



MAHARSHI DAYANAND UNIVERSITY, ROHTAK

(A State University established under Haryana Act No. XXV of 1975)

NAAC Accredited (A+) Grade

University Institute of Engineering and Technology

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BIDDING DOCUMENT FOR PURCHASE OF LAB EQUIPMENTS IN ELECTRICAL ENGINEERING DEPARTMENT

PART-1: COMPLETE BIDDING DOCUMENT

Name of Work: PURCHASE OF LAB EQUIPMENTS IN UIET,
M.D.UNIVERSITY, ROHTAK.

PRESS NOTICE

MAHARSHI DAYANAND UNIVERSITY, ROHTAK	
Notice Inviting Short Term E-Tender	
Name of Work:	PURCHASE OF LAB EQUIPMENTS IN ELECTRICAL ENGINEERING
Estimated Cost:	Rs.15.38 lacs
Earnest Money:	i) 2% of the Quoted Amount
Time Limit	21 days
e-Tenders to be uploaded upto 21.03.2022 at 03.00 P.M.	
i) The tenders will be received only through e-tendering. For further details visit website https://www.etenders.hry.nic.in	
ii) Cost of Bid document is Rs.3000/- (non refundable) which will be deposited through online mode from https://etenders.hry.nic.in	
iii) Earnest Money (as mentioned above) will be deposited through online mode (https://etenders.hry.nic.in)	
iv) Willing bidders shall have to pay Rs.1180/- as the e-Service/ Processing Fee through online mode (https://etenders.hry.nic.in)	
v) The interested parties/bidders should visit the University website (https://www.mdu.ac.in) or https://etenders.hry.nic.in regularly for corrigendum(s) which may be issued regarding extension of date, modification of eligibility or amendments in other terms & conditions etc., as corrigendum(s) will not be published in newspapers.	
vi) The Bidder who is registered as MSME of Haryana State only for the same work are exempted from payment of EMD but Bidder will have to submit an affidavit to this effect as per Annexure-I available on the website of Department of Industries & Commerce, Govt. of Haryana.	

REGISTRAR,
M.D. University, Rohtak

DETAILED NOTICE INVITING SHORT TERM E-TENDER

E-Tender is invited for purchase of below mentioned item in single stage two cover system i.e. request for Pre-Qualification/Technical Bid (online Bid under PQQ/Technical Envelope) and request for Commercial Bid (comprising of price bid proposal under online available commercial Envelope):

Sr. No.	Name of work	EMD to be deposited by bidder	Tender Document Fee & E-Service Processing fee (non Refundable)	Start date & time of Bid Preparation & Submission	Last Date & time of Bid Preparation & submission
1.	PURCHASE OF LAB EQUIPMENTS as mentioned in Annexure-I	2% of the quoted Amount	Rs.3000/- for Tender/Bid Document Fee and Rs.1180/-for e-Service/ Processing fee	10.03.2022 (02.00 PM)	21.03.2022 (03.00 PM)

1. Any clarification regarding the detailed notice inviting tender can be sought from the Director(UIET) during office hours at **8295088199** or E-Mail: **dir.uiet@mdurohtak.ac.in**
2. Tender document is available on website <http://etenders.hry.nic.in> and <https://www.mdu.ac.in>
3. The Bidders would submit bid through e-Tendering only on the website <http://etenders.hry.nic.in>

Under the process, the Pre-qualification / Technical online bid application as well as online Price Bid shall be invited at single stage under two covers i.e. PQQ/Technical & Commercial Envelope. Eligibility and qualification of the Applicant will be first examined based on the details submitted online under first cover (PQQ or Technical) and with respect to eligibility and qualification criteria prescribed in this Tender document. The Price Bid under the second cover shall be opened for only those Applicants whose PQQ/Technical Applications are responsive to eligibility and qualifications requirements as per Tender documents. The tenderer should read the terms & conditions and specification in tender documents strictly before submission of e-tender. Tender documents can be downloaded/uploaded online on the Portal: <http://etenders.hry.nic.in>

1. The payment of Tender Document fee as well as EMD and e-Service/Processing Fee shall be made by eligible bidders through online mode only from <https://etenders.hry.nic.in>
2. The interested bidders will be mandatorily required to online sign-up (create user account) on the website <https://www.etenders.hry.nic.in> to be eligible to participate in the e-tender.
3. The Bidders can submit their tender documents (Online) as per the dates mentioned in the key dates:-

