UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY

MAHARSHI DAYANAND UNIVERSITY ROHTAK

TENDER NOTICE

Sealed tenders super scribing as "Tender for ECE Lab Equipments" such as "Data Communication Trainer, LAN Trainer, Base band transmitter training system, Quam Trainer, Optical Communication Trainer, LAN simulation software Netsys, Bar Code data Technology Trainer, RFID Training System, Oscilloscopcs with logic analyzer and Bluetooth Interface, Function-pulse-data top 5.5 Digit" are invited for the purchase of various Lab Equipments required in UIET latest by 5.8.2008 along with an earnest money equal to 2% of involved value in the shape of Demand Draft in favour of Finance Officer, M.D. University, Rohtak. Detailed specifications of the items, terms and conditions may be obtained from the O/o Director, UIET on any working day or can be downloaded from the website of the University www.mdurohtak.com . The tenders received will be opened on 6.8.2008 at 3.00 p.m. in the office of the Director(UIET) in the presence of tenderer present at that time. Tenders should be sent to the Director, UIET, M.D.U.Rohtak by above said date.

REGISTRAR

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY
MAHARSHI DAYANAND UNIVERSITY ROHTAK

TERMS & CONDITIONS OF THE TENER

The articles/material as per specifications attached herewith are to be purchased for this Institute. You are requested to kindly quote your rates for the same. The following terms and conditions for quoting the rates may kindly be kept in view while you do so:-

1. All charges payable by the University should clearly be stated.
2. Sealed quotations/tender should be addressed to the Director, University Institute of Engg. & Technology, M.D University, Rohtak and reach the office of undersigned on/before 5.8.2008 quoting our reference and due date of opening on the envelope.

   The quotations/tender should be submitted only if the material is available in your ready stock or can be supplied within 30 days after the order is placed.
3. The quotation tender will be opened in the office of undersigned on 6.8.2008 at 3.00 P.M. in the presence of the parties or their representatives who so ever like to be present.
4. An amount of 2% of quoted amount only in the shape of Bank Draft in favour of Finance Officer, M.D. University, Rohtak as earnest money should accompany the quotation tender, in absence of which the tender quotation will not be entertained.
5. As far as possible the rates should be quoted for the made and specification of the items given. In case any alternative/equivalent item is offered its specifications and leaflets may be sent with the tender/quotation. The sample of material should accompany the tender/quotation for record.
6. 100% payment will be made on receipt and inspection of goods/items to ensure the specifications and their good condition by the inspection Committee.
7. Dispute, if any, will be subject to Rohtak Jurisdiction.
8. The University reserves the right to reject any or all quotations/tenders without assigning any reason thereof.

9. If your rates are approved by DGS & D and other Central/State Agency, the rates of the same must be quoted and the copy of the rate contract be attached.

10. Tender must be submitted by Either Manufacturer or their authorized Dealer/Distributor. Authorization letter in proper format must be attached with tender otherwise Bids will not be considered. Authorization letter should be signed & stamped. Tenders from Dealers will be rejected without proper authorization letter from the manufacturers.

11. The manufacturer or supplier must be an ISO certified company of repute with at least 10 years experience of supplying Machines/Equipments to Universities/IIT's/

12, F.O.R.should be UIET, M.D. University, Rohtak.

DIRECTOR(UIET)

Data communication Lab.

Sr. No	Specifications	Qty	Approx. price	Total Amt.
01.	**Data Communication Trainer** **Features** • Pin to pin study of serial and parallel port • Different methods of serial & Parallel communication • Wireless communication (IR/RF) • Full duplex fiber optics communication • FSK modem communication • Software & hardware based data flow controls • Protocols of serial & parallel port • LED ind. for displaying data, status & control pins of port • Printer interface ,Windows based operating software • Switch faults in both hardware & software • **No Components on top of trainer only block diagram to be provided** **Technical Specifications** Serial Communication ports : 2 Nos RS-232 Parallel Communication ports : 2 Nos 25 pin LPT **Duplex Fiber Optic Communication** Transmitter : 2. Fiber optic LED's having peak wave length of emission 660nm Receiver : 02. Fiber optic photo detector Core type : Step indexed multimode PMMA plastic cable Baud rate : 115200 bps Fiber Length : 0.5 & 1m **Wireless Communication** Infrared Transmitter : IR LED Infrared Receiver : Direct TTL output Baud rate : 2400 bps Carrier Frequency : 38 KHz/40KHz **Modem Communication** Modem type : Data Interface type : Serial-RJ 11	05		

