power Supply : 220 V ±10%, 50 Hz/60 Hz on request.</p>		2000/-
85.	SCR Triggering Techniques	<p>On board DC supply: +5 V, +12 V</p> <p>On Board Triggering Circuits : 555 IC triggering circuit UJT triggering circuit.</p> <p>Interconnection : 2 mm socket</p> <p>SCR : SCRs TYN616, 1000 V, 16 A</p> <p>Fuse : 1A</p>		2000/-

		<p>Test Points : 4 Power Supply (SMPS Based) : 220 V \pm10%, 50 Hz / 60 Hz on request Accessories : Patch cords, Power cord, Operating Manual.</p>		
86.	Speed Control Of AC Motor Using TRIAC	<p>On Board Firing Circuit: DIAC Firing Circuit. Firing Angle Variation: Gradual Variation from 0 to upto 180 degree using firing control POT. Pulse Transformer: PT4502, 1:1 Fuse: 1A Mains Power Supply: SMPS Based 220V\pm10%, 50 Hz. 60 Hz on request. Universal Motor Specification: single phase – 230V, 1.2 A, No Load RPM- 17000.</p>		2000/-
87.	Control System Lab Trainer	<p>DC Motor : 12 VDC Servo Motor : 5 VDC Temperature Sensor :10 mV / ° C Light Sensor : Photo Conductive Cell (LDR) Light Source : Two numbers of filament lamps V/F : For 0 - 5 V output is 0 - 50 KHz (approx.) F/V : For 0 - 50 KHz output is 0 - 5 V (approx) PC based Analog Inputs : 4 Inputs with 0 to 5 V / 0 to 10 V PC based Analog Output : 1 Output with 0 to 5 V / 0 to 10 V PC based Digital Inputs : 3 Inputs PC based Digital Outputs : 3 Outputs PC based DC Voltmeter : 0 to 10 V range PC based Frequency counter : 0 to 6 MHz (square wave) DPM : Rang 0-20 Vdc De-Bounced Switch : Monostable (5 V output) Buzzer : 5 V operated Switches : IR Switch, DIP selector switch Clock : 0-50 KHz (approx) Power Supply : 230 V \pm10%, 50 Hz Accessories Include : Adequate number of Patch Cords, 5 Pin DIN cable 1 no., PC Interface Module, Software CD., Mains Cord., Operating Manual.</p>		3000/-
88.	Zener Diode Voltage Regulator Trainer	<ul style="list-style-type: none"> • Provided with different sections of a regulated power supply. • Good quality, reliable sockets and test points are provided. 		2000/-

		<ul style="list-style-type: none"> Strongly supported by systematic operating instructions and theoretical details. A low cost training system. <p>Technical Specifications : Mains Supply : 230V \pm10%, 50Hz Transformer : 0-9 V, 500 mA (approx.) Filter : Capacitive 1000μF, 35V Zener Diode : $V_Z = 5.6$ V I = 178 mA ZM Potentiometer, P1 : 4.7KW Potentiometer, P2 : 4.7KW Banana Sockets for connection: 2mm Accessories: Operating manual, Patch Cards adequate number of patch cards.</p>		
89.	FET Characteristics Trainer	<ul style="list-style-type: none"> Built-In SMPS power Supply. Inbuilt Voltmeter and Ammeter. Diagrammatic representation for the easy connection. Extensive e-manual. <p>Technical Specification: DC power Supply: + 12V and – 5V(SMPS) Mains Power Supply: 220V\pm10%, 50Hz FET type: J112A Voltmeter: Range: 200mV to 200V Display: 3 ½ Digit Display Ammeter: Range: 2mA to 200mA Display: 3 ½ Digit LCD Display Accessories: Operating manual, Patch Cards adequate number of patch cards.</p>		1000/-
90.	Network Theorems Trainer	<ul style="list-style-type: none"> Exclusive and compact design. On board digital Ammeter and Voltmeter. Straight forward representation of Thevenin's Maximum Power Transfer and Tellegen's Theorems. Provided with an extensive manual. <p>Technical Specifications : DC power supply : +12V, +5V,500mA Display: Digital LCD Display for Voltage and Current Voltmeter : 200mV to 200V Ammeter : 2μA to 200mA Banana Sockets for connection: 2mm Mains : 230V\pm10%,50Hz</p>		1000/-