Key Dates

Sr. No.	Department Stage	Bidder's Stage	Start date & time of bid submission	Last date & time of bid submission
1		Tender Document Download and Bid Preparation / Submission	10.03.2022 (02.00 PM)	21.03.2022 (03.00 PM)
2	Technical Bid Opening		22.03.2022 at 11.00 A.M.	
3	Financial Bid Opening		After evaluation of the Technical Bids	

Important Note:

- 1) The Applicants/bidders have to complete 'Application / Bid Preparation & Submission' stage on scheduled time as mentioned above. If any Applicant / Bidder fails to

- complete his / her aforesaid stage in the stipulated online time schedule for this stage, his / her Application / Bid status will be considered as 'Application / Bid not submitted'.
- 2) Applicant / Bidder must confirm and check his/her bids even after completion of his/her all activities for e-bidding.
 - 3) Applicant/Bidder can rework on his / her bids even after completion of 'Application/Bid Preparation & submission stage' (Application/Bidder Stage), subject to the condition that the rework must take place during the stipulated time frame of the Applicant/Bidder Stage.
 - 4) In the first instance, the online payment details of tender document fee + e-Service Fee and EMD and PQQ/Technical Envelope shall be opened. After that the financial bid quoted against each of the item by the shortlisted bidder/agency wherever required shall be opened online and if the bidders want to participate, they are welcomed to participate during the process. The bidder has to submit online Bids as per the dates mentioned in the scheduled/Key dates above.
 - 5) The bids shall be submitted online in two separate envelopes:-

Envelope 1: Technical Bid

The bidders shall upload the required Eligibility & Technical Documents online in the Technical Bid.

Envelope 2: Commercial/Financial Bid

The bidders shall quote the prices in Price Bid format under Commercial/Financial Bid.

Conditions:-

- 1- The tenderer will keep in touch with the University Website for any change in the DNIT till the last date/revised last date of online invited tender and incorporate such changes in DNIT and the tender bids.
4. DNIT and prequalification criteria can be seen on the Haryana Govt. portal (<https://www.etenders.hry.nic.in>) or on the University website (www.mdu.ac.in) and for any clarification regarding the detailed notice inviting tender can be sought from the Director(UIET)) during office hours at **8295088199** or E-Mail: **dir.uiet@mdurohtak.ac.in**
- 2- Conditional tenders will not be entertained & are liable to be rejected.
- 3- In case the day of opening of tenders happens to be holiday, the tenders will be opened on the next working day. The time and place of opening of tenders and other conditions will remain unchanged.
- 4- The University reserve the right to reject any tender or all the tenders without assigning any reasons.
- 5- The societies shall produce an attested copy of the resolution of the Executive/Governing body for the issuance of tenders.
- 6- The Jurisdiction of court will be at **Rohtak**.
- 7- The tender of the bidder who does not satisfy the eligibility/qualification criteria in the bid documents are liable to be rejected summarily without assigning any reason and no claim whatsoever on this account will be considered.
- 8- The bid for the contract shall remain open for acceptance during the bid validity period to be reckoned from the last date of submission of the tender. If any bidder/tenders withdraws his bid/tender before the said period or makes any modification in the Terms and Conditions of the bid, during the fix validity period, the Earnest Money shall stand forfeited. Bids shall be valid for three months from the date of bid closing i.e. from last date of submission of EMD. In case the last day to accept the tender happens to be holiday, validity to accept tender will be the next working day.

- 9- Any work/order, here tendered, may be withdrawn from further processing at any stage at the discretion of the competent authority without assigning any reason.
- 10- The **Committee constituted by the CPC / VC** is competent to increase/decrease the quantity of items without any prior intimation. In case of decrease of quantity of items, the bidder shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work/order in full.
- 11- The University reserves the right to accept or reject or negotiate any of the tender or conditions/items without assigning any reason.
- 12- The Earnest Money (EMD) of the successful agency / firm shall be returned on completion of all the Tender process.
- 13- In case of any dispute relating to this contract, the matter shall be referred to the Arbitrator to be appointed by the Vice-Chancellor whose decision shall be binding on both the parties.
- 14- Rates should be carefully filled-up both in words and figures without any cutting, erasing or overwriting.
- 15- In case the firm / agency quoting the lowest rates declines to accept the offer, the Earnest Money (EMD) of such firm shall be forfeited and firm shall be blacklisted by the University for any kind of dealing in future.
- 16- Any other conditions as may be deemed appropriate shall be announced at the time of Opening of Tenders in the presence of Bidders.
- 17- The agency / firm shall also append the following declaration with the tender:-

