

NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR

Silchar – 788 010 (ASSAM)

No: NITS-PS-532-EE-PS Lab-Relay Trainer-18(R)

Date: 02/05/2018

NOTICE INVITING TENDER

FOR SUPPLY AND INSTALLATION OF EQUIPMENT FOR EE DEPARTMENT AT NIT
SILCHAR



LAST DATE & TIME OF SUBMISSION : 13/06/2018 up-to 01.00 PM

DATE & TIME OF OPENING : 13/06/2018 at 03.30 PM



NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR - 788 010

Tel.No. Director: (03842) 224879

Fax: (03842) 224797

NOTICE INVITING TENDER

Adv. No: NITS-PS-532-EE-PS Lab-Relay Trainer-18(R)

Sealed Tender/Quotations are invited from reputed Firms/Agencies/Manufacturer/Authorized Dealer **FOR SUPPLY AND INSTALLATION OF EQUIPMENT FOREE DEPARTMENT AT NIT SILCHAR along with Earnest Money Deposit (EMD) @2% of the total bid value in the form of Demand Draft/Bank Guarantee in favour of "The Director, NIT Silchar", Payable at Silchar. No Interest shall be paid on EMD at the time of return.**

Detail specification of the item/items is given in **(Annexure – A)**.

Tender documents can be obtained from Purchase Section, NIT Silchar or may be downloaded from our website www.nits.ac.in or <http://eprocure.gov.in> **The cost of tender document is Rs.5,00/-** (Non-refundable) to be submitted in the form of DD in favour of The Director, NIT Silchar-788010, Payable at Silchar. The last date and time for submission of Tender document will be 13/06/2018 up-to **01.00PM** and tender will be opened on the same date at **03.30 PM** in office of HOD, EE Dept., NIT SILCHAR.

The offers without Cost of Tender & Earnest Money Deposit (EMD) shall be out rightly be rejected.

Director, NIT Silchar reserves the right to extend the date or cancel the tender, accept or reject any/all quotations or not to purchase all or any of the items.

Quotations are to be sent/submitted in sealed covers addressed to:-

**The Faculty-In-Charge, Purchase
National Institute of Technology, Silchar-788 010, Cachar, Assam
Email : purchasecell.nits@gmail.com**


REGISTRAR, NIT SILCHAR

NOTICE INVITING TENDER

Credential Criteria:

- 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. **Duly certified copies are to be enclosed.**
- 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 address of the firm submitting the quotation must appear distinctly on both the inner sealed covers, indicating also **TECHNICAL BID / PRICE BID** as may be applicable. The outer most cover shall be super scribed as
 - "QUOTATION FOR SUPPLY & INSTALLATION OFFOR
..... NIT SILCHAR.
 - VIDE TENDER REF NO NITS/PS-....., DATED.....DATE OF
OPENING

[The bid will summarily be rejected & returned to the bidder if the sealed envelope containing the quotation is not super scribed as above].

- **Genuine Pricing** (Both foreign & indigenous) :Vendor is to ensure that quoted price is not more than the price offered to any other customer in India to whom this particular item has been sold recently, particularly to IIT/Institutes and other Government Organization.
- **No Part Delivery:** Part shipment for any items will not be allowed.
- **Any Optional item quoted by the supplier will not be entertained.**
- **Termination for default :** Default is said to have occurred -
- If the supplier fails to deliver any or all of the items/services within the time period(s) specified in the purchase order or any extension thereof granted by NIT Silchar, the Institute may terminate the contract / purchase order in whole or in part and forfeit the EMD/PBG as applicable.