	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 **General** Power Supply : 220 V ±10%, 50 Hz / **Accessories** : 02 RS-232 Serial Cable 02 DB25 Parallel Port cable 01RJ11- RJ11 Conn. Cable 02 Plastic Fiber Cable Operating Manual Software CD,patch chords			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
02.	**LAN Trainer** **Features** • PC to PC communication with IEEE 802.3 • Peer to Peer network ,Client - Server network • Design of Star topology using 100Base-Tx ,Bus topology using 10Base-2 , Ring topology using DB9 • Creation of cables for network connections • Network design using RJ45,BNC & DB9 connectors • Socket programming and processing • Data Encryption and Decryption • Various LAN Protocols • Data rate up to 100Mbps • Variable packet size & delay • Error generation (Manual and Auto) • Real time graphical representation of Transmission & reception • Switch faults in both hardware & software • **No Components on top of trainer only block diagram & Connectors to be provided** **Technical Specifications**	05		

	Hardware: PC to PC using RJ-45 Connector Star topology using RJ45 Connector Bus topology using RJ 45 connector with load termination on BNC Connector Ring topology using DB9 Connector Data transmission speed: 10/100 Mbps 4 Nodes **Software** **:** Star, Bus & Ring selection Protocols : CSMA/CD, CSMA/CA, Stop N Wait, Go back to N, Selective repeat, Sliding Window, Token Bus, Token Ring Packet size : 128, 256, 512, 1024, 2048, 4096, 8192, 16384 Inter Packet delay : 1000 - 5000 ms Error generation : Acknowledgment lost, bad packet, auto error generation Data encryption & decryption Complete analysis of Network & Protocols **Graphical Representation:** Graphic representation of data on s/w screen with packet details **Network details:** Indication of computer name, IP address, Port number, status of network, MAC address and OS on computer. **Network & protocol analysis:** Indication of packet serial number, file name, file size, file number, receiver name, Workgroup ,receiver IP address , total packets, packet length, time out, protocol, topology, receiver, MAC address, port number, file send start time, file sent completion time, transmission time data rate(Mbps), error. **Power Supply** **:** 220 V ±10%, 50 Hz			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
03.	**<u>Baseband Transmitter Trainer</u>** **<u>Features</u>**	05		