DECLARATION

I/We (Name) of the firm _____ do hereby solemnly affirm and declare that the facts stated in the Technical Bid are correct and true to the best of my / our knowledge and belief and nothing has been concealed therein. In case of any concealment or misrepresentation detected at any stage, I/We will be liable for legal action under Section 182 and Section 415 read with Section 417 and 420 of the Indian Penal Code as the case may be.

Place: _____

Dated: _____

(Signature of the Tenderer)

with full name and Address

with seal & stamp

Director(UIET)
M.D. University, Rohtak

TERMS AND CONDITIONS GOVERNING THE TENDERS FOR THE SUPPLY

1. Every e-tender shall be accompanied by the **Earnest Money 2% of the quoted amount** and **Rs.3000/- as tender fee** and **Rs.1180/- the e-service fee** should be deposited **through online mode only**.
2. The e-tender received without earnest money or after the due date shall not be entertained except with the special approval of the competent authorities.
3. **The e-tenders shall be opened in the office of Director (UIET), M.D. University, Rohtak on 22.03.2022 at 11:00A.M. by the Purchase Committee.** The quotes or their authorized representatives are allowed to attend the meeting of the Tender Opening Committee at their own costs.
4. The goods shall be supplied by the Supplier within the time limit specified in the supply order. **In case, the material is not supplied within the delivery period, the supplier shall be liable to pay the University the compensation amount equivalent to 1% (one percent) of the cost of material each day or such other amount as the CPC/Asstt. Registrar (P&S) may decide till the supply remains incomplete, provided that the total amount of compensation shall not exceed 10% (ten percent) of the total amount of the cost of material supplied.** Appeal against these orders shall, however, lie with the Vice-Chancellor, M.D. University, Rohtak whose decision shall be final.
5. **The following charges and terms may be spelt out in your offer clearly:-**
 - i. **F.O.R shall be University Main Store, M.D.University, Rohtak.**
 - ii. **Rates of VAT/Excise Duty (in per cent), if any. Please note that the University does not issue Form 'C' or 'D'**
 - iii. **Payment terms.**
 - iv. **Delivery period.**
 - v. **Guarantee/Warranty period.**
 - vi. **After-sales service.**
 - vii. **Installation charges, if any.**
 - viii. **Validity period of the tender.**
 - ix. **Bank Draft charges, if any.**
 - x. **Misc. charges such as Packing & Forwarding charges, Insurance charges, etc., if any.**
7. Only the firm(s) which has possessed the GST No. can quote their rates for required items.
8. **HSN Code if applicable must be entered in the hard copy while quoting the rates.**
9. **All the charges including packing, forwarding and installation, taxes and other levies should be specified in the tender. if any extra charges not specified in the tender shall not be paid.**
10. **The EMD, tender fee etc. exemption be allowed for those MSMEs registered with Govt. of India (Ministry of Micro Small and Medium Enterprises)who are having manufacturing unit located in State of Haryana (as per Haryana State Public Procurement Policy for MSMEs 2016 vide G.O. No. 02/02/2016-41B11(1) dated 20/10/2016).**
11. The quantity of material/supplies shall be subject to increase or decrease on the tendered rates. This increase or decrease shall be communicated by the University within 180 days of acceptance of the tender.
12. Supplies shall be made as per the schedule and within such time as is indicated in the supply order.
13. The rates accepted by the University shall be applicable up to 180 days and the supplier shall have to make supply during the period as and when required.
14. The University is situated within the Municipal Limits. As such, Octroi, if any, shall be payable. In case, the material is supplied through a Transport Company by road, the Transport Company's charges, labour charges and octroi charges shall be borne by the supplier. It may be

mentioned specifically as to whether the material will be sent by rail or by road through a Transport Company.