TERMS & CONDITIONS:

1. The bidding agency should be 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.
2. 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.
3. 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. In case of proprietary or patented item, necessary certificates in support of the same should be attached. The bidder must submit the Compliance Statement and Deviation Statement of technical specification.
4. The firm should have satisfactorily manufactured and supplied equipment, as requisitioned in this tender, to IITs/NITs/Govt. Departments/Semi Govt. Departments/PSU/Educational Institutions of National Importance etc. during the last 3(three) years ending the last day of March 2017.
5. **The rate quoted must be both in words and figures and F.O.R. / Destination National Institute of Technology Silchar -788010 inclusive of packing, forwarding etc. Octroi, surcharge, insurance, Installation, Demonstration and any other charges.** Educational discount, if any should be indicated clearly. Tenderer(s) may note that the Government of India exempts this Institute from paying custom duty/excise duty on selected items. Necessary documents will be furnished if required on demand by the Tenderer(s). **Rate quoted for any other destination shall not be accepted.**

6. Quoted rate should be inclusive of all taxes. Nothing extra will be paid by the Institution. If there is any increase / decrease of statutory taxes will be reimbursed accordingly.
7. **Payment: Payment 100% shall be made only after receipt of ordered items as per specification and quantity and after successful installation, demonstration, training (where applicable) and commissioning.**
 - **In connections to foreign items Payment shall be made 90% through irrevocable Letter of Credit and 10% after receipt of ordered items as per specification and quantity and after successful installation, demonstration, training (where applicable) and commissioning.**
8. 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.
9. Tenderer(s) registered with the State/Central Government must quote his registration numbers, if any, and submit a xerox copy of registration along with the tender.
10. Guarantee/Warranty period offered for the tendered item is to be clearly specified.
11. The rates to be quoted by the agency should be valid for a period of **6(six) months** after the deadline date specified in the tender.
12. The quantity against each item mentioned in the tender may vary according to the actual requirements at the time of placing Purchase Order.
13. It is not binding for the bidding agency to quote for all the items.
14. **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.**
15. **Bid Price**
 - a) The contract shall be for the full quantity as described above. Corrections, if, shall be made by crossing out, initialing dating and rewriting.
 - b) **The bidder should quote the total price for each item inclusive of packing and forwarding, all duties, levies, insurance, installation, demonstration and any other charges, etc. only taxes & (discount if any) should be mentioned separately.**
 - c) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
16. Each bidder shall submit only one quotation.
17. All necessary documents shall be furnished along with the bid.
18. Validity of Tenders/Quotations: Tenders/Quotations shall remain valid for a period not less than **6 (six) months** after the deadline date specified for submission of tender.
19. **Packing**
 - a) 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.
 - b) The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be provided for in the Contract including additional requirements.
20. **Evaluation of Quotations :**
 - a) NIT Silchar will evaluate and compare the quotations determined to be substantially responsive i.e. which are properly signed

b) Conform to the terms and conditions, and specifications.

21. Award of contract:

NIT Silchar 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.

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

b) Normal commercial warranty/guarantee shall be applicable to the supplied goods.

c) The goods (both indigenous & imported) should be insured against theft, loss or breakage during transit till destination.

d) Upon delivery of goods, the supplier shall submit Suppliers Invoice, Insurance certificate, Warranty Certificate, or any other document as required/demand.

22. Acknowledgement of the Purchase Order: The supplier shall give an acknowledgement of the Purchase Order within 15(fifteen) days of the date of the Purchase Order. In case, the supplier fails to acknowledge the Purchase Order within the stipulated time, the Institute is at liberty to cancel the Purchase Order.

23. No alternations in tender forms shall be made by the bidder and if any such alteration is made, the tender is liable to be rejected.

a) Delivery Schedule and Penalty for Delay: Delivery of equipment should be made within 30(thirty) days OR as per terms and condition of Purchase Order from the date of issue of Purchase Order. **Penalty at the rate of 0.5% or part thereof of the order value per week, subject to a maximum of 2.5% will be imposed for delayed delivery and installation.**

24. Demurrages and penalty, if any, paid by the supplier shall not be borne by the Institute.

25. The tenders submitted shall clearly mention the name of the firm/person in whose favour the purchase order is to be placed.

