



# 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/48**

**Current Date: 18-Jun-2019**

**Package Name: Power System Lab**

**Method: Shopping Goods**

To,

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**Sub: INVITATION LETTER FOR Power System 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	Relay Test	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
2	Buchholz Relay Trainer	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
3	Trainer Kits	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
4	Distance Protection Relay Trainer kit	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
5	Under voltage and Over	1	Manipur Technical University,	

	voltage relay testing system		Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
6	Differential relay	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
7	Overcurrent relay, earth fault realy	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
8	Symmetrical and unsymmetrical fault demonstrator	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
9	Transmission Line Trainer	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
10	Digital earth resistance tester	5	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
11	CLAMP METER	10	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
12	Digital Multimeter	15	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
13	Air Circuit Breakers, Digital Protection Relays & Protection and Measurement Devices	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	
14	Distributed System lab	1	Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004	

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 **45** 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.
- 6.3 All required/derived documents contained in the Tender notice shall be submitted.

**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 fulfilling all Technical Specification as desired by the University 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 by e-transfer through PFMS.

**10. Satisfactory Delivery & Installation - 10% of total cost**

**Satisfactory Acceptance - 90% of total cost**

11. All supplied items are under warranty of **12** months from the date of successful acceptance of items and AMC/Others.
12. You are requested to provide your offer latest by **16:30** hours on **10-Jul-2019**.
13. Detailed specifications of the items are at Annexure I.
14. **Training:** Training/Demonstration must be done for each item.
15. **Testing/Installation:** Testing/Installation must be executed in presence of a faculty of concerned department of Manipur Technical University and duly certified by the Faculty.
16. Information brochures/ Product catalogue must be accompanied with the quotation clearly indicating the model quoted for.
17. The bidder should have provided similar nature of services to IITs/NITs/Govt. Departments/Semi Govt. Departments/PSU/Educational Institutions of National Importance etc. during last 3(three) years ending the last day of March 2019. Duly certified copies of such services are to be enclosed.
18. Tender/Quotations are to be submitted in TWO PARTS i.e. (a) Technical Bid and (b) Price Bid, in two separate properly sealed covers; and both these covers will have to be again put in to a single sealed cover. Also, the full address of the firm submitting the tender/quotation must appear distinctly with PIN on both the inner sealed covers, indicating also TECHNICAL BID/ PRICE BID as may be applicable.
19. The outer most cover shall be super scribed as:  
 "QUOTATION FOR SUPPLY & INSTALLATION OF .....  
 .....  
 FOR..... MANIPUR  
 TECHNICAL UNIVERSITY.  
 VIDE TENDER REF NO:- .....  
 DATED.....  
 [The bid will summarily be rejected & returned to the bidder if the sealed envelope containing the quotation is not super scribed as above].

20. Sealed quotation to be submitted/ delivered at the address mentioned below:  
**Manipur Technical University, Govt. Polytechnic Campus, Takyelpat, Imphal West, Manipur-795004**
21. No Part Delivery: Part shipment for any items will not be allowed and any Optional item quoted by the supplier will not be entertained.
22. The bidding agency should be a reputed firm and having all necessary certificates, viz. GST registration certificate, PAN, Registration, Sale Tax clearance Certificate, Authorized Dealership/Distributorship certificate, etc. The photocopies of all the certificates should be attached with the tender.
23. The firm should be an original equipment manufacturer (OEM) in the business of manufacture or supply of equipment for minimum 3-5 years. The firm should submit audited financial statements for latest three financial years in support of this claim.
24. The items being quoted should be of Original Manufacturer and no non-standard item should be quoted. All detailed specifications with make & model no. of the items accompanied by proper leaflets should be clearly mentioned and attached with the offer.
25. The rate quoted must be both in words and figures inclusive of all charges i.e. packing, forwarding, octroi, surcharge, insurance, installation, demonstration and other charges if any.
26. Manufacturer's/Company's name, it's trademark should be mentioned in the tender and illustrative leaflets giving technical particulars, etc. should be attached in the tender.
27. Each bidder should clearly specify that the bidder agrees to abide by the conditions of this tender document on their printed letter head duly sealed & signed by an authorized person.
28. The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling

during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall have to be taken into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit. **Manipur Technical University will not take responsibility and accept any damaged goods during transit.**

29. Contact details of the person for all post sales/installation maintenance support should clearly be given with Name & Designation, Phone No., Mobile No. and E-mail address.
30. All legal disputes shall be under the jurisdiction of Manipur High Court in the state of Manipur.
31. We look forward to receiving your quotation and thank you for your interest in this project.