15. Guarantee/warrantee of items must be mentioned.
16. **The University is registered with the Department of Scientific & Industrial Research, Ministry of Science & Technology, New Delhi in terms of Govt. Notification No. 10/97-Central Excise dated 1 March, 1997 and Notification No. 51/96-Customs dated 23.7.1996 vide Registration No. TU/V/RG-CDE(244)/2020 dated September, 18,2020 upto 31-08-2025. Thus the University is exempted from payment of Custom Duty and Excise Duty. The consignee shall issue necessary certificates duly countersigned by the Registrar, M.D. University, Rohtak to avail of exemption.**
17. No tender documents will be issued separately and rates are to be offered on company's letter pad.
18. If a holiday occurs on the opening day, the tenders will be opened on the next working day.
19. The packing, forwarding, freight, insurance charges etc. may be quantified in terms of amount. These charges will not be payable against such vague statement as "packing, forwarding, freight and insurance charges etc. extra".
20. In case, the supplier/contractor fails to execute the supply order/contract on the rates, and terms and conditions as contained in the supply order within the stipulated period, they shall be liable to such action as blacklisting, debarring from having any business with this University, forfeiture of earnest money/security, besides any other action as may be deemed proper by the University.
21. As a general policy, the University tries to make 100% payment as early as possible after the receipt of the material subject to proper installation, wherever applicable, and satisfaction of the Inspection Committee. No advance payment or payment against documents negotiated through Bank shall be made.
22. The acceptance of the material shall be subject to satisfactory report of this Office's Inspection Committee/Technical Committee/Experts Committee.
23. The samples of the material, if necessary and possible, shall be supplied with the tender. The unapproved samples shall be collected on receipt of information failing which the same shall be dispatched by Goods Carrier on your risk with the condition of "**Freight to Pay**". Samples **costing less than** Rs. 100.00 shall not be returned to the **quotees**. However, if the **quotees** wish to take the same back, it can be collected at their own cost within a period of one month, failing which the samples will be disposed off.
24. The acceptance of the tender shall rest with the Registrar who does not bind himself to accept the lowest tender and reserves the right to reject any or all items of tender without assigning any reason thereof. The Registrar also reserves the right to accept tender in part i.e. any item or any quantity and to reject it for the rest.
25. It may be certified that you have not been debarred/blacklisted for any reason/period by DGS&D, DS&D (Haryana) or any other Central/State Govt. Dept./University/PSU etc. If so, particulars of the same may be furnished. Concealment of facts shall not only lead to cancellation of the supply order, but may also warrant legal action.
26. In case, any other information/clarification is required, the undersigned may be contacted at Telephone No. 9050805136 on any working day (Monday to Friday) during office hours (9 a.m. to 5.00 p.m.).
27. The Sub Committee reserves the right for negotiation thereafter if considered necessary.

28. The items be purchased from the firm(s) on the basis of quality and not merely on the lowest rates.
29. The rates should be quoted for required specifications. The technical specifications equipment's required must accompany the tender. The decision of the University will be final with regard equipment's to be purchased.
30. The tender should be submitted only if the material is readily available in your stock or can be supplied within 15 days after the order is placed.
31. The bidder should possess minimum 3 years' experience in direct supply, installation, testing and commissioning of similar equipment's / software's and support to the Govt. / PSU / reputed institutions. Proof of the direct dealership details i.e OEM Authorization letter / dealership certificate for supply along with prime customers contact details and photocopies of purchase orders and / or installation report, to whom the similar products have been supplied by the tender, is required to be submitted along with the technical bid.
32. Terms and conditions printed on tender/Invoice of the firm, if any, shall not be binding on the University, except those mentioned specifically on the supply order of MDU, Rohtak, and your acceptance of the order shall be construed as your agreement to all the terms and conditions contained in the order.
33. The acceptance of the tender shall rest with the undersigned who does not bind himself to accept the lowest tender and reserve the right to reject any or all items of tender without assigning any reason therefore. The undersigned also reserves the right to accept tender in part i.e any item or any quantity and to reject it for the rest.
34. EMD of unsuccessful bidders will be returned subsequently. No interest shall be paid on EMD.
35. The dispute, if any, shall be subject to the jurisdiction of Courts at Rohtak. Any other jurisdiction mentioned in the tender or invoices of the manufacturers/distributors/ dealers/suppliers etc. shall be invalid and shall have no legal sanctity.