26. Contact details of the person for all post sales/installation maintenance support should clearly be given with **Name & Designation, Phone No, Fax No, Mobile, E-mail and official address.**

27. National Institute of Technology Silchar is not liable for non-receipt of the tender forms in time due to wrong address/ any delivery delay of the mail service provider/ force majeure. Tender documents received after the last date and time for receiving tenders will be summarily rejected.

28. **Successful bidder shall give a performance security @5-10% of the total order value in the form of Bank Guarantee.** The performance security shall be furnished after the order for supply is placed and before the final payment. Validity of the Performance Security shall cover the warranty period.

- The proceeds of the Performance Security shall be payable to the purchaser as compensation for any loss resulting from the suppliers failure to complete its obligations under the contract.

29. All legal disputes shall be under the jurisdiction of the Silchar Courts of Cachar District in the state of Assam.



Registrar, NIT Silchar

DECLARATION

I / We hereby declare that no case is pending with the police/ court against the proprietor/ firm/ partner or the company (Agency). Also I /We have not been suspended / blacklisted by any PSU / Government Department / Financial Institution / Court.

(Signature & seal of the contractor)

Place:

Date:

NO DEVIATION CERTIFICATE

Notwithstanding anything mentioned in our bid, we hereby accept all the terms and conditions of this tender and we do not have any deviation to this tender enquiry. We hereby undertake and confirm that we have understood the scope of work properly and shall be carried out as mentioned in this tender enquiry.

(Signature & seal of the contractor)

Place:

Date:

BIDDERS DETAILS

Name of the Contractor /Party/ Firm	:	<input type="text"/>
Name of Authorized Representative	:	<input type="text"/>
Phone Nos.	:	<input type="text"/>
Mobile Nos.	:	<input type="text"/>
Fax No.	:	<input type="text"/>
E-Mail Address	:	<input type="text"/>
Web Site Address (If Any)	:	<input type="text"/>

(Signature & seal of the contractor)

Place:

Date:

CHECK-LIST (TECHNICAL BID)

SUMMARY OF COMPLIANCE TO REQUIREMENT OF TENDER

Sl. No.	Description of Requirement	Yes / No / NA	Page No.
1.	Tender Cost Rs.500/- (Non-refundable) in the form of Demand Draft in favour of "Director, NIT Silchar" in a separate envelope		
2.	EMD @2% of total bid value in the form of Demand Draft /Bank Guarantee in favour of "Director, NIT Silchar" in a separate envelope		
3.	Copy of Manufacturer/ Authorized Supplier Certificate		
4.	Audited financial statement for the last 3 years		
5.	Copy of the PAN card.		
6.	Copy of GST registration certificate		
7.	Copies of previous work order of similar work with completion certificate (if any)		
8.	Declaration certificate		
9.	No Deviation certificate		
10.	Bidder's details		
11.	Technical Specification		
12.	NSIC/SSI Certificate where applicable		
13.	All the pages of tender document have been signed		
14.	Price bid in separate sealed envelope.		
15.	Complete copy of Techno Commercial Bid submit along with the Price Bid.		

(Signature & seal of the contractor)

Place:

Date:

The specification of items (Different relay trainers, ac analyser) required for power system lab