		Accessories: Operating manual, Patch Cards adequate number of patch cards.		
91.	Network Theorems Trainer	<ul style="list-style-type: none"> • Exclusive and compact design. • On board digital Ammeter. • Straight forward representation of Norton's Superposition & Reciprocity Theorems. • Provided with an extensive manual. <u>Technical Specifications :</u> DC power supply : +12V, $\pm 5V$, 500mA Display: Digital LCD Display for Current Ammeter : 2mA to 200mA Banana Sockets for connection: 2mm Mains : 230V $\pm 10\%$, 50Hz Accessories: Operating manual, Patch Cards adequate number of patch cards.		2000/-
92.	Logic Gates Trainer	<ul style="list-style-type: none"> • Straight forward representation of all. Logic gates. • +5V SMPS Adaptor provided with the trainer for power supply. • Provided with an extensive manual. • Low cost trainer including illustration of all logic gates. • Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs. <u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1) 0V : LOW (Logic 0) Banana Sockets for connection: 2mm Logic Input: 08 nos. Through SPDT Switches Logic Output: 08 Nos. Through LEDs LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Accessories: Operating manual, Patch Cards adequate number of patch cards.		1000/-
93.	Universal Gates Trainer	<ul style="list-style-type: none"> • Exclusive and compact design. • +5V SMPS Adaptor provided with the trainer for power supply. • Low cost trainer including illustration of logic gates design using universal gates. • Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs. <u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1)		1000/-

		<p>0V : LOW (Logic 0) Logic Input: 08 nos. Through SPDT Switches Logic Output: 08 nos. Through LEDs LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Banana Sockets for connection: 2mm Accessories: Operating manual, Patch Cards adequate number of patch cards.</p>		
94.	De-Morgan's Theorem Trainer	<ul style="list-style-type: none"> • Exclusive and compact design. • +5V SMPS power supply provided with the trainer. • Provided with an extensive manual. • Easy explanation of both the De-Morgan's theorem statements. • Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs. <p><u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1) 0V : LOW (Logic 0) Logic Input: 08 nos. Through SPDT Switches Logic Output: 08 nos. Through LEDs LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Banana Sockets for connection: 2mm Accessories: Operating manual, Patch Cards adequate number of patch cards.</p>		1000/-
95.	Adders and Subtractors Trainer	<p>Exclusive and compact design. +5V SMPS power supply provided with the trainer. Provided with an extensive manual. Adaptable illustration of Binary Adders and Subtractors. Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs</p> <p><u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1) 0V : LOW (Logic 0) Logic Input: 08 nos. Through SPDT Switches Logic Output: 08 nos. Through LEDs LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Banana Sockets for connection: 2mm Accessories: Operating manual, Patch Cards adequate number of patch cards.</p>		1000/-

96.	Flip-Flop Trainer	<ul style="list-style-type: none"> • Exclusive and compact design. • +5V SMPS power supply provided with the trainer. • Provided with an extensive manual. • Adaptable illustration of Flip-Flops. • Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs <p><u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1) 0V : LOW (Logic 0) Logic Input: 08 nos. Through SPDT Switches Logic Output: 08 nos. Through LEDs. Logic Pulsar: Provided a Switch for Logic Pulse to give a single clock pulse. LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Banana Sockets for connection: 2mm Accessories: Operating manual, adequate number of patch cards.</p>		1000/-
97.	Multiplexer and Demultiplexer Trainer	<ul style="list-style-type: none"> • +5V SMPS power supply provided with the trainer. • Provided with an extensive manual. • Easy illustration of Multiplexer and Demultiplexer. • LEDs for visual indication of inputs and outputs status. • Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs <p><u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1) 0V : LOW (Logic 0) Logic Input: 06nos. Through SPDT Switches Logic Output: 05nos. Through LEDs. LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Banana Sockets for connection: 2mm Accessories: Operating manual, adequate number of patch cards.</p>		1000/-
98.	Encoder and Decoder Trainer	<ul style="list-style-type: none"> • +5V SMPS power supply provided with the trainer. • Provided with an extensive manual. • Easy illustration of Encoder and Decoder.. 		1000/-