Director(UIET)

The above terms & conditions of the University mentioned at Sr. No.1 to 35 are acceptable.

Signature of the Authorized signatory of the firm (With seal/stamp of the firm)

TECHNICAL DOCUMENT

Sr. No.	Description	Bidders Response (Yes/No)	Remarks
1.	Copy of PAN Card / GST No.		

2.	Copy of latest Income Tax Return alongwith last two years ITR certified by the Chartered Accountant. (total Three years ITR certified by Chartered Accountant)		
3.	List of institutions where the LAB EQUIPMENTS IN as mentioned in Annexure-I has been supplied, if any		
3.	Satisfactory report regarding the supply of items from University / institutions where supply		
4.	Name and address of the agency / bidder / manufacturer / supplier, etc.		
5.	Name of Contact person of the agency / bidder / manufacturer / supplier with phone number and e-mail id		
6.	The bidder should submit a proof of having an average turn-over of Rs.30 lac or above for during the last three years relating to manufacturing/supply of supply of LAB EQUIPMENTS as mentioned in the annexure -I . Proof to be duly certified by a registered Chartered Account is required		
7	Affidavit on non-judicial stamp paper duly attested by 1 st Class Magistrate to the effect that they have not been debarred / blacklisted by any State Government / Central Government / PSU Department in India / Public or Private Institute / Organization as Annexed-II .		

SPECIFICATIONS OF ITEMS TO BE PROCURED

TRANSMISSION AND DISTRIBUTION LAB

Sr. No	Items Specifications	Qty Nos
1	<p>Radial, Ring, Interconnected distribution system</p> <p>The Trainer should have following features:</p> <p>Technical Specifications</p> <p>Input 3 phase DOL Starter panel</p> <ul style="list-style-type: none"> •4 pole MCB of 415 V/20A. •DOL 16A Contactor with 24DCV / 11VA COIL •Bimetallic thermal O/L relay with range 9A - 15A •RYB inputs indicators. •Manual start / stop with local trip contact •Power ON LED indicator <p>Phase Bidirectional Power cum Energy meter panel</p> <ul style="list-style-type: none"> •Bidirectional Multifunction •3 phase 3/4 wire, 415VAC, CT Input 5A •LCD/LED display, Aux. supply 230V, 45-65Hz,5W •Measure V. I., Hz, Pf, KVA, KW, KWH <p>Aux power supply panel X 1 No.</p> <ul style="list-style-type: none"> •9 pin D type female connectors 9 nos. to supply Aux power to respective switching bays. •Power ON LED. <p>In feeder Panel</p> <ul style="list-style-type: none"> •Consisting of 3-isolator switches, •Circuit breaker, Main bus, Reserve bus, Feeder. •9 pin D connector to supply 24V Aux power for CB operation. •Manual start / stop with local trip contact. <p>Bus Coupler Panel X 2 Nos.</p> <ul style="list-style-type: none"> •Consisting of Circuit breaker, Main bus, Reserve bus. •9 pin D connector to supply 24V Aux power for CB operation. •Manual start / stop with local trip contact 	<p>01</p> <p>No.</p>

Out feeder Panel

- Consisting of 4-isolator switches,
- Circuit breaker, Main bus, Reserve bus, Transfer bus/Earth switch, Feeder.
- 9 pin D connector to supply 24V Aux power for CB operation.
- Manual start / stop with local trip contact

Section Coupler Panel X 1 No.

- Consisting of 2 Circuit breakers, Main bus, Reserve bus.
- Supply 24V Aux power for CB operation.
- Manual start / stop with local trip contact

Table top panels**Transmission line panel**

3 MW scaled down by (1000:1) TLS, 5A max. rated.

- Consisting of 5 numbers of transmission lines of different lengths.
- 2 Transmission lines of 0.3pu for 125Km.
- 2 Transmission lines of 0.2pu for 75Km.
- 1 Transmission line of 0.13pu for 50Km.

RLC load Panel

- 3 nos of 600W resistors with switch selectable 6 nos of taps at 100, 112, 150, 175, 200 & 225 ohm.
- 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 & 1.5H.
- Capacitors 440VAC rating (3 nos, one per phase) with switch selectable 7 nos of value of 2, 5, 10, 15, 20, 30 & 50 μ F.