Sl. No	Item name	Specification	Quantity required
1.	MICRO-CONTROLLER BASED IDMT/DMT TYPE OVER CURRENT RELAY STUDY RAINER	<p>One number of PIC-Micro controller used as processor to read fault-current, & relay function.</p> <ul style="list-style-type: none"> * One number LCD to indicate 1) Set current 2) Fault current 3) Set Time 4) DMT/IDMT type, 5) Relay Tripping time * Four number of key used 1) To select IDMT/DMT type, 2) Set current adjustment, 3) Set time adjustment, 4) Reset function * One number of 20A CT used to sense fault current * One number of 12V auxiliary relay used for contactor operation. <p>SPECIFICATION: Current Input: 0-20Amp Number of contact: One number "NC" contact @ 220V, 10Amp rating, one number Of "NO" CONTACT @ 220v, 10Amp rating. Auxiliary supply: 230V AC, 50Hz</p> <ul style="list-style-type: none"> * Power ON/OFF switches with indicator. * CURRENT INJECTION SOURCE * One number of auto transformer used for current adjustment. * One number of loading transformer used for current source. * Current output terminated in the banana-sockets. * One number of digital meter used to indicate current. * Specification: Current Range: 0-20Amp AC (Continuously variable) <p>PC Interface with the above Relay EXPERIMENTS:</p> <ul style="list-style-type: none"> * Study & testing of over current relay IDMT type with different current settings * Study & testing of over current relay DMT type with different current settings. 	1 set
2.	ELECTROMECHANICAL TYPE IDMT OVER CURRENT RELAY STUDY TRAINER	<p>This test set-up consists of (1) Electro-mechanical Over Current Relay, (2) Current Injection source with meter.</p> <ul style="list-style-type: none"> * One number Electro-Mechanical type Over Current Relay # Make: Preferably ALSTOM /AVOMECA / MEGAWIN # Current Rating: 5 Amp # Current Setting multiplier # Time setting Multiplier # One number of NO contact @ 220V, 10Amp rating # One number of NC contact @ 220V, 10 Amp rating * Current Injection source: # One no. of auto transformer provided for current adjustment # One no. of loading transformer used for current source # Current output applied to relay coil. # One no. of digital ammeter used to indicate current # Specification: current range: 0-20 Amp AC. (continuously variable) # One no. of automatic relay tripping time measurement circuit. 	1 set

		<p># One no. of Digital timer provided to measure relay tripping time.</p> <p># One number of reset switch provided for timer reset.</p> <p>EXPERIMENTS:</p> <p>* Study & testing of over current relay IDMT type with different current & time setting multiplier.</p> <p>* Plotting of IDMT characteristics of over current relay.</p>	
3.	MICRO CONTROLLER BASED IDMT/DMT TYPE OVER/UNDER VOLTAGE RELAY STUDY TRAINER	<p>This test set-up consists of (1) Micro controller based Over / Under Voltage Relay, (2) Voltage Injection Source.</p> <p>MICRO CONTROLLER BASED OVER/UNDER VOLTAGE RELAY</p> <p>* One no. of PIC-Micro controller used as processor to read fault-voltage, & relay function.</p> <p>* One no. of LCD to indicate</p> <p>1) Set voltage, 2) Fault voltage, 3) Set Time, 4) DMT/IDMT type, 5) Relay tripping time.</p> <p>* Five no. of key used 1) To select IDMT/DMT type, 2) Set Voltage Adjustment, 3) Set Time Adjustment, 4) Reset Function, 5) OV/UV selection.</p> <p>* One no. of 240/9V PT used to sense fault voltage.</p> <p>* One no. of 12v auxiliary relay used for contactor operation.</p> <p>SPECIFICATION:</p> <p>Voltage Input: 0 – 220volt</p> <p>Number of contact: One number “NC” contact @ 220V, 10Amp rating, one no. of “NO” contact @ 220V, 10amp rating. Auxiliary Supply: 230V AC, 50Hz Power ON/OFF switch with indicator.</p> <p>VOLTAGE INJECTION SOURCE</p> <p>* One no. of auto transformer used for voltage adjustment.</p> <p>* Voltage output terminated in the banana-sockets</p> <p>* One number of digital meter used to indicate output voltage.</p> <p>* Specification: Voltage range: 0-300V AC. (Continuously variables)</p> <p>EXPERIMENTS:</p> <p>* Study & Test DMT type Over/Under-voltage relay with different voltage & time settings</p> <p>* Study & Test of IDMT type Over/Under voltage relay with different voltage & time settings</p> <p>PC Interface with the above Relay</p>	1 set
4.	ELECTRO - MECHANICAL TYPE OVER VOLTAGE RELAY STUDY TRAINER	<p>This set-up consists of (1) Electro mechanical type Over voltage-relay, (2) relay test setup with meter</p> <p>* One no. of Electro-Mechanical type over voltage relay</p> <p># Make: Preferably Alstom / Avomec</p> <p># Voltage setting multiplier (121v, 132, 143, 154, 165, 176, 187v)</p> <p># Time setting multiplier.</p> <p># One no. of “NO” contact @ V, 10 Amp rating.</p> <p># One number of “NC” contact @ 220V, 10Amp rating.</p> <p>TEST SET-UP:</p> <p>* One no. of 0-300V, 1AMP variable AC source provided for relay coil.</p>	1 set