	• Encoding Techniques :1 bit, 2 bit, 3bit, 4 bit,Convolutional 1/2, 2/3 & 3/4 Encoding) • Modulation Techniques : ASK, PSK, DPSK, FSK, QPSK, OQPSK, Pi by 4 QPSK, 8-PSK, 16-PSK, 16-QAM) • Constellation (Vector) Pattern for respective Modulation • Eye Pattern view • Hardware mode or in Software mode without need of external Data Acquisition Card • 60 test points which will help students to observe the signal on Oscilloscope and Logic Analyzer • Real time Software, to control & analyze Digital signal, Analog signal, Mixed Signal and XY mode • Simulations for different Encoding Techniques and Modulation Techniques on software • **No Components on top of trainer only block diagram & switches to be provided (FPGA Based VLSI Technology)** **Technical Specifications** On board Digitally Synthesized Sine and Cosine wave Generator with Variable Step Frequencies: 75 Hz, 150 Hz, 300 Hz, 600 Hz, 1.2 KHz, 2.4 KHz, 4.8 KHz and 9.6 KHz. On board Clock Generator with Step Variable Frequencies (75 Hz, 150 Hz, 300 Hz, 600 Hz, 1.2 KHz, 2.4 KHz, 4.8 KHz and 9.6 KHz) On board Data generator with Step Variable data length (8, 16, 32, 64 bits) and variable data type select (four type per length i.e.16 combinations are possible) Encoding Techniques (1 bit, 2 bit, 3 bit, 4 bit, Convolutional 1/2, 2/3 , 3/4 Encoding) Modulation Techniques (ASK, PSK, DPSK, FSK, QPSK, OQPSK, Pi by 4 QPSK, 8-PSK, 16-PSK, 16-QAM) **Power supply :** 220 V + 10%, 50 Hz			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
04.	**QAM Trainer** **Features:** • On board Noise Generator with 4 levels digitally selectable via two on-board debounced DIP switches. • Constellation diagram interface for both modulated & demodulated waveform. • Analog Signals Synchronized to digital signal for easy viewing. • User settable External Trigger for easy tribit sequence in waveform • search and view desired I-Q-C combination on CRO **Technical Specifications:** Data speed : 15625 bits/sec Data Format : Synchronous Data sequence : 24 bit user selectable via on board debounced DIP Switches Data Coding : Tribit (Absolute) Sine carriers : 15.625KHz, 0/90 degrees Accessories : Manual, Set of patch cord, Power cord	05		
05.	**Simulation software for Local area network with following topics & Features.** • Fundamentals of Networking • Network Model • Different Network Protocols • Network Components • Ethernet **[ISDN]** • Architecture • Virtual LAN	20 user		

	• Internet • Switching Techniques • Security • How to Create Network • Wide Area Network • Detailed theory of Networking • Drag & drop approach • Network performance calculation. • Interactive graphic analysis.			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
06.	**Advanced Fiber Optic Trainer-Dual Channel & PC-PC Communication Facility. Simulation & Teaching software** Transmitter : 2 Nos. Fiber Optics LED having peak wavelength of 660nm & 950nm Receiver : 2 Nos. Fiber optics Photo detector Modulation Technique : AM, FM & PWM Drivers : 1 No. with Analog & Digital Modes PLL Detector : 1 No. Comparator : 2 Nos. Filters : 2 Nos., 4^{th} Order Butterworth, 3.4 KHz cutoff Frequency Analog Bandwidth : 350KHz Digital Bandwidth : 2.5MHz Function Generators : 1) 1KHz Sine Wave (Amplitude Adjustable)	05		

	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 : RS232 Switched faults : 4 in Transmitter and 4 in Receiver Fiber Optics Cable : Step Indexed Multimode PMMA Plastic Cable Connector Type : Standard SMA 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 Fiber Length : 0.5 m & 1 m Test Point : 50 Accessories Included : Line Cord, Manuals, NA Measurement Jig, Mandrel, Fiber Cables, Microphone, Headphone, Patch cords **Software : Simulation & Teaching software with experiments & Theory on optical communication Single user should be provided with Set of 5 trainers.**			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
07.	**RFID Trainer**	05		

Features

Highly integrated analog circuitry to Demodulate,
Decode and Respond
3.56 MHz multi protocol support
Provided with LCD and software
RS-232 Interface
On board LED Indication
On board Buzzer indication
On board Antenna
Provided with application program software
Test points are provided to observe the signals
No Components on top of trainer only block diagram to be provided

Technical Specifications

Operating Frequency	: 13.56 MHz
Modulation Type	: ASK
Operating Range	: Less than 10 cm
Protocol Support	: ISO 14443A ISO 14443B ISO 15693
Application Software helps the understand the by using	: This programme Students to attendance records RFID technology
Supply Voltage and Reader, display	: 3.3 V for controller 5 V for LCD
Micro Controller 256 KByte KByte ROM	: 89C51 ED2 with RAM and 64
Antenna coupled coil type	: Inductively
Power Supply Hz	: 230 V ± 10%, 50
Accessories supplied with 25 **Physical Model** **Manual,** **Mains chord.**	**: Should be** **Passive Tags ,** **for car toll Plaza.** **software CD &**

