



OFFICE OF THE REGISTRAR MANIPUR TECHNICAL UNIVERSITY, IMPHAL

(A University established under the Manipur Technical University Act, 2016)
Recognised by UGC under Section 2(f) and Section 22 of UGC Act, 1956

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INVITATION LETTER

Package Code: TEQIP-III/2019/MN/mtui/71

Current Date: 05-Dec-2019

**Package Name: Basic Electrical Engineering Lab and
Electronics Circuit Analysis Lab**

Method: Shopping Goods

To,

**Sub: INVITATION LETTER FOR Basic Electrical Engineering Lab and Electronics Circuit Analysis
Lab**

Dear Sir,

1. You are invited to submit your most competitive quotation for the following goods with item wise detailed specifications given at Annexure I,

Sr. No	Item Name	Quantity	Place of Delivery	Installation Requirement (if any)
1	Electrical and Electronic System Trainer	2	Manipur Technical University, Takyelpat	
2	Circuit Theory Experimentation Setup	1	Manipur Technical University, Takyelpat	
3	BH-CURVE Apparatus	1	Manipur Technical University, Takyelpat	
4	Characteristics of semiconductor(Led,diode,DIAC,Zener,Germanium	1	Manipur Technical	

	diode)		University, Takyelpat	
5	Electrical wiring -provision for AC	2	Manipur Technical University, Takyelpat	
6	Digital storage Oscilloscopes	3	Manipur Technical University, Takyelpat	
7	Calibration of voltmeter and ammeter with a potentiometer set up	2	Manipur Technical University, Takyelpat	
8	LAMP LOAD	2	Manipur Technical University, Takyelpat	
9	Resistive Load Bank	2	Manipur Technical University, Takyelpat	
10	Single PHASE Transformer Trainer	2	Manipur Technical University, Takyelpat	
11	RLC Series circuit Kit	1	Manipur Technical University, Takyelpat	
12	Insulation Tester	1	Manipur Technical University, Takyelpat	
13	DC MOTOR SPEED CONTROL (A)	1	Manipur Technical University, Takyelpat .	
14	DC-DC & DC-AC Converter Setup	1	Manipur Technical University,	

			Takyelpat	
15	Power Supply kit	5	Manipur Technical University, Takyelpat	

2. Government of India has received a credit from the International Development Association (IDA) towards the cost of the **Technical Education Quality Improvement Programme [TEQIP]-Phase III** Project and intends to apply part of the proceeds of this credit to eligible payments under the contract for which this invitation for quotations is issued.

3. **Quotation**

- 3.1 The contract shall be for the full quantity as described above.
- 3.2 Corrections, if any, shall be made by crossing out, initialling, dating and re writing.
- 3.3 All duties and other levies payable by the supplier under the contract shall be included in the unit Price.
- 3.4 Applicable taxes shall be quoted separately for all items.
- 3.5 The prices quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
- 3.6 The Prices should be quoted in Indian Rupees only.

4. Each bidder shall submit only one quotation.

5. Quotation shall remain valid for a period not less than **30**days after the last date of quotation submission.

6. Evaluation of Quotations: The Purchaser will evaluate and compare the quotations determined to be Substantially responsive i.e. which

- 6.1 are properly signed; and
- 6.2 Confirm to the terms and conditions, and specifications.

7. The Quotations would be evaluated for all items together.

8. Award of contract The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

- 8.1 Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of Contract.

8.2 The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order.

9. Payment shall be made in Indian Rupees as follows:

Payment Description	Expected Delivery Period (in Days)	Payment Percentage
Satisfactory Delivery & Installation	30	10
Satisfactory Acceptance	30	90

10. Liquidated Damages will be applied as per the below:
Liquidated Damages Per Day Min %: N/A
Liquidated Damages Max %: N/A
11. All supplied items are under warranty of **N/A** months from the date of successful acceptance of items and AMC/Others is .
12. You are requested to provide your offer latest by **10:30** hours on **19-Dec-2019**.
13. Detailed specifications of the items are at Annexure I.
14. Training Clause (if any)
15. Testing/Installation Clause (if any)
16. Performance Security shall be applicable: **0%**
17. Information brochures/ Product catalogue, must be accompanied with the quotation clearly indicating the model quoted for.
18. Sealed quotation to be submitted/ delivered at the address mentioned below, **Manipur Technical University, Imphal, null**
19. We look forward to receiving your quotation and thank you for your interest in this project.