		<ul style="list-style-type: none"> * One no. of auto transformer provided for AC voltage adjustment. * One no. of illuminated rocker switch provided for power ON/OFF * One no. of digital voltmeter used to indicate applied voltage. * One no. of digital timer provided for relay tripping time measurement. * One no. of automatic relay tripping time measurement circuit. * One number of start/stop push-to on switch provided for time measurement circuit. * One no. of reset switch provided for timer reset. <p>EXPERIMENTS:</p> <ul style="list-style-type: none"> * Study and testing of over voltage relay with different voltage & time setting multiplier. * Measurement of relay tripping time. * Plotting the IDMT characteristics of over voltage relay. 	
5.	ELECTRO - MECHANICAL TYPE UNDER VOLTAGE RELAY STUDY TRAINER	<p>This test set-up consists of (1) Electro mechanical Under voltage relay, (2) Relay Test set-up with meter.</p> <ul style="list-style-type: none"> * One no. of Electro-Mechanical type Under Voltage relay # Make: Preferably Alstom / Avomec. # Voltage setting multiplier (55V, 66, 77, 88, 99v) # Time setting multiplier # One no. of "NO" contact @ 220V, 10Amp rating # One no. of "NC" contact @ 220V, 10Amp rating. <p>TEST SET-UP</p> <ul style="list-style-type: none"> * One no. of 0-300V, 1AMP variable AC source provided for relay coil * One no. of auto transformer provided for AC voltage adjustment. * One no. of illuminated rocker switch provided for power ON/OFF * One no. of digital voltmeter used to indicate applied voltage * One no. of digital timer provided for relay tipping time measurement. * One no. of automatic relay tripping time measurement circuit. * One no. of start/stop push-to on switch provided for time measurement circuit. * One number of reset switch provided for timer reset. <p>EXPERIMENTS:</p> <ul style="list-style-type: none"> * Study and testing of under voltage relay with different voltage setting multiplier. * Measurement of relay tripping time * Plotting the IDMT Characteristics of Under voltage relay. 	1 set
6.	MICRO CONTROLLER BASED IDMT/DMT TYPE OVER/UNDER FREQUENCY RELAY STUDY TRAINER	<p>This test set-up consists of (1) Micro controller based over/under frequency-relay (2) Variable frequency source, Micro controller Based Over/under-frequency Relay</p> <ul style="list-style-type: none"> * One no. of PIC-Micro controller used as processor to read supply frequency & relay function. * One number LCD to indicate, 	1 set