(Authorized Signatory)

Name & Designation

**Asst. Registrar  
Manipur Technical University**

**Annexure I**

<b>Sr. No</b>	<b>Item Name</b>	<b>Specifications</b>
1	Relay Test	<p>Over Current Relay testing Kit Technical Specifications:</p> <ul style="list-style-type: none"><li>• The trainer should consist of built in requisite relay testing kit typically consisting of voltage injector, current injector, elapsed time counter (1 msec resolution), trip relay logic etc.</li><li>• The trainer should have a few set of associated relay testing (current / voltage injection etc.) panels (7-8 nos. typically) which are mounted in a light weight sturdy aluminum profile flat demo panel system.</li><li>• Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements.</li><li>• Each panel should have ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection</li><li>• Should Facilitates easy and safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords and shrouded socket arrangements for high voltage circuits &amp; Set of Instructor Guide &amp; Student Workbook should be provided</li></ul> <p>Interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in modular plastic enclosures to minimize shock possibility.</p> <ul style="list-style-type: none"><li>1 phase AC Input supply panel Should consist of</li><li>• 1ph. MCBs of 4A/1.6A - 2nos.</li><li>• Bulb Load. Variable voltage &amp; current injector panel Should consist of</li><li>• 1 phase dimmer 230VAC/1A</li><li>• Short circuit transformer with primary 230VAC/1A, secondary 0-2-8V/12A taps.</li><li>Over current &amp; elapsed time measurement panel Should consist of</li><li>• AC ammeter of 20A</li><li>• Elapsed time counter range 999.001 sec, resolution 1 msec.</li><li>Over Current Relay Panel All the connecting of relay should brought out on this panel &amp; it should consist of</li><li>• 2 NO trip contacts.</li><li>• Relay Coil Protection relay type (Electromechanical) Should consist of Electromechanical type IDMT over current relay, current rating 5A, with current setting of 2-250% in seven equal steps of 2%, time setting 0.1 to 1.</li></ul>
2	Buchholz Relay Trainer	<p>Buchholz Relay Testing Kit Relay Technical Specification:</p> <ul style="list-style-type: none"><li>*Conservator and transformer tanks are made of transparent acrylic for easy to observation oil levels.</li><li>* Air pump and foot pump are provided to simulate gas formation &amp; short circuit fault</li><li>* QRC socket provided to replace air pump by foot pump easily</li><li>* Transparent piping for easy to observation oil &amp; air bubbles.</li><li>* Facilitates easy and safe wiring by students due to use of 4mm sturdy shrouded banana patch cords and socket arrangements.</li><li>*Aluminumprofile sturdy flat modular demo panel (table top) system, carrying various high voltage components housed in plastic enclosures (panel) to minimise shock possibility.</li><li>* Set of Students workbook and Instructors Guide.</li><li>* 1 Phase AC Input Supply Panel</li><li>• 1 ph.dual</li></ul>