Sr. No	Specifications	Qty	Approx. price	Total Amt.
08.	**Bar Code Technology Trainer** **Features** • Complete details of the Barcode Technology • Detailed explanation of each block with the Given test points • Application software should be provided • Facility of Barcode Generation • **No Components on top of trainer only block diagram to be provided** **Technical Specifications** Power Supply : +5 V DC provided from computer By PS/2 Interfacing/USB Current : 100 mA (while scanning) Scan-Rate (Typical) : 100 Scans per second Scanning distance : 0 to 30 mm Standards Supports with : UPC/EAN, UPC/EAN Supplemental, UCC/EAN 128, Code 39, Code 39 Full ASCII, Code 39 Tri Optic, Code 128, Code 128 Full ASCII, Codabar, Interleaved 2/5 Interface supported : PS/2	05		

	Ambient Light of normal Immunity conditions, : Immune to direct exposure office and factory lighting as well as direct exposure to sunlight. Accessories : Barcode scanner, Different barcode sample sheets, Manual & software .			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
09.	**<u>25 MHz Digital storage oscilloscope with 16 channel logic analyzer & Bluetooth Interface.</u>** Bandwidth : 25MHz Realtime Sample Rate: 400MSa/s Scope, 200MSa/s (Logic Analyzer) Equiv. Sample Rate : 25GSa/s Number of Channels : 2 CH + Ext Trig , +16 CH Logic Analyzer Memory Depth : 1M points on one channels (CH 1 or CH 2) 12K points (L .A) Acquisition Modes : Normal/Average/Peak dt ,XY/Roll Roll Range : 500ms/div ~ 50s/div Average Selectable : from 2 to 256 Vertical Sensitivity : 2mV/div - 5V/div Accuracy : ± 3% 10mV to 5V/div, ± 4% 2mV to 5mV/div Vertical Resolution : 8 bits Rise Time : 14ns Maximum I/PVoltage : 400V (DC+AC peak) Oscilloscope Maximum I/P Voltage: 40V (DC+AC peak) L.A Timebase Range : 20ns ~ 50s Time Base Accuracy : ±100 ppm Trigger Sources : CH1, CH2, Ext, Ext 5/5, AC Line ,L.A D0~D15 Trigger Hold off : 100ns - 1.5s Trigger Type : Edge, Pulse, Slope, Video, Alt., Pattern and Duration Trigger Coupling : DC, AC, LF Reject, HF rej. Trigger External : Ext± 2.4V, Ext/5, ±12V Auto Measure :Vpp, Vmax, Vmin, Vtop, Vbase, Vamp , Vrms, Vavg, Vover, Vpre, Freq, Period, Rise, Fall, +Width, Width, +Duty, Duty, Delay A, Delay B ,Cursor Measure Manual,	08		

	Trace, Auto measure Math , FFT X-Y Operation :Bandwidth : 25 MHz Phase Difference :3 degrees Storage :Internal 10 waveforms and Setups , USB :BMP, CSV, Waveforms, Display : TFT (64K, Color LCD), 320 234 Power : 100 - 240V / 50W max. Interface : **Bluetooth interface** & ,USB Accessories : Two Probes (1x, 10x switch able), Power cord, User manual, Active logic head, Logic clip 20 for logic analyzer, Software : Signal analysis & capture software DSO Demonstrator : DSO demonstrator with single shot, slow motion, medical application like ECG signal, Low freq repetitive signal , relay bouncing, & MIC testing with variable gain audio amp. application to be provided with Instrument with detailed exercise manual for understanding applications of DSO. All in a moulded box with no components on the top of box.			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
10.	**<u>10 MHz Function-Pulse-Data Generator with Frequency Counter</u>** Operating Modes (Function) : Sine, Square, Triangle, Ramp, Pulse, TTL and Serial Data Frequency Range : 1Hz - 10MHz Sine wave, 1Hz - 2MHz others Pulse Duty Cycle : 15% - 85% var. (min. width 200ns) Frequency Display : LCD controlled by Menu Keys Output impedance : 50 Ω	05		