		<ul style="list-style-type: none"> • LEDs for visual indication of inputs and outputs status. • Built-In SPDT switches for selection of Logic Input and LEDs for Logic Outputs <p><u>Technical Specifications :</u> Power Supply : SMPS based +5V DC Logic levels : +5V : HIGH(Logic 1) 0V : LOW (Logic 0) Logic Input: 06nos. Through SPDT Switches Logic Output: 05nos. Through LEDs. LED Indication : LED will be ON (glow) for 1 state and will be OFF for 0 state. Banana Sockets for connection: 2mm Accessories: Operating manual, adequate number of patch cards.</p>		
99.	Three Phase Lab Trainer	<ul style="list-style-type: none"> • Designed considering all the safety standards. • Stand alone operation. • Test points are provided to measure line and phase parameters. • Provided with a detailed Operating manual. • Can Study three phase star and delta connections. <p><u>Technical Specifications:</u> <u>Three Phase Low Voltage Power Supply:</u> Input : Three Phase Mains (230 V Phase voltage, 415 Line voltage 50 Hz) $\pm 10\%$ Outputs : 18 V Phase voltage, 28 V line voltage 50 Hz $\pm 10\%$ MCB (Power Switch) : Three Phase <u>Three Phase Lab:</u> Input : 18 V each phase, 50 Hz $\pm 10\%$ Loads: Resistors : 1 K, 10 K, 100 K Capacitors : 10 μf, 100 μf and 1000 μf Inductors : 5 mH, 10 mH, 20 mH Conceptual Study Boards For Three Phase Lab (Optional): 1) For Study the Three Phase power supply configuration: <u>Technical Specifications:</u> Input : 18 V each phase, 50 Hz $\pm 10\%$ Output : 9 V 2) Three Phase Rectifiers Module: <u>Technical Specifications:</u> Input : 18 V each phase, 50 Hz $\pm 10\%$</p>		3000/-

		Output : 18 V Rectified three phase. Accessories: Operating manual, Adequate number of patch cards.		
100.	Single Phase Transformer Lab	<ul style="list-style-type: none"> • R-Core Transformer. • Terminals are provided in different sections. • High quality meters. • Diagrammatic representation for the ease of connections. • Exclusive and rugged designed panel. <u>Technical Specifications :</u> Mains Supply : 230V \pm 10%, 50Hz Transformer: Rating : 1KVA Primary Voltage : 0-125V, 0-125V Secondary Voltage : 0-125V, 0-125V Meters Used: Voltmeter (MI) : 300 V (2 Nos.) Voltmeter (MI) : 50V Ammeter (MI) : 5A (2 Nos.) Ammeter (MI) : 100 mA Wattmeter : 100 W Wattmeter : 500 W Auto Transformer : 270V, 5A MCB : 5A Accessories: Operating manual, Adequate number of patch cards.		3000/-
101.	Power Measurement by Two Wattmeter Method	Features : <ul style="list-style-type: none"> • Diagrammatic representation for the ease of connections. • Provided with an extensive e-manual. • Designed by considering all the safety precautions. • Exclusive and rugged designed panel. <u>Technical Specifications :</u> Mains Supply : Three Phase 415V \pm 10%, 50Hz Load : R-L Meters Used: Wattmeters : 500W (2 Nos.) Voltmeter (MI) : 500V Ammeter (MI) : 1A MCB : 10A Accessories: Operating manual, Adequate number of patch cards.		2000/-
102.	RLC Resonance Trainer	<ul style="list-style-type: none"> • Inbuilt Signal Generator. • LCD Voltmeter and Frequency Counter Display. 		1000/-