		<p>MCBs of 2A for short circuit protection * Lamp to indicate buchholz relay trip/fault * Buchholz relay * Gas/ Oil operated relay * 2 Nos. of NO contacts (upper and lower mercury contacts) are brought out on SBS5 sockets on 'C' bracket. * Transformer tank * Air tight acrylic tank to house transformer * Capacity- 1.5 liters * Tank mounted using MS 'L' plate * Conservator tank * Top open acrylic tank used to fill oil in to buchholz relay * Capacity- 1.5 liters * Tank mounted on MS 'L' plate * Reservoir / sump tray * MS black painted tray to collect oil overflow during experiment * Size (mm): 1070 (L) x 300 (W) x 30 (H) * 2mm thick MS sheet * Piping * Plastic reinforced 12mm (Ø) piping as air vent- 1M * Plastic transparent 12mm (Ø) inter device piping- 1M * Miscellaneous Manual ball valves SS ¼ inch (6mm) 1 no. SS ½ inch (12mm) 2 nos. SS ¾ inch (18mm) 1 no. Non Return Valve Allows air in to X'mer container 1 no. (NRV) while oil is prevented from spilling into pump, line mounting (CI10T) Quick Release To substitute air pump by foot pump easily 1 no. Coupler (QRC) ¼ inch (6mm) 6 x 4 PU tube To connect air pump/ foot pump 1.5 mtr to transformer container Foot pump 150 PSI 1 no. Air pump 230Vac operated 1 no. Oil mug 500ml plastic graduated 2 nos. Nozzles Brass ½ inch (5), Brass ¼ inch (2) 9 nos. Brass ½ inch by ¾ inch threading (2) T coupler SS, ½ inch inner threading 1 no. Hose clips ½ inch 7 nos.</p>
3	Trainer Kits	<p>Frequency Relay Testing Kit Technical Specifications: • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • Each panel should have ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection • Set of Instructor Guide &amp; Student Workbook  Interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Input 3 phase DOL Starter panel • 4 pole MCB of 415 V/4A . • DOL 9A Contactor with 230V / 50 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 2.5A -6A . Integrated AC 3 phase measurement panel • Consist of (96 X 96 mm) Digital meters for 3 ph. • Measures V, I, PF (0.2 lag – unity 0.2 lead), Hz. Hence separate analog wattmeters (3ph., 1ph.) are not needed. Under / Over Frequency Relay Panel • All the connection of relay are brought out on this panel. • 1 NO and 1 NC contact • Relay Coil 415/110VAC, Star/Star Step Down Transformer Panel • This panel consisting of 415/110VAC, 50VA, Star / Star Step Down Transformer Panel • All the connections of transformer primary and secondary are brought on SBS5 on the top of panel Over current &amp; elapsed time measurement panel • Consists of AC ammeter of 20A • Elapsed time counter range 999.001 sec, resolution 1 msec. Protection Relay Type: Microprocessor / Microcontroller Based. Able to communicate with PC.</p>
4	Distance Protection Relay Trainer kit	<p>Impedance relay/Distance Protection Relay Trainer SALIENT FEATURES • Facilitates distance protection of transmission line &amp; Auto release function. • Above trainer has built in requisite relay</p>



		<p>testing kit typically consisting of RL Transmission Line (125Kms / 250kms), trip relay logic etc. • The Trainer needs a few set of associated relay testing panels (7-10 nos. typically) which are mounted in a light weight sturdy aluminum profile flat demo panel system. Do not need any separate testing kit. • Facilitates easy &amp; safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords &amp; shrouded socket arrangements for high voltage circuits, each panel has ABS molded plastic sturdy enclosure, &amp; colorful screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding &amp; connection. • Auto reclose facility of Distance relay is demonstrated. Technical Specifications of interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in modular plastic enclosures to minimize shock possibility. Input 3 phase DOL Starter panel Should consist of • 4 pole MCB of 415 V/2A. • DOL 9A Contactor with 230V / 50 Hz / 11VA Coil . • Bimetallic thermal O/L relay with range 1.4A - 2.3A, also work as circuit breaker. • R-Y-B Input Indicators. Separate NO contact brought out for auto recloser &amp; NC for trip. 1 phase AC Input supply panel Should consist of • 1ph. MCBs of 4A/1.6A • Bulb Load. 3 Phase Bidirectional Power cum Energy meter panel Should consist of • Bidirectional Multifunction • 3 phase 3/4 wire, 415VAC, CT Input 5A • LCD/LED display, Aux. supply 230V, 45-65Hz,5W, • V, I, Hz, Pf, KVA, KW, KWH. • Modbus RTU RS 485 connections Distance Relay Panel All connection of relay should brought out on this panel &amp; should consist of • 2 NO Trip contacts, 1 NC Trip contacts, 1 NO Auto reclose contact. • Aux. Supply 230VAC. CT panel Should consist of • 5/5 Amp. CT 6 Nos. • Primary side of CTs should brought on 3 x 2 x 2 SBS-5 sockets. • Secondary side of CTs should Star connected in group of 3 &amp; brought out on 4 x 2 SBS-5 sockets. 415/110VAC, Star/Star Step Down Transformer Panel Should consist of • 415/110VAC, 50VA, Star/Star Step Down Transformer Panel • All the connections of transformer primary &amp; secondary should brought on SBS5 on the top of panel. FWD-OFF-REV, Switch Panel Should consist of FWD/REV, 3 pole 3 way switch with center OFF, 6A/440V. Transmission line Panel - Table Top Panel consisting of : • Simulated model for short transmission line using R(10 ohm/600W), L(0.15H/5A) &amp; C (2.2uF/630V) 6 No. each component. • Simulated model for medium length 125kms &amp; long length 250kms transmission line. • Forced Air cooled using 2 fans. Resistive Load panel Table Top Panel consisting of : • 3 nos of 600W resistors with switch selectable 7 nos of taps at 100, 112, 125, 150, 175, 200 &amp; 225 Ohm • Forced Air cooled using 2 fans. Protection relay type (Numerical) : Should consist of Numerical type distance protection relay, current rating 1A/5A for protection of transmission line, RS232 port for PC communication, relay setting with software should on CD, RS232 to USB converter for USB interface.</p>
5	Under voltage and Over voltage relay testing system	<p>Technical Specification: • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • Each panel should have ABS molded plastic sturdy enclosure, and colorful</p>