Accessories:**Cables:**

- i) 9 pin D male to 9 pin D female with 9 core cable, length up to 6 meter - 9 nos.

The Trainer should be capable of performing following experiments :

- i) Single busbar operation with two incoming feeders.
- ii) Double busbar operation with two incoming feeders.
- iii) Busbar change without interruption.
- iv) 3 bus power flow study.
- v)4 bus power flow study.

2	<p>Transmission Line parameter kit L & C</p> <p>Circle Diagram of Transmission Line Trainer.</p> <p>Receiving & Transmitting</p> <p>Short, Medium & Long Transmission Line</p> <ul style="list-style-type: none"> • Simulates 400 KV, 50 / 60Hz, 3 Phase 1MVA. Transmission Line by scaling it down by 1000:1. second TL may be supplied for 3 bus experiments. <p>Technical Specifications</p> <p>Input 3 phase DOL Starter panel</p> <ul style="list-style-type: none"> • 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 <p>FWD-OFF-REV, Switch Panel</p> <ul style="list-style-type: none"> • FWD/REV, 3-pole 3 way switch with center OFF, 6A/440V. • Integrated AC 3 phase measurement panel • Bidirectional Multifunction Meter • 3 Phase 3/4 wire, 415V, CT Input 5A • LCD/LED display, Aux supply 230V, 45-65 Hz, 5W • V.I., Hz, Pf, KVA, KW, KWH • Modbus RTU RS 485 <p>VAR Compensation panel</p> <ul style="list-style-type: none"> • Consisting of VAR compensating capacitors of 2, 4, 6, 8, 10 & 15μF each of 3 nos with 3 pole 7 way switch for selection. <p>Transmission line Panel Table Top Panel consisting of :</p> <ul style="list-style-type: none"> • Simulate model for transmission line constructed using R(10ohm/600W), L(0.15H/5A) & C (2.2uF/630V) 6 No. each component. • Can Simulate model for medium/long (125 km/250 km) length transmission line for p model. • Can Simulate model for medium/long (125 km/250 km) length transmission line for T model. • Fan cooled table top setup for long life. <p>RLC load panel</p> <p>Table Top Panel consisting of :</p> <ul style="list-style-type: none"> • 3 nos of 1KW resistors with switch selectable 1(off) + 6 nos. of 	2 Nos.

	<p>taps at 100, 112, 150, 175, 200 & 225 ohm & SIL tap of 262 ohm.</p> <ul style="list-style-type: none"> • 3 nos. of inductor 1.5H/1A with switch selectable 1(off) + 6 nos. of taps at 0.3, 0.6, 0.75, 0.9, 1.2 & 1.5H. • Capacitors 440VAC rating (3 nos, one per phase) with switch selectable 7 nos of value of 2, 5, 10, 15, 20, 30 & 50μF. • Fan cooled table top setup. <p>3 phase dimmer panel</p> <p>Table Top Panel consisting of :</p> <ul style="list-style-type: none"> • 3 phase dimmer I/P : 415VAC, 50Hz, O/P : 0 - 470VAC, 6A, 3 phase. <p>List of Experiments :</p> <ol style="list-style-type: none"> 1. Working with bi-directional 3 AC measurement panel, observing flow of real & reactive power & modbus communication with PC. 2. No load test & Ferranti effect. 3. Determination of transmission line constants (ABCD) by experimental measurement using 2-port method as well as by knowing components values & its verification. 4. Load Test & Calculation of Regulation, efficiency of Transmission Line by Laboratory measurement method. 5. Working with power circle diagram & to find steady state power limit of transmission line. 6. Capacitive VAR compensation 7. Per unit representation 8. Symmetrical & unsymmetrical faults in transmission line, LG fault with & without Petersen Coil. 9. Predicting Power Flow in Transmission Line (2 bus) by Numerical method [Newton Raphson / Gauss-Seidel Method/ Fast Decouple Method] 	
3	<p>HVDC link - Monopolar, Bipolar & homopolar</p> <p>High Voltage DC transmission line Trainer</p> <p>SALIENT FEATURES:</p> <ul style="list-style-type: none"> • Scaled down (1000:1) lab grade simulated monopole HVDC transmission line of 200KV@5KA/1000MW / 300Km. • Facilitates experimental verification of efficiency, watt & VAR control in HVDC transmission line. Concept learning of Monopolar, Bipolar & homopolar • Use of solid state Statcoms to control reactive power in the 	1 No.

grid, Fault ride through behavior of system.