		<p>1)Set frequency 2) Actual Frequency 3) Set Time 4) DMT/IDMT type, 5) Relay tripping time. * Five number of key used 1)To select IDMT/DMT type, 2) Set frequency adjustment, 3) Set time adjustment, 4) Reset function, 5) OF/UF relay selection * One no. of 230/9V PT & ZCD used to sense supply frequency * One no. of 12v auxiliary relay used for contactor operation SPECIFICATION: # Frequency input: (30-70Hz) # Number of contact: One number NC contact @ 20V, 10Amp rating # One number of NO contact @ 220V, 10AMP rating. # Auxiliary supply: 230V AC, 50Hz. # Power ON/OFF switch with indicator VARIABLE FREQUENCY SOURCE * One no. of 220V/110 voltage source provided with frequency adjustment (30-70Hz) * Outputs terminated in the banana-sockets * One no. of LCD used to indicate output frequency. * Specification: Voltage range: 110V/200VAC (30-100Hz) (continuously variable) * PC Interface with the above Relay EXPERIMENTS: * Study and testing of over/under frequency relay function with DMT/IDMT characteristics.</p>	
7.	MICRO CONTROLLER BASED EARTH FAULT RELAY TRAINER	<p>This test set-up consists of (1) Micro controller based Earth-fault-relay, (2) Current injection source. MICRO CONTROLLER BASED EARTH-FAULT RELAY * One no. of PIC-Micro controller used as processor to read fault-current, & relay Function. * One no. LCD to indicate, 1) Set Current 2) Fault Current 3) Set Time 4) DMT /IDMT type 5) Relay tripping time. * Four no. of key used 1) To select IDMT/DMT type, 2) Set current adjustment, 3) Set time adjustment 4) Reset function * One no. of 2A CT used to sense EARTH current * One no. of 12V auxiliary relay used for contactor operation SPECIFICATION Current Input: 0-2 Amp Number of contact: One number NC contact @ 220V, 10Amp rating, one number of NO contact @ 220V, 10Amp rating. Auxiliary supply: 230V AC, 50Hz * Power ON/OFF switch with indicator CURRENT INJECTION SOURCE * One no. of auto transformer used for current adjustment</p>	1 set

		<ul style="list-style-type: none"> * One no. of loading transformer used for current source. * Current output terminated in the banana-sockets * One no. of digital meter used to indicate current. * Specification: current range: 0-2Amp AC (Continuously Variable). <p>PC Interface with the above Relay</p> <p>EXPERIMENTS:</p> <ul style="list-style-type: none"> * Study & testing of DMT type earth-fault relay with different current & time setting. * Study & testing of IDMT type earth-fault relay with different current & time setting 	
8.	ELECTRO-MECHANICAL TYPE EARTH-FAULT RELAY STUDY TRAINER	<p>This test set-up consists of (1) Electro-mechanical earth-fault-relay (2) Transformer test setup with meter,</p> <ul style="list-style-type: none"> * One no. of electromechanical type earth fault relay <p>Make: Preferably ALSTOM /AVOMÉC / MEGWIN</p> <ul style="list-style-type: none"> # Current rating: 5A or 1 Amp # Current setting Multiplier # Time setting multiplier # One no. of NO contact @ 220V, 10Amp rating. # One no. of NC contact @ 220 V 10Amp rating. <p>CURRENT INJECTION SOURCE:</p> <ul style="list-style-type: none"> * One no. of 24/24V, 3Amp three phase delta-star transformer provided with secondary midpoint tapping. * Mid point provided for earth fault creation. * One no. of variable rheostat provided for variation of short-circuits earth resistance. * 24V, 3 Amp three phase AC source provided for transformer primary input. * One no. of digital ammeter used to indicate current * One no. of digital timer provided for tripping time measurement * One no. of automatic relay tripping time measurement circuit. * One no. of start/stop push-to on switch provided for time measurement circuit. * One number of reset switch provided for timer reset. <p>EXPERIMENTS:</p> <ul style="list-style-type: none"> * Study and testing of Earth Fault relay with different current & time multiplier. * Measurement of relay tripping time. 	1 set
9.	MICRO CONTROLLER BASED REVERSE POWER RELAY STUDY TRAINER	<p>This test set up consists of (1) Micro controller based reverse power-relay (2) Voltage & current injection source, MICRO CONTROLLER BASED REVERSE POWER RELAY</p> <ul style="list-style-type: none"> * One no. of PIC-Micro controller used as processor to read fault-current, & voltage phase angle & relay function. * One no. LCD to indicate 1)Set current 2) Fault current 3) Set time 4) DMT/IDMT type 5) Relay tripping time * Four no. of key used 1)To select IDMT/DMT type, 2)Set current adjustment, 3)Set time adjustment, 4)Reset function * One no. of 20A CT used to sense fault current. 	1 set