		<p>screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection • Set of Instructor Guide &amp; Student Workbook • Should interface with computer and facility to upload and download the programs. Interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Input 3 phase DOL Starter panel • 4 pole MCB of 415 V/1A . • DOL 9A Contactor with 230V / 50 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A – 2.3A . Integrated AC 3 phase measurement panel • Consists of 96 x 96 mm digital meters for 3 phase • Measures V, I, PF (0.2 lag – unity 0.2 lead), Hz. Hence separate analog wattmeters [3ph. 1 ph. are not needed. Under / Over / Under / Unbalance Voltage Relay Panel • All the connection of relay are brought out on this panel. • 1 NO and 1 NC contact • Relay Coil FWD-OFF-REV Switch Panel • FWD/REV, 3 pole 3 way switch with center OFF, 6A/440V. Over current &amp; elapsed time measurement panel • Consists of AC ammeter of 20A • Elapsed time counter range 999.001 sec, resolution 1 msec. Protection Relay Type Numerical Type IDMT Under / Over Voltage Relay. Accessories : 3 Phase 3 Amp. Variac</p>
6	Differential relay	<p>Differential relay testing System Technical Specification: Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. Each panel should have ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection The trainer should consist of built in requisite relay testing kit typically consisting of voltage injector, current injector, elapsed time counter (1 msec resolution), trip relay logic etc. Should Facilitates easy and safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords and shrouded socket arrangements for high voltage circuits Each panel Should have ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection Set of Instructor Guide &amp; Student Workbook should be provided Interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Input 3 phase DOL Starter panel Should consists of • 4 pole MCB of 415 V/2A . • DOL 9A Contactor with 230V / 50 Hz / 11VA COIL. • Bimetallic thermal O/L relay with range 1.4A – 2.3A. 1 phase AC input supply panel Should consists of • 1 phase MCB of 4A/1.6A – 2 nos. • Bulb load Variable voltage and current Injector panel =2 nos. Should consists of • 1 phase dimmer of rating 0-230VAC/0.75A. • Toroidal current injecting transformer of 100VA with primary 230VAC/1A, secondary-0-2-8V/12A. • All connections of dimmer &amp; transformer should be brought out on shrouded sockets for easy connection. 3 Phase Bidirectional Power cum Energy meter panel Should consists of • Bidirectional Multifunction • 3 phase 3/4 wire, 415VAC, CT Input 5A • LCD/LED display, Aux. supply 230V, 45-65Hz,5W, • V, I, Hz, Pf, KVA, KW, KWH. • Modbus RTU RS 485 connections. Over current measurement &amp; Elapsed</p>