Technical Specifications:

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 3A - 5A

3 Ph. Bidirectional power cum Energy meter panel

- True RMS, Bidirectional Multifunction meter
- 3 Ph. 3/4 wire, 415V, CT input 5A
- LCD/LED display, Aux supply 230V, 45-65 Hz, 5W
- V,I, Hz, Pf, KVA, KW,KWH

FWD-OFF-REV switch panel

- FWD/REV, 3 pole 3 way switch with centre OFF, 6A/440V

Instrumentation Power supply cum Multichannel DPM panel

- 1 Ph. MCBs of 4A/1.6A x 3 Nos.
- +12 V, -12V, 500 mA, +5V, 300mA, Unregulated 17VDC /750 mA , line synchronizing signal.

3 P/PI controller panel

- Provided with built in 3 nos. of P/PI controller blocks with O/P +/-9V. 2 nos. of PI controller block to control DC link voltage [0-200Vdc] & current [0-5A] on converter side and 1 no. PI controller block to control DC link current on inverter side.
- 3 nos. of level shifter to convert +/-9V to 0-2.5V.
- Bi-colour LED to indicate current control mode [CC] & voltage control mode [VC] for converter.

6 SCR Firing/Synchronizing Panel

- Cosine firing scheme to facilitate linear control for better harmonic ripple control.
- 6 SCR Power Module. Consist of 6 SCR [Body Anode Type] with PIV rating 1200V/25A.(Graetz Circuit)
- 6 No. of uncommitted Snubbers for protection of thyristors consisting of capacitor 0.1uF/1000V & 100E/5W ceramic resistors.

- 3 nos. of such double length panels are needed, one each for converter, for inverter & for solid state Statcom (TCR).

DC voltmeter and DC ammeter panel

- DC voltmeter (0-300V)
- DC Ammeter (0-5A) with polarity protection diode
- Thermal over current protection relay 6A.

Hall Sensor based AC/DC Current Measurement Expt. 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): Using high speed opto coupler IC (max. up to 600Vdc), isolation = 2 KV, 1
- 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 and voltage, only 1 functional block each supplied, Field failure/zero current detector.

Table top panels:

DC transmission line panel]

- DC transmission line consisting of 10ohm/600W resistor.
- Smoothing reactor with tapping at 0-0.15-0.3-0.375-0.45-0.6-0.75H/5A with 3 pole 7 way switch for selection, total 6 taps + 1 off position.

415/110V/3KVA Three Phase Transformer panel

- Used for Isolation & step down transformer
- 3 phase / 3KVA transformer (Yy0).
- Primaries: 3 Nos. Isolated, 0-415/4A at 50Hz brought out on 3 x 4 sockets.
- Secondaries: 3 Nos. Isolated windings groups, main 110V/5A, zigzag 110V/5A, Tertiary 220V/1A brought out on 4 x 3 x 3 sockets.
- Two such transformers are mounted in one box, one for converter & other for inverter.

RLC load panel

- 3 nos of 1KW resistors with switch selectable 1(off) + 6 taps at 100, 112, 150, 175, 200 & 225 ohm & SIL tap of 262 ohm.
- 3 nos. of inductor 1.5H/2.5A with switch selectable 1(off) + 6 taps at 0.3, 0.6, 0.75, 0.9, 1.2 & 1.5H.

	<ul style="list-style-type: none"> • Capacitors 440VAC rating (3 nos, one per phase) with switch selectable 7 nos of value of 2, 5, 10, 15, 20, 30 & 50μF. • Forced air cooling provided. • 2 numbers of such panels needed one for loading transmission line and other for Thyristor control reactor (TCR) solid state Statcom to control reactive power in the grid. <p>List of experiments:</p> <ol style="list-style-type: none"> 1) To study & determine efficiency & power losses in DC transmission line. 2) Study of watt control in DC transmission line. 3) Study of VAR control in DC transmission line. 4) Study of load sharing in DC transmission line. 5) Study of solid state Statcom using switched shunt capacitor (SSC/SVC) to manage VAR. 6) Study of solid state Statcom (TCR) to control VAR across load. 7) Use of Statcom in HVDC to control VAR into grid. 8) Fault ride through study in HVDC system for <ol style="list-style-type: none"> a) Voltage fluctuations in grid supply. b) Limited short circuit across DC link. 	
4	<p>Study of Different types of Cables Presented in a Board.</p> <p>Low Voltage Cable, High Voltage cable, Ferrite, etc</p>	1 No.