		<ul style="list-style-type: none"> * One no. of 230/5V PT used to sense voltage * One no. of 12V auxiliary relay used for contractor operation. <p>SPECIFICATION:</p> <ul style="list-style-type: none"> # Current input: 0-20 Amp # Voltage input: 0-230V # Phase Diff.: 0-89 deg. # Number of contact: One number NC contact @ 220V, 10Amp rating # One number of NO contact @ 220V, 10Amp rating # Auxiliary supply: 230V AC, 50Hz. * Power ON/OFF switch with indicator <p>CURRENT & VOLTAGE INJECTION SOURCE:</p> <ul style="list-style-type: none"> * One no. of auto transformer used for current adjustment. * One no. of auto transformer used for voltage adjustment so as phase angle adjustment. * One no. of loading & phase angle adjustment. * Current & voltage output terminated in the banana-sockets. * One no. of digital meter used to indicate current * Specification: Current range: 0-20Amp AC (continuously variable) <p>phase diff 0-90 deg. (W.R.T. Voltage) PC Interface with the above Relay</p>	
10.	<p>MICRO CONTROLLER DIRECTIONAL OVER CURRENT RELAY STUDY TRAINER</p>	<p>This test set-up consists of Micro controller based reverse power relay (2) Voltage & Current Injection source:</p> <p>MICRO CONTROLLER BASED DIRECTIONAL OVER CURRENT RELAY</p> <ul style="list-style-type: none"> * One no. of PIC-Micro controller used as processor to read fault-current, & Voltage phase angle & relay function. * One no. LCD to indicate, 1) Set current 2) Fault Current 3) Set time 4) DMT/IDMT type 5) Relay tripping time. * Four no. of key used 1)To select IDMT/DMT type, 2)Set current adjustment, 3)Set time adjustment 4)Reset function * One no. of 20A CT used to sense fault current * One no. of 230/5V PT used to sense voltage * One no. of ZCD for phase angle measurement. * One no. of 12V auxiliary relay used for contractor operation. <p>SPECIFICATION:</p> <ul style="list-style-type: none"> # Current input: 0-20 Amp. # Voltage input: 0-230V # Phase diff.: 0-89 deg. # No. of contact: One no. NC contact @ 220V, 10Amp rating # One no. of NO contact @ 220V, 10Amp rating. # Auxiliary supply: 230V AC, 50Hz * Power ON/OFF switch with indicator. <p>CURRENT & VOLTAGE INJECTION SOURCE</p> <ul style="list-style-type: none"> * One no. of auto transformer used for current adjustment. * One no. of auto transformer used for Voltage adjustment so as phase angle adjustment. * One no. of loading & phase shifting transformer provided for current and phase adjustment. * Current & Voltage output terminated in the banana-sockets. 	1 set