(Authorized Signatory)

Name & Designation

Annexure I

Sr. No	Item Name	Specifications
1	Electrical and Electronic System Trainer	<p>Electrical & Electronic System Trainer</p> <p>Technical specifications: Built in Power Supply DC Supply: 5V / 1A. & ± 12V, 500mA. 0 to 15V DC (Variable), 100 mA (Isolated) 0 to 30V DC (Variable), 100 mA (Isolated) High Volt DC - 15V to 220 V, 100mA. AC Supply : 12-0-12V AC, 150 mA. Short circuit protected Built in Function Generator Output Waveform: Sine, Triangle & TTL O/Ps Output Frequency: 1 Hz to 1MHz in 6 ranges, with amplitude & frequency control pots. O/P Voltage 20V p-p max. (Sin / TRG) Modulation I/P : AM: - I/P voltage + 5V (100% modulation) O/P - For 0V (min), + 5V (max.) - 5V (Phase reversal of O/P) FM: I/P voltage ± 400mV (+ 50% modulation) Clock Generator: 10 MHz TTL clock. Data Switches (10 no.) & bi-colour LED status indicators 10X2 nos, for High/Low indication. Pulser switches (2 nos.) with four debounced outputs-2no. BNC to 2 channel banana adapter-2No. Logic probe to detect High/Low level pulses upto 1MHz, with bi-colour LEDs to indicate status. 2 / 4 digit 7 segment display with BCD to 7 segment decoder. Onboard DPMS provided with mode/range selection.</p> <p>(A) DC volt : 2V/200V - 1no. (B) DC current : 2mA/200mA - 1no. (C) DC Volts/Current : 20V/200mA - 1no. Onboard moving iron meters provided for A) AC Current: 1 AMP - 1No. (B) AC Voltage: 15V - 1No. Onboard speaker - 8 Ohms, 0.5 Watt (1no.) Onboard POTS : 1K-1no. 1M-1no.</p>
2	Circuit Theory Experimentation Setup	<p>Circuit Theory experimentation set up Panel Compatible to Electrical & Electronic System Trainer DC, AC & Wave Shaping Circuit Experiment Panel. DC : Resistance, current and</p>

		<p>voltage measurements, Ohm's law, Power DC circuits, Series, parallel and mixed circuits, Kirchoff's law, Superposition theorem, Thevenin's & Norton's theorems, Reciprocity Compensation Tellegen & Millman's theorems, Max. Power transfer theorem, Voltage distribution of capacitors in series & parallel, total capacitance of capacitors in series and parallel, charging and discharging of capacitor through resistance & time constant, Wheatstone's Bridge, 2 Port Network Y, Z, h, ABCD Parameters & Star Delta Network, T & Pi attenuators.</p> <p>AC : AC Voltage & Current Measurements - R-L series, R-C series, R-L-C series circuit (Series Resonance). R - L parallel, R-C parallel, R-L-C parallel (Parallel Resonance), Active, Reactive power & power factor(Vector Diagram), average & RMS Value measurement. WaveShaping: Differentiator, Integrator, Clipping, Clamping, Passive filters LC / RC, LPF/ HPF</p>
3	BH-CURVE Apparatus	<p>Panel Compatible to Electrical & Electronic System Trainer (BH-CURVE Apparatus) Magnetism, Electromagnetism and Transformer Experiment Panel Faraday's law of magnetic induction, Left-hand rule for north pole of coils / conductors & Corkscrew rule for flux around current carrying conductor. Fleming's left-hand rule (motor law -force on a current carrying conductor in a magnetic field), Lenz's Law. Transformer: BH curve, calculation of total Iron core loss (Hyst & Eddy loss) using CRO, DC-AC resistance, transformation ratio, loading of transformer, Auto transformer, self & mutual inductance calculations. Magnetic sensor: Reed switch, Electromagnetic Relay, Hall sensor (Analog /Digital), Mag. compass needle.</p>
4	Characteristics of semiconductor(Led, diode, DIAC, Zener, Germanium diode)	<p>Panel Compatible to Electrical & Electronic System Trainer Semiconductor & Power semiconductor devices experiment panel.</p>