		<p>time counter panel =2 nos. Should consists of: AC ammeter of 0-20A range, Aux. supply 230VAC, Display: 0-19.99. Elapsed time counter with display range 999.999 of resolution of 1msec. Should have facility to freeze time. Should have start-stop push buttons, provision to connect trip NO contact from protection relay.</p> <p>Differential Relay Panel All connection of relay should brought out on this panel &amp; should consists of: • 2 NO Trip contacts • Aux. Supply 110VDC/230VAC CT panel Should consists of • 5/5 Amp. CT 6 Nos. • Primary side of CTs connection should brought on 3 x 2 x 2 SBS-5 sockets. • Secondary side of CTs should be Star connected in group of 3 &amp; brought out on 4 x 2 SBS-5 sockets.</p> <p>415/230VAC, 1KVA, Star/Delta Transformer Panel Should consists of 415/230VAC, 1KVA, Star/Delta transformer Panel Consists of all the connections of transformer primary and secondary should brought on SBS5 on the top of panel. Resistor Load (Table Top panel) Should consists of AC/DC Resistors 750E/600E/300E/212E/162E/ 125E/ 112E/100E/400W /8 taps + OFF + separate 60E tap for DC series Gen. Resistive Load panel (Table Top panel) Should consists of 3 nos. of 600W resistors with switch selectable 7 nos. of taps at 100, 112, 125, 150, 175, 200 &amp; 225 Ohm Protection relay type (Numeric) : Should consists of Numeric type High speed biased differential relay, current rating 1A, with biased setting of 15%, 30% and 45% by plugboard taps, Aux. supply 230V AC /110VDC</p>
7	Overcurrent relay, earth fault realy	<p>The trainer should consist of built in requisite relay testing kit typically consisting of voltage injector, current injector, elapsed time counter (1 msec resolution), trip relay logic etc. The trainer should have a few set of associated relay testing (current / voltage injection etc.) panels (7-8 nos. typically) which are mounted in a light weight sturdy aluminum profile flat demo panel system. Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. Each panel should have ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection Should Facilitates easy and safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords and shrouded socket arrange-ments for high voltage circuits &amp; Set of Instructor Guide &amp; Student Workbook should be provided Interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in modular plastic enclosures to minimize shock possibility. 1 phase AC Input supply panel Should consist of • 1ph. MCBs of 4A/1.6A - 2nos. • Bulb Load. Variable voltage &amp; current injector panel Should consist of • 1 phase dimmer 230VAC/1A • Short circuit transformer with primary 230VAC/1A, secondary 0-2-8V/12A taps. Over current &amp; elapsed time measurement panel Should consist of • AC ammeter of 20A • Elapsed time counter range 999.001 sec, resolution 1 msec. Earth Fault Relay Panel All the connecting of relay should brought out on this panel &amp; it should consist of • 2 NO trip contacts. • Relay Coil • Earth Fault Relay Coil Protection relay type (Numerical) Should consist of numerical type IDMT over current &amp; Earth fault relay,</p>