	Output Voltage O.C. PP PP	: 10V into 50 , 20V			
	Attenuation variable)	: 20dB, 40dB (20dB			
	Level Flatness 1.5dB	: ±0.5dB (2MHz), (10MHz) typical			
	DC Offset adjustable	: ±5V (approx.)			
	Modulation Standard, FM, PWM Modulation	: AM Balance, AM ASK, FSK &			
	Modulation Input	: 10V max. PP			
	Modulation Generator				
	Operating Modes Triangle	: Sine, Square ,			
	Frequency Range (var.)	: 10Hz to 100kHz			
	Output	: 2VPP			
	Freq. Display Menu keys	: LCD controlled by			
	Freq. Accuracy	: ± (1% +7 digits)			
	Frequency counter				
	Frequency Range	: DC to 30MHz			
	Resolution	: 1Hz			
	Sensitivity	: 0.5Volts			
	Frequency Accuracy of rdg	: ± (0.5 % + 5Digit)			
	Frequency Display Menu Keys	: LCD controlled by			
	Input Impedance	: 1MΩ			
	Max. Input Voltage Peak)	: 200V (DC+AC			
	Power Supply 50Hz	: 220V AC 10%,			
	Accessories BNC-BNC	: Operating Manual, Cable.			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
11.	**5 ½ Digit Benchtop True RMS DMM** DC Voltage : 100 mv to 1000V with 1µ v min res. AC Voltage : 100 mv to 750 V with 1µ v min res Ac bandwidth : upto 100KHz DC Current : 10 mA to 3A with 100nA min res. AC Current : 10 mA to 3A with 100nA min res. Resistance : 100 Ω to 1000 M Ω min res. 1 m Ω (2 wire/4 wire) Frequency : 5 Hz to 1.1 MHz min res. 10 µHz Other Meas. : period ,Diode Test /continuity ,dB/dBm, Relative.. Display : High brightness vacuum fluorescent dual display. Other Features : True-rms AC voltage and current measurement. 512 reading storage and MAX/MIN/ AVER/STD statistics. Calibration without opening the case. 10 sets of meter status can be stored and loaded. Interface : RS 232	05		

DSP Lab

Sr. No	Specifications	Qty	Approx. price	Total Amt.
01.	**DSP Lab Trainer** Processor : TMS320C 6713 DSK dev.board. Power supply : 5 V DC Lab tutor : Spl. Designed software to describing all fundamentals & concepts of DSP processor & operations of code composer studio. Also should contain stepwise procedure to perform experiments .Three channel simeltanious graphical display to observe the input & output signals simeltaniously .Facility for inbuilt audio player for playing audio file Manual : Spl. Designed manual to cover various exercises on DSP like design of filters, signal generation etc. Accessories : IEEE 1284 male to female cable, Code composer studio. Audio microphone, Head phone etc..	10		

02.	**<u>Multifunction PC based Instrument</u>** **Consisting of following**: Digital Storage Oscilloscope : DC- 50 MHz ,2 channel, 4 Gs/s Eq. time samp. Rate. Function Generator : Synthesized, Sine, square, Tri, DC & Arb. DC- 4MHz(sine), 10 Vpp. Logic Inputs : 16 channel input Interface : RS 232 & USB. DC power supply : ± 5V fixed & ± 15 V variable. All above should be constituted in a single box which can be interfaced with PC. Single user simulation software should also be supplied with each instrument.	04		