		<p>characteristics of following devices: Silicon diode, Semiconductor Testing using Multimeter, Germanium diode, zener diode, LED, diac, bipolar transistor (NPN , PNP) , Field Effect Transistor (FET), MOSFET (IGBT), UJT,PUT,Silicon Controlled Rectifier (SCR), Triac, Optocoupler, Band gap energy Calculations, Thermistor, V-I Characteristics on CRO of SCR, Triac ,Transistor as a switch & MOSFET as a Switch.</p>
5	Electrical wiring -provision for AC	<p>Electrical wiring -provision for AC Electrical wiring trainer Aluminum profile sturdy flat demo panel (table top) system, having top row carrying tube, led lamp, metal halide/ halogen etc., while bottom 3 rows carry various device panels as below & it is fronted by particle board for wiring practice with inclination settable 1 Phase AC input supply panel 1ph. MCBs of 4A/1.6A - 2nos Grounding & protection panel Consists of a 2 pole Earth Leakage Circuit Breaker (ELCB) 25A with current imbalance of 30mA. One NO push button to create Earth leakage fault. One SPDTto select HI- leakage or LO-leakage fault. One 15W bulb for Hi-Leakage fault & 22KW resistor for leakage fault Integrated AC (1 phase) measurement panel 1 nos of Digital meter for 1 ph. parameters V, I, PF, W, Wh, VA, VAR, Hz, etc. Current specs = 1A/5Afor 1ph. meter (170-250V). AC Power supply panel AC OSARAM power supply for metal halide lamp 70W (max. 5KV) 1 Input 230VAC/0.4A DC Power supply panel SMPS power supply for LED Input 230VAC, Output +12V/5A, 60W DC supply for down lighter Switches panel One way switch = 2 nos Two way switch = 2 nos Buzzer/bell switch/ Neon panel Buzzer/Bell, I/P230VAC Bell switch 1 Neon lamp indicator Kitkat fuse Dimmer/Fault panel Dimmer fault = 2 nos Sockets panel Three pin AC mains Sockets = 3 nos 230V/10Arating DP switch panel Double pole single through four terminal S/W= 2nos Rating</p>

		<p>32A/240VAC Lamp panel Incandescent lamp = 3 nos., CFLtube = 1 no Various Lamp/Tubes provided Metal Halide lamp (70W) Electronic tube Point source LED Strip LED Electric Tube Display panel showing various wiring accessories Conduit, Elbow joints, casing taping, Cleats, Batten with clips, cable/wires etc Wiring practice board A replaceable 20mm particle / PVC board is mounted horizontally between legs like a drawer. It is used for wiring practice by students using self tapping screws & wiring accessories use drilling machine to drill holes. All banging by hammer. Accessories: Drill machine, screw driver set, self tapping screws, drill bits (3mm, 4mm)</p>
6	Digital storage Oscilloscopes	<p>Digital Storage Oscilloscope Signal bandwidth: 50M Real-time sampling rate: Max. 500 Msa/s Equivalent sampling rate: Max. 50 GSa/s 7.0" TFT LCD Color display 32kpts memory depth Independent vertical scale & position control knobs for each channel. Edge, Pulse Width, Video, Slope, Alternate trigger mode Math functions including Add, Subtract, Multiply, Divide & 1024 point FFT 32 parameters of automatic measurements Digital Filter & Waveform recorder function Advanced cursor modes: Manual,Auto & Track Waveform Intensity & Grid Brightness can be adjusted PASS / FAILdetection, PASS/FAIL output Built-in 50MHz hardware frequency counter Save/recall types: Setups, Waveforms, CSV file, Picture Standard Interface USB Host: Support USB flash driver save/recall function & update firmware, USB Device: Support Pic tBridge compatible printer & support PC remote control, RS232</p>
7	Calibration of voltmeter and ammeter with a potentiometer set up	<p>Calibration of Milli Ammeter as Voltmeter Should Consist of: A) Control Panel consisting AC MCB, DC Variable supply, 300 V DC Analog Voltmeter, 200 mA DC analog Ammeter, all other required Terminals and fuse. B) 2000 Ohms / 0.5 A wire wound Rheostat</p>

8	LAMP LOAD	Characteristics of Filament Lamp Control panel Control Panel consisting AC MCB, DC Variable supply, Digital 300 V DC Voltmeter, 1 A Digital DC Ammeter, Lamp Holder, all other required Terminals.
9	Resistive Load Bank	Resistive Load Bank: A) Consists of six incandescent lamp holder, separate switch, 100W bulb(3 Unit) and 200W bulb(3 Unit).
10	Single PHASE Transformer Trainer	To find voltage and current ratio of 1 Phase Transformer (Transformer with control Panels) Control Panel consisting AC MCB, 300 V AC Voltmeter 2 No., 5 A AC Ammeter 2 No., 250 VA / 230 – 115 V Transformer 1 no., inbuilt 1 A Resistive load, 2 A Dimmer, all other required Terminals & fuse.
11	RLC Series circuit Kit	Measurement of Power and study of series R L C Circuit Should consist of: A) 1 Phase / 230 V / 4 A rated / wire wound resistive load controlled by rotary switches in 4 steps. Complete with caster wheels for easy movement in lab. B) 1 Phase / 230 V / 4 A rated / 50 hz. / Continuous variable inductive load Complete with caster wheels for easy movement in lab. C) 1 Phase / 230 V / 5 A / 50 Hz. / Capacitive load bank controlled by rotary switches in 5 steps. Complete with Charging – discharging Bulb mounting holders (without bulbs. 60 W bulbs to be arranged locally) D) Single Phase / 10 A / Autotransformer (Variac) / air cooled / copper wound with sheet metal enclosure. Input : 1 Phase / 230 V / 50 Hz. / AC Output : 1 Phase / 0 – 250 V / 10 A AC E) Portable Meters with handle 1. 5 / 10 A AC Ammeter – 1 No. 2. 150 V / 300 V AC Voltmeter –4 no. 3. 5 / 10 A – 150 / 300 V - 1 Ph. UPF Wattmeter – 1 No. 4. 5 / 10 A – 150 / 300 V - PF Meter – 1 No.
12	Insulation Tester	Insulation Tester • Automatic calculation of polarization index and dielectric absorption ratio • Multiple test voltages:

		<p>50 V, 100 V, 250 V, 500 V, 1000 V • Remote test probe for rapid testing • Insulation test range 0.01 MΩ to 10 GΩ • Compare (Pass/Fail) function for repetitive tests • Live circuit detection prevents insulation test if voltage > 30 V is detected • Auto-discharge of capacitive voltage • AC/DC voltage: 0.1 V to 600 V • Lo ohms/Earth-bond continuity (200 mA) for checking connections and motor windings • Resistance: 0.01 Ω to 20.00 Ω</p>
13	DC MOTOR SPEED CONTROL (A)	<p>DC Motor Speed control Trainer The Trainer should have following features :</p> <ul style="list-style-type: none"> • Following trainer may need a few set of associated panels (4 nos. typically) which are mounted in a light weight sturdy aluminum flat demo panel system. • Facilitates easy & safe wiring by students due to 4mm sturdy shrouded banana patch cords & shrouded socket arrangement for high voltage circuits. • Each panel has ABS molded plastic sturdy enclosure, & colorful screwless overlays showing circuit diagram & its connection tag numbers for easy understanding & connections. • Set of Instructor Guide & Student Workbook Technical specifications: It should consists of : 1] Instrumentation Power supply cum Multi- channel DPM panel (a) +/-12 V, 500 mA (b) +5V, 300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) Multi channel DPM for digital display of speed, etc. 2] SCR Actuator (variable DC) cum sensor signal conditioning panel 1. Full bridge SCR based 0V-195V / 12 Amp cosine firing with linear characteristics. 2. Supports signal conditioning circuit for speed to give output 0-2.5Vdc (FS). 3. 2 Nos. of these supplies required for DC Armature & DC motor field. 3] DC voltmeter & DC ammeter panel a) DC voltmeter (0-300V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. 4] DC Integrated Motor Specifications 180V/300W/1500RPM with series shunt & compound windings,

		<p>Chasis mounted table top with spring balance loading arrangement [10kg] & Electronic Tacho:1V/1000RPM. Electrical Tacho :10V/1000RPM. List of Experiments 1. Open loop torque speed characteristics. 2. Closed loop speed control using Armature voltage / speed feed back using P/PI mode.</p>
14	DC-DC & DC-AC Converter Setup	<p>DC-DC, DC-AC Experiment panel DC to AC, AC to DC, DC to DC Voltage converter circuit. DC to AC Circuit (Converts 5VDC I/P to 12-0-12VAC O/P) AC to DC circuit (Converts 12-0-12VAC I/P to ± 12VDC O/P) DC TO DC by combining two above circuits to get (5VDC Input to ± 12VDC O/P)</p>
15	Power Supply kit	<p>Specification Output Type: Dual Output Display: LCD Range: 0~30V, 0~5A, Fixed O/P- 5V,2A Key Features: Line Regulation : CV $\pm 0.01\%$ + 3mV / * CC $\pm 0.2\%$ + 3 mA Load Regulation : CV $\pm 0.01\%$ + 3mV / * CC $\pm 0.2\%$ + 3 mA Ripple and Noise : CV 1mV rms / * CV 3 mA rms with high precision voltage setting. With extended output terminals, this device offers continuous working under full load condition Protection : Constant current and Short-circuit protection Tracking Error : $\pm 0.5\%$ +10 mV Indication Accuracy : $\pm 0.5\%$ +1digit Input Voltage : 220 V AC $\pm 10\%$, 50hz ± 2Hz</p>

FORMAT FOR QUOTATION SUBMISSION
(In letterhead of the supplier with seal)

Date: _____
To: _____

Sl. No.	Description of goods \ (with full Specifications)	Qty.	Unit	Quoted Unit rate in Rs. (Including Ex-Factory price, excise duty, packing and forwarding, transportation, insurance, other local costs incidental to delivery and warranty/ guaranty commitments)	Total Price (A)	Sales tax and other taxes payable	
						In %	In figures (B)
Total Cost							

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs. _____ (Amount in figures) (Rupees _____ amount in words) within the period specified in the Invitation for Quotations.

We confirm that the normal commercial warranty/ guarantee of _____ months shall apply to the offered items and we also confirm to agree with terms and conditions as mentioned in the Invitation Letter.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

Signature of Supplier

Name: _____
Address: _____
Contact No. _____