		current rating 5A, with current setting of 2-250% in seven equal steps of 2%, time setting 0.1 to1.
8	Symmetrical and unsymmetrical fault demonstrator	<p>Technical Specification:</p> <ul style="list-style-type: none"> <li>• Should consists of few set of associated panels (7-8 nos. typically) which should be mounted in a light weight sturdy aluminum profile flat demo panel system.</li> <li>• Should consists of easy and safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords and shrouded socket arrangements for high voltage circuits</li> <li>• Should consists of ABS molded plastic sturdy enclosure, and colorful screw less overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection.</li> <li>• Should consists of set of Instructor Guide &amp; Student Workbook.</li> </ul> <p>Interfacing panels: Aluminum profile sturdy Flat panel system carrying various high voltage components housed in modular plastic enclosures to minimize shock possibility.</p> <p>Input 3 phase DOL Starter panel Should consists of</p> <ul style="list-style-type: none"> <li>• 4 pole MCB of 415 V/4A .</li> <li>• DOL 9A Contactor with 230V / 50 Hz / 11VA COIL</li> <li>• Bimetallic thermal O/L relay with range 2.5A -6A FWD-OFF-REV, Switch Panel Should consists of</li> <li>• FWD/REV, 3 pole 3 way switch with center OFF, 6A/440V.</li> </ul> <p>3 Phase Bidirectional Power cum Energy meter panel Should consists of</p> <ul style="list-style-type: none"> <li>• Bidirectional Multifunction</li> <li>• 3 phase 3/4 wire, 415VAC, CT Input 5A</li> <li>• LCD/LED display, Aux. supply 230V, 45-65Hz,5W, • V, I, Hz, Pf, KVA, KW, KWH.</li> <li>• Modbus RTU RS 485 connections.</li> </ul> <p>VAR Compensation panel (dual panel) Should consists of VAR compensating capacitors of 2, 4, 6, 8, 10 &amp; 15<math>\mu</math>F each of 3 nos with 3 pole 7 way switch for selection.</p> <p>Transmission line Panel - Table Top Panel should consisting of :</p> <ul style="list-style-type: none"> <li>• Simulated model for transmission line (250kms) using R(10 ohm/600W), L(0.15H/5A) &amp; C (2.2uF/630V) 6 No. each component.</li> <li>• Simulated model for medium/long length transmission line for Pi model.</li> <li>• Simulated model for medium/long length transmission line for T model</li> </ul> <p>Optionally 2 transmission line panels supplied to simulate up to 500kms length.</p> <p>RLC load panel - Table Top Panel should consisting of :</p> <ul style="list-style-type: none"> <li>• 3 nos of 600W resistors with switch selectable 7 nos of taps at 100, 112, 125, 150, 175, 200 &amp; 225.</li> <li>• 3 nos. of inductor 1.5H/1A with switch selectable 6 nos of taps at 0.3, 0.6, 0.75, 0.9, 1.2 &amp; 1.5H.</li> <li>• Capacitors 440VAC rating (3 nos, one per phase) with switch selectable 7 nos of value of 2, 5, 10, 15, 20, 30 &amp; 50<math>\mu</math>F.</li> <li>• 3 phase dimmer/variatic panel – Table top panel should consisting of 3 phase dimmer I/P : 415VAC, 50Hz, OP : 0-470VAC, 6A, 3 phase</li> </ul>
9	Transmission Line Trainer	<p>Technical Specifications:</p> <ul style="list-style-type: none"> <li>• Should consists of a few set of associated panels (7-8 nos. typically) which should be mounted in a light weight sturdy aluminium profile flat demo panel system.</li> <li>• Should consists of easy and safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords and shrouded socket arrangements for high voltage circuits</li> <li>• Should consists of ABS moulded plastic sturdy enclosure, and colourful screw less overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding and connection.</li> <li>• Should consist of a set of Instructor Guide &amp; Student Workbook.</li> </ul> <p>Interfacing panels: Aluminium profile</p>