Sr. No	Specifications	Qty	Approx. price	Total Amt.
03.	**<u>3 GHz Spectrum Analyzer with built-in Tracking generator with Spectrum demonstrator for students.</u>** Frequency : 1kHz~3 GHz Tuning Res. : 1 Hz Aging per year : ± 1ppm Amplitude Display : 100dBm in 10dB/div log scale. 50dBm in 5dB/div log scale. 20dBm in 2dB/div log scale. 10dBm in 10dB/div log scale. 10 divisions with liner amplitude scale Amplitude Units Log :dBmV or dBm units. Display : 6.4 Inch color TFT with high res. Preamp : Detecting the very low signal by the internal Pre-amp. Processor : Fast processor and large memory capable of storing up to Memory : 1,000 traces and 2,000 setups . RBW : 300Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100kHz,300kHz, 1MHz, 3MHz Video BW : 10Hz to 1MHz in 1-3-10 steps Marker : Peak search, Peak Track, Delta Marker, 1/Delta Marker Shift, 9 Markers Interface : IEEE, RS232 & Printer Modulation : AM/FM Demodulation Measurement Function: Channel Power, Adjacent channel Power, Occupied Bandwidth, Xdb down, Frequency counter, Harmonic distortion, Phase Noise Measurement,	02		

	Other Features : Multimarker, Autotune, variable trace points. **Tracking Generator :** Frequency :100 KHz ~ 3 GHz Output Level : 0 ~ -70dBm, 0.1 dB step Absolute Level Acc : ± 1.0 dB @ 0 dBm Flatness : ≤ 2.0 dB @ -10 dBm **Spectrum Analyzer Demo. Trainer** : should have experiments on Filters (LP,BP,HP, notch), DC amplifier freq. response(130 MHz approx),3 channel Modulators with one mixer cascaded with audio & video i/p. Function generator built in 40KHz to 2 MHz (sine, square & triangle waveform) for Harmonics analysis. Built-in speaker. All in a moulded box with no components on the top of box.			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
04.	**25 MHz Digital storage oscilloscope with 16 channel logic analyzer & Bluetooth Interface.** Bandwidth : 25MHz Realtime Sample Rate: 400MSa/s Scope, 200MSa/s (Logic Analyzer) Equiv. Sample Rate : 25GSa/s Number of Channels : 2 CH + Ext Trig , +16 CH Logic Analyzer Memory Depth : 1M points on one channels (CH 1 or CH 2) 12K points (L .A) Acquisition Modes : Normal/Average/Peak dt ,XY/Roll Roll Range : 500ms/div ~ 50s/div Average Selectable : from 2 to 256 Vertical Sensitivity : 2mV/div - 5V/div Accuracy : ± 3% 10mV to 5V/div, ± 4% 2mV to 5mV/div Vertical Resolution : 8 bits Rise Time : 14ns Maximum I/PVoltage : 400V (DC+AC peak) Oscilloscope Maximum I/P Voltage: 40V (DC+AC peak) L.A Timebase Range : 20ns ~ 50s Time Base Accuracy : ±100 ppm Trigger Sources : CH1, CH2, Ext, Ext 5/5, AC Line ,L.A D0~D15 Trigger Hold off : 100ns - 1.5s Trigger Type : Edge, Pulse, Slope, Video, Alt., Pattern and Duration Trigger Coupling : DC, AC, LF Reject, HF rej. Trigger External : Ext± 2.4V, Ext/5, ±12V Auto Measure :Vpp, Vmax, Vmin, Vtop, Vbase, Vamp , Vrms, Vavg, Vover, Vpre, Freq, Period, Rise, Fall, +Width, Width, +Duty, Duty, Delay A, Delay B ,Cursor Measure Manual, Trace, Auto measure Math , FFT X-Y Operation :Bandwidth : 25 MHz Phase Difference :3 degrees Storage :Internal 10 waveforms and Setups , USB :BMP, CSV, Waveforms, Display : TFT (64K, Color LCD), 320 234 Power : 100 - 240V / 50W max. Interface : Bluetooth interface & ,USB Accessories : Two Probes (1x, 10x switch able), Power cord, User manual, Active logic head, Logic clip 20 for logic analyzer, Software : Signal analysis & capture software . DSO Demonstrator : DSO demonstrator with single shot, slow motion, medical application like ECG signal, Low freq repetitive signal , relay bouncing, & MIC testing with variable gain audio amp. application to be provided with Instrument with detailed exercise manual for understanding applications of DSO. All in a moulded box with no components on the top of box.	10		