		<ul style="list-style-type: none"> • Inbuilt power supply. • Experiments can be performed with or without Oscilloscope. • Can demonstrating both Series and Parallel Resonance. <p><u>Technical Specifications :</u> SMPS Based Mains Supply : 90 - 275 V, 50/60 Hz. Function generator Output : 8Vpp Frequency Ranges : 1 KHz, 10 KHz, 60 KHz Voltmeter : 2V Accessories: Operating manual, Adequate number of patch cards.</p>		
103.	Microwave Power Meter	<ul style="list-style-type: none"> • Microcontroller based instrument. • Automatic self balancing Power meter. • Available with sensor connecting cable. • Measurement of power in micro/milli Watt and in dBm simultaneously. • Provided with 1 mW calibration source. • Automatic self balancing Power meter. • Provided LCD Display. <p><u>Technical Specifications:</u> Power R ange : 1 W to 20 mW -30 dBm to +13 dBm Zero Adjustment : Coarse & Fine adjustable from front panel. Calibration factor : 90% to 100% in 11 steps Accuracy : mW range $\pm 1\%$ μW range $\pm 2.5\%$ Recorder output : As per the indicated power. Calibration output : 1 mW / 50 MHz Response Time : 35 ms time constant (typical) at recorder output Power Supply : 230 V $\pm 10\%$, 50 Hz <u>Power Sensor (Optional):</u> Type : Temperature Compensated Ther mister mount. Frequency Range : 10 MHz - 18 GHz Maximum SWR: 10 MHz to 30 MHz : 1.75 30 MHz to 100 MHz : 1.35 100 MHz to 1 GHz : 1.10 1 GHz to 12.4 GHz : 1.35 12.4 GHz to 18 GHz : 1.6 Accessories: Operating manual, Adequate number of patch cards, Mains Cards.</p>		5000/-

104.	DSP Lab trainer	<p>DSK 6713</p> <ul style="list-style-type: none"> • TMS320C6713 DSK: TMS320C6713 DSK development board. • Other Hardware : External 5VDC Power Supply. IEEE 1284 compliant male-to- female cable. • CD: Code Composer Studio DSK tools and Multi Channel Window DSP Lab solution Software for Real Time analysis. • Other Accessories: Audio cable Head Phone, Microphone, Installation, Manual and experiment Book. • MATLAB 7.0.4 (Trial version for 30 days). • Technical reference guide for TMS320C6713. <p>The C6713 DSK has a TMS320C6713 DSP onboard that allows full-speed verification at code with code composer Studio. The C6713 DSK provides.</p> <ul style="list-style-type: none"> • A USB Interface. • SDRAM and ROM • An Analog interface circuit for Data conversion (AIC). • An I/O port. • Embedded JTAG emulation support. <p>Code composer features include:</p> <ul style="list-style-type: none"> • IDE • Debug IDE • Advanced watch Windows. • Integrated editor. • File I/O, probe points and graphical algorithm scope probes. • Advanced graphical signal analysis. • Interactive profiling. • Automated testing and customization via scripting. • Visual project management system. 		2000/-
105.	Interactive Board	Minimum Diagonal size 1700mm, medium to high resolution, with , With floor stand for easy projection, Interactive panel , electronic pens (quote separately for each item)		3000/-
107.	LCD Projector	XGA technology, 2000 to 3000 lumens, high resolution, remote control , option of roof mounting, output source for connecting with LCD in series.		3000/-
108.	Public address System	Public address system for seminal hall, cord less mike,AWM 90 V2, collar mike, fixed mikes99XLR, sound boxe SRM 120D, Stand 2 feet & 4 feet..		2000/-
109.	VLSI Trainers			5000/-
i.		VLSI development platform with wireless Communication		
ii.		VLSI development platform With FPGA board, 50k gates, 1728 logic cells, I/O ports 176 numbers of pins 208		
iii.		VLSI development platform With FPGA board, 15k gates, 432 logic cells, I/O ports 86 numbers of pins 144		
iv.		CPLD development platform		