		<p>sturdy Flat panel system carrying various high voltage components housed in modular plastic enclosures to minimize shock possibility. Input 3 phase DOL Starter panel Should consists of</p> <ul style="list-style-type: none"> <li>• 4 pole MCB of 415 V/4A</li> <li>• DOL 9A Contactor with 230V / 50 Hz / 11VA COIL</li> <li>• Bimetallic thermal O/L relay with range 2.5A -6A FWD-OFF-REV, Switch Panel Should consists of</li> <li>• FWD/REV, 3 pole 3 way switch with center OFF, 6A/440V.</li> </ul> <p>3 Phase Bidirectional Power cum Energy meter panel Should consists of</p> <ul style="list-style-type: none"> <li>• Bidirectional Multifunction</li> <li>• 3 phase 3/4 wire, 415VAC, CT Input 5A</li> <li>• LCD/LED display, Aux. supply 230V, 45-65Hz,5W,</li> <li>• V, I, Hz, Pf, KVA, KW, KWH.</li> <li>• Modbus RTU RS 485 connections.</li> </ul> <p>VAR Compensation panel (dual panel) Should consists of VAR compensating capacitors of 2, 4, 6, 8, 10 &amp; 15<math>\mu</math>F each of 3 nos with 3 pole 7 way switch for selection.</p> <p>Transmission line Panel - Table Top Panel should consisting of :</p> <ul style="list-style-type: none"> <li>• Simulated model for transmission line (250kms) using R(10 ohm/600W), L(0.15H/5A) &amp; C (2.2<math>\mu</math>F/630V) 6 No. each component.</li> <li>• Simulated model for medium/long length transmission line for Pi model.</li> <li>• Simulated model for medium/long length transmission line for T model</li> </ul> <p>2 transmission line panels supplied to simulate up to 500kms length. RLC load panel - Table Top Panel should consisting of :</p> <ul style="list-style-type: none"> <li>• 3 nos of 600W resistors with switch selectable 7 nos of taps at 100, 112, 125, 150, 175, 200 &amp; 225.</li> <li>• 3 nos. of inductor 1.5H/1A with switch selectable 6 nos of taps at 0.3, 0.6, 0.75, 0.9, 1.2 &amp; 1.5H.</li> <li>• Capacitors 440VAC rating (3 nos, one per phase) with switch selectable 7 nos of value of 2, 5, 10, 15, 20, 30 &amp; 50<math>\mu</math>F.</li> <li>• 3 phase dimmer/variatic panel – Table top panel should consisting of 3 phase dimmer I/P : 415VAC, 50Hz, OP : 0-470VAC, 6A, 3 phase</li> </ul>
10	Digital earth resistance tester	<p>Digital Earth Resistance tester Earth Resistance range: 0-10/100/1000 ohm Display: Backlit LCD Multimeter Function range: 200 K ohm, 750V AC, 1000V DC Sampling rate: 2.5 times per second Data hold facility Lock facility Accessories: 4 sets Test Kits, 4 pcs rods, 6 pcs battery, hard carrying case, manual</p>
11	CLAMP METER	<p>Digital AC DC Clamp meter 3 ¼ Digit Hz Function: 9999 Counts LCD Display Jaw opening &amp; conductor Dia: 51 mm Sampling rate: 3 times per sec DC/AC Current Max Range: 1000A DC Voltage: 1000 V</p>
12	Digital Multimeter	<p>3 ½ Digit Digital Multimeter DC Voltage 200mV/2/20/200/1000V Accuracy <math>\pm(0.5\%rdg+1dgt)</math> on all ranges AC Voltage 200/750V (50-500Hz) Accuracy <math>\pm(1\%rdg+4dgt)</math> on 200V <math>\pm(1.5\%rdg+4dgt)</math> on 750V DC Current 200mA/2mA/20mA/ 200mA/10A Accuracy <math>\pm(1\%rdg+1dgt)</math> on all ranges except <math>\pm(2\%rdg+3dgt)</math> on 10A Resistance 200V/2kV/20kV/200kV /2MV Accuracy <math>\pm(0.8\%rdg+1dgt)</math> on all ranges, except <math>\pm(1\%rdg+3dgt)</math> on 200V Sp. Function Audible Continuity, Diode Check, hFE Test Data Hold &amp; Backlight Display</p>
13	Air Circuit Breakers, Digital Protection	<p>Air Circuit Breaker trainer The Trainer should have following features</p> <ul style="list-style-type: none"> <li>• The trainer has built in requisite relay testing kit typically</li> </ul>