Sr. No	Specifications	Qty	Approx. price	Total Amt.
05.	**10 MHz Function-Pulse-Data Generator with Frequency Counter** Operating Modes (Function) : Sine, Square, Triangle, Ramp, Pulse, TTL and Serial Data Frequency Range : 1Hz - 10MHz Sine wave, 1Hz - 2MHz others Pulse Duty Cycle : 15% - 85% var. (min. width 200ns) Frequency Display : LCD controlled by Menu Keys Output impedance : 50 Ω Output Voltage : 10V into 50 , 20V O.C. PP PP Attenuation : 20dB, 40dB (20dB variable) Level Flatness : ±0.5dB (2MHz), 1.5dB (10MHz) typical DC Offset : ±5V (approx.) adjustable Modulation : AM Balance, AM Standard, FM, ASK, FSK & PWM Modulation Modulation Input : 10V max. PP **Modulation Generator** Operating Modes : Sine, Square , Triangle Frequency Range : 10Hz to 100kHz (var.) Output : 2VPP Freq. Display : LCD controlled by Menu keys Freq. Accuracy : ± (1% +7 digits) **Frequency counter** Frequency Range : DC to 30MHz Resolution : 1Hz Sensitivity : 0.5Volts Frequency Accuracy : ± (0.5 % + 5Digit) of rdg Frequency Display : LCD controlled by Menu Keys Input Impedance : 1MΩ Max. Input Voltage : 200V (DC+AC	05		

	Peak) Power Supply : 220V AC 10%, 50Hz Accessories : Operating Manual, BNC-BNC Cable.			

Sr. No	Specifications	Qty	Approx. price	Total Amt.
06.	**5 ½ Digit Benchtop True RMS DMM** DC Voltage : 100 mv to 1000V with 1µ v min res. AC Voltage : 100 mv to 750 V with 1µ v min res Ac bandwidth : upto 100KHz DC Current : 10 mA to 3A with 100nA min res. AC Current : 10 mA to 3A with 100nA min res. Resistance : 100 Ω to 1000 M Ω min res. 1 m Ω (2 wire/4 wire) Frequency : 5 Hz to 1.1 MHz min res. 10 µHz Other Meas. : period ,Diode Test /continuity ,dB/dBm, Relative.. Display : High brightness vacuum fluorescent dual display. Other Features : True-rms AC voltage and current measurement. 512 reading storage and	05		

	MAX/MIN/ AVER/STD statistics. Calibration without opening the case. 10 sets of meter status can be stored and loaded. Interface : RS 232			

Requirement of workshop.

Sr. No	Specifications	Qty	Approx. price	Total Amt.
01.	***Three Phase Lab*** **Three Phase Low Voltage Power Supply** **Input** : Three Phase Mains (230 V Phase voltage, 415 Line voltage 50 Hz) ± 10% **Outputs** : 18 V Phase voltage, 28 V line voltage 50 Hz ± 10% **MCB (Power Switch)** : Three Phase **Three Phase Lab**	05		

	Input : 18 V each phase, 50 Hz ± 10% **Loads** Resistors : 1 K, 10 K, 100 K Capacitors : 10 uf, 100 uf and 1000 uf Inductors : 5 mH, 10 mH, 20 mH **Modules Required** **Three Phase Supply Configuration Module** **Input** : 18 V each phase, 50 Hz ± 10% **Output** : 9 V **Three Phase Rectifiers Module** **Input** : 18 V each phase, 50 Hz ± 10% **Output** : 18 V Rectified three phase			
02	***UPS 5 KVA***	02		