110.	PCB lab Complete kit			10000/-
111.	Instrumentation trainer using transducers			5000/-
112.	microprocessor trainer kits with inbuilt power supply			4000/-
113.	Power project boards with variable DC power supply +/- 15 v and with bread boards			5000/-
114.	Microwave Oven			1000/-
115.	Biomedical apparatus			10000/-
i.		ECG Simulator		
ii.		Digital Hand Held Glucometer		
iii.		Electro myograph trainer		
iv.		Electroencephalegraph trainer		
v.		Phonocardiograph Trainer		
116.	Softwares			10000/-
i.		Complete Software MATLAB latest version with all engineering tools like DSP, ANN etc		
ii.		Complete Software VHDL and accessories or kits		
iii.		Complete Software labview latest version		
Total of EMD in Rs. (for all quoted equipments)				

TERMS AND CONDITIONS:

1. Tender shall be accepted on tender form only. Additional information if any should be provided by attaching additional sheets. Complete Tender form must be submitted to the office of the Registrar on or before February 09, 2009 (1 PM).
2. Required EMD indicated against the sr. of the equipment, in form of Demand Draft in Favour of Finance Officer, Bundelkhand University, Jhansi should be submitted with the Technical Bid. Technical bids without EMD will be rejected. Firms quoting for more than one equipment may submit one DD of cumulative EMD.
3. The technical bid should contain all technical specification and manufacturers details in a separate envelope. No price should be mentioned in the Technical Bid. Technical bids with price will be rejected. Technical bid will be accepted on original Tender form purchased from university cash counter. Tender form downloaded from website should be accompanied with DD of Tender form cost along with EMD.

4. Price bid will be accepted on tender form to avoid any ambiguity in sr. of quoted equipment. (Photocopy of Tender form may be used for price bid.). The name of the firm should be clear on price bid.
5. The firm should be registered with Sales Tax Authorities wherever applicable. Income tax clearance certificate for the past three years, PAN, experience certificate, past three years balance sheet, performance statement, service support details and self verified proof of address should be produced with tender.
6. The suppliers have to sign an agreement for supply, installation and maintenance of the equipment as per the terms and conditions of the university.
7. In case of imported equipments, payment will be made in form of foreign currency demand draft. The university will prepare the demand draft and will provide a photocopy of the same to the Indian agent. The Indian agent will get the equipment shipped & installed in the concerned department of the university. The original copy of the FDD will be given only after successful installation. In case of indigenous equipments, the payment will be made by cheque after successful installation of the equipment.
8. The letter of authorization of the manufacturer (for distributor) is essential. Technical Bids submitted by dealer without authorization will not be entertained. Taxes and other levies, if any are to be specified clearly in the bid.
9. The University is registered with DSIR and exempted from payment of Custom Duty and Central Excise Duty under notification 10/97 Central Excise Dated 01.03.1997 and valid from 01.09.2005-31.08.2009.
10. The equipment/item should be of the quality and technical specifications as mentioned in tender form. The university reserves the right to test the items for their quality. If the quality is found to be inferior, the items are to be replaced by the firms at their own cost with in stipulated period of time.
11. Supply & Installation shall be accepted at concerned University Department/ Campus only. The installation will be examined by technical experts from the university.
12. The terms & conditions for warranty and free repair / services under warranty period should be quoted clearly in the bid.
13. University/Department reserves the right to accept/cancel one/all the tender/s without specifying any reason.
14. In case of any dispute out of this tender will be subject to jurisdiction in Jhansi Only.

Signature of Supplier/Dealer
With address and rubber stamp and phone
number

REGISTRAR