	<p>Relays &amp; Protection and Measurement Devices</p>	<p>consisting of voltage injector, current injector, elapsed time counter (1 msec resolution), trip logic etc. all mounted in a light weight sturdy aluminum profile flat demo panel system. Do not need any separate relay testing kit. • Facilitates easy &amp; safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords &amp; shrouded socket arrangements for high voltage circuits • Each panel has ABS molded plastic sturdy enclosure, &amp; colorful screw less overlays showing circuits diagrams &amp; its connection tag numbers for easy understanding &amp; connection • Set of Instructor Guide &amp; Student Workbook • Trainer should be modular panels for easy site servicing not close control; panel box no wiring should not be there &amp; shrouded 4 mm banana patch cords &amp; shrouded sockets arrangements for the safety of the students Technical Specifications The Trainer should have Aluminum profile sturdy Modular flat panel (table top) system, carrying various high voltage components housed in plastic enclosures (panel) to minimise shock possibility Control Power Supply &amp; 1 Ph. AC Distribution Panel • +12V, -12V, 500mA • +5V, 300mA • Unregulated 17VDC/750mA Variable voltage &amp; current injector panel • Consist of 1 phase dimmer 230VAC/1A • Short circuit transformer with primary 230VAC/1A, secondary 0-2-8V/12A taps. Over current &amp; elapsed time measurement panel • Consists of AC ammeter of 20A • Elapsed time counter range 999.001 sec, resolution 1 msec. Fuse &amp; MCB Panel • Kitkat Fuse - 2Amp • MCB - 2Amp Hall Sensor Based Zero Current Detector Panel AC/DC current hall sensor (x2nos, ): Closed Loop current measurement using Hall sensor IC (max. I/P upto 20A, 50/60Hz), Isolation = 2.1KV, Proportional O/P = 0 - 2.5V, 1 CH . DC Voltage transducer (x2 nos, one ): Using high speed opto coupler IC (max. up to 600Vdc), isolation = 2 KV, 1 CH . Function Blocks Used : Precision rectifier (x 2 nos) with gain = 5, LPF (x2nos) with gain = 2, Span Zero Circuit to interface with ADC(0-2.5Vdc) for both current &amp; voltage, only 1 functional block each supplied, 2nd , field failure / zero current detector with Relay NO-NC Contact. Air Circuit Breaker (ACB)- Table top • ACB 3ph, 440V, 3 pole, 50Hz, fixed type • Rated current- 400A • Rated voltage- 415V • Rated S.C. breaking- 50KA • Rated (S.T.) with stand capacity 1sec- 50KA</p>
14	Distributed System lab	<p>1. Radial And Ring Main Distribution System Technical Specification: • Simulates 2 &amp; 3 wire DC transmission line &amp; study load distribution under various conditions. • Operates at scaled down <math>\pm 12V</math> voltages for convenience of learning without shock. high voltage (<math>\pm 200V</math>) setup offered. • Facilitates easy &amp; safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords &amp; shrouded socket arrangements for high voltage circuits. • Aluminum profile Sturdy (5x4) Modular Flat Panel system, carrying various components housed in plastic enclosures (panels) with colorful screwless overlays showing circuit schematic &amp; its connection tag numbers for easy understanding &amp; connection. • Set of Instructor Guide &amp; Student Workbook. • Results can be verified using PC based simulator Variable power supply panel x 4 Nos • 1 pole MCB of 230V/2A. • Fixed +12V, -12V, 500 mA,</p>

		<p>+5V/300mA power supply. • Power ON LED indicator Digital DC voltmeter &amp; ammeter panel x 14 Nos • DC voltmeter 0-50V. • DC ammeter 0-5A DC transmission line panel • Simulated model for transmission line constructed using 12 numbers of 0.22E/10W resistors to construct 2/3 wire Short, Medium &amp; Long DC transmission lines. Input 3 phase DOL starter panel •4 pole MCB of 415 V/4A. RYB three color phase indicators. •DOL 9A trip Contactor with 230V / 50 Hz / 11VA COIL. •Bimetallic thermal O/L relay with range 1.4A - 2.3A. Load panel •Consists of 5 numbers of 25E/20W resistors &amp; 12V/2W light bulbs each to load transmission line at various nodes.</p>
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## CHECK-LIST (TECHNICAL BID)

### SUMMARY OF COMPLIANCE TO REQUIREMENT OF TENDER

Sl. No.	Description of Requirement	Yes / No / NA	Page No.
1.	Copy of Manufacturer/ Authorized Supplier Certificate		
2.	Audited financial statement for the last 3 years		
3.	Copy of the PAN card.		
4.	Copy of GST registration certificate		
5.	Copies of previous work order of similar work with completion certificate		
6.	Declaration certificate		
7.	No Deviation certificate		
8.	Bidder's details		
9.	Technical Specification		
10.	NSIC/SSI/MSME Certificate where applicable		
11.	All the pages of tender document have been signed		
12.	Price bid in separate sealed envelope.		
13.	Complete copy of Quotation in the format given along with the Price Bid.		

**(Signature & seal of the contractor)**

Place:

Date:



**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)
<b>Total Cost</b>							

Gross Total Cost (A+B): Rs. \_\_\_\_\_

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. \_\_\_\_\_