ELECTRIC CIRCUIT ANALYSIS LAB

SL. No	Item Description	Qty Nos
5	<p>Tellegen's Theorem and Compensation Theorem:</p> <ul style="list-style-type: none"> - (0-100) V Variable AC Voltage Source - One dependent source (CDCS, VDVS, CDVS and VDCS) - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Two Digital Panel Meter, one for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. - 	02 Nos.

6	<p>Two port parameter kit contain ladder network, T-Network and π-Network:</p> <ul style="list-style-type: none"> - To determine two port parameters like Z, Y, ABCD, hybrid, inverse hybrid and inverse ABCD. - (0-100) V Variable AC Voltage Source - (0-10) A Current source - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Two Port Network Two Digital Panel Meter, one for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. 	02 Nos.
7	<p>Nodal analysis and Mesh Analysis in ac circuit:</p> <ul style="list-style-type: none"> - (0-150) V Variable AC Voltage Source - (0-10) A Current source - One dependent source (CDCS, VDVS, CDVS and VDCS) - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Six Digital Panel Meter, three for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. 	02 Nos.
8	<p>Interconnection of Two Port Network:</p> <p>To connect two identical networks in:</p> <ul style="list-style-type: none"> - Series-Series - Parallel-Parallel - Series-Parallel - Parallel-series - Cascading - Two Voltage source one (0-150) V AC Voltage Source and other (0-100) V AC Voltage Source - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - By designing two identical T- Network and two identical π-Network on a kit. - Two Digital Panel Meter, one for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. 	02 Nos.

9	Transient Response of RLC Trainer: <ul style="list-style-type: none"> - Built in + 12V / 350mA DC Power Supply - Variable frequency Square wave - L, R & C Circuit, Sine Wave Generator - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of Patch Chords & Experimental Manual 	02 Nos.
10	AC Maximum Power Transfer theorem: <ul style="list-style-type: none"> - 120$\angle 0^\circ$ V AC Voltage Source - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Two Digital Panel Meter, one for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. 	02 Nos.
11	AC Reciprocity Theorem with meters <ul style="list-style-type: none"> - (0-150) V AC Voltage Source - (0-10) A Current source - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Two Digital Panel Meter, one for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords Experimental Manual 	02 Nos.
12	AC Superposition Theorem with meters <ul style="list-style-type: none"> - (0-150) V AC Voltage Source - (0-100) V AC Voltage Source - One dependent source (CDCS, VDVS, CDVS and VDCCS) - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Four Digital Panel Meter, two for Voltage and other for Current measurement. - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. 	02 Nos.
13	AC Thevenin's & Norton's Theorem with meters <ul style="list-style-type: none"> - (0-150) V AC Voltage Source - (0-10) A Current Source - One dependent source (CDCS, VDVS, CDVS and VDCCS) - Resistive Network-(2,4, 8, 10, 15, 20) Ohm - Inductor-(0.3, 0.6, 0.75, 1.2, 1.5) Henry - Capacitor-(2, 4, 6, 8, 10) μF - Two Digital Panel Meter, one for Voltage and other for 	02 Nos.

	<p>Current measurement.</p> <ul style="list-style-type: none"> - Assembled in Metal / Wooden Box with Screen Printed Circuit on Glass Epoxy PCB with 4mm Socket for test points & to measure the Voltage, - Set of patch Chords - Experimental Manual. 	
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Director, UIET
M. D. University, Rohtak

ANNEXURE-II

Undertaking (on Non Judicial stamp paper)

This is to certify that M/s _____, address _____ has not ever been debarred / blacklisted from any **by any School / Board / University / Organization / Government Agency, etc.** for any reason at any point of time and no legal case / proceedings is pending against the Agency as on date.

Place: _____

Dated: _____

Signature of the Tenderer
with full name and Address
with seal & stamp