		* Specification: Current range: 0-20 Amp AC. (continuously variable) phase Diff 0-90 deg. (w.r.t. voltage)	
11.	ELECTROMECHANICAL TYPE DIRECTIONAL OVER CURRENT RELAY STUDY TRAINER	<p>This test set-up consists of (1) Electro-mechanical directional over current relay (2) Relay test setup with meter.</p> <ul style="list-style-type: none"> * One number of Electro-mechanical types directional over current relay (Make: Preferably ALSTOM / AVOMEK / MEGAWIN) # Current rating: 5 Amp # Time setting multiplier # One no. Of NO contact @ 220V, 10Amp ratings. # One no. Of NC contact @ 220V, 10Amp ratings <p>VOLTAGE AND CURRENT INJECTION SOURCE:</p> <ul style="list-style-type: none"> * Two nos. of autotransformer provided for current and voltage adjustment * Two nos. of loading transformer used for current source * Current and Voltage applied to the relay coil. * One no. of digital voltmeter used to indicate the voltage. * One no. of digital ammeter used to indicate current. * Specification: Current range: 0-20 Amp AC, Continuously variable) * One no. Of automatic relay tripping time measurement circuit. * One no. Of Start/stop push-to on switch provided for time measurement circuit. * One no. Of digital timer provided to measure relay-tripping time. * One no. Of reset switch providers for timer reset. <p>EXPERIMENTS:</p> <ul style="list-style-type: none"> * Study and testing of IDMT type directional over-current relay with different current & time setting multiplier. * Plotting of IDMT characteristics of over current relay. 	1 set
12.	MICRO CONTROLLER BASED THREE PHASE DIFFERENTIAL RELAY STUDY TRAINER (MERZ - PRICE PROTECTION SCHEME)	<p>This test set-up consists of (1) Micro controller based differential-relay, (2) 300VA transformer set-up.</p> <p>MICRO CONTROLLER BASED DIFFERENTIAL RELAY</p> <ul style="list-style-type: none"> * One no. of PIC Micro controller used as processor to read all current, (PY, SY) & activation of relay function. * One number LCD to indicate, 1)Set value 2) All currents 3) Set time 4) DMT/IDMT type 5) Relay tripping time 6) Biased/Unbiased type status * Four no. of key used 1)To select IDMT/DMT type or biased unbiased type., 2)Set current value adjustment, 3)Set time adjustment, 4)Reset function * Six number of 5A CT used to sense primary and secondary current. * One no. of 12V TPTT auxiliary relay used for contractor operation. <p>SPECIFICATION:</p> <ul style="list-style-type: none"> # Current input: 0-5Amp # Voltage input: 0-230V / Output (24V / 0V) i/p (24V-0V) to (0V-12V-24V) # % of difference 0-90%. 	1 set

		<p># Number of contacts: Three number NO contact @ 220V, 10Amp rating.</p> <p># Auxiliary supply: 230V AC, 50Hz</p> <p>* Power ON/OFF switches with indicator.</p> <p>THREE PHASE TRANSFORMER SET-UP</p> <p>* One no. of 24/24V three phase transformer with primary and secondary side inter winding termination for fault creation.</p> <p>* Star-star connection.</p> <p>* One no. of V three phase transformer provided for fault transformer input voltage.</p> <p>* Three phase lamp load provided</p> <p>* Diff. Types of fault L-L, L-N, S/C can be created used termination.</p> <p>* One no of rheostat provided for variation of short circuit resistance.</p>	
13.	<p>MICRO CONTROLLER BASED SINGLE PHASE DIFFERENTIAL RELAY STUDY TRAINER (MERZ PRICE PROTECTION SCHEME)</p>	<p>This test set-up consists of (1). Micro controller based differential-relay (2) 2KVA transformer Set-up.</p> <p>MICRO CONTROLLER BASED DIFFERENTIAL RELAY</p> <p>* One no. of PIC Micro controller used as processor to read all current, (PY & SY) & activation of relay function.</p> <p>* One number of LCD to indicate,</p> <p>1)Set value 2) All currents 3) Set time 4) DMT/IDMT type 5) Relay tripping time 6) Biased/unbiased type status</p> <p>* Four no. of key used 1)To select IDMT/DMT type or biased un-biased type., 2)Set current value adjustment, 3)Set time adjustment, 4)Reset function</p> <p>* Two no. of 20A CT used to sense primary and secondary current.</p> <p>* One no. of 12V DPDT auxiliary relay used for contractor operation.</p> <p>SPECIFICATION:</p> <p># Current input: 0-20Amp</p> <p># Number of contact: Two number 'NO' contact @ 220V, 10Amp rating</p> <p># Auxiliary supply: 230V AC, 50Hz</p> <p>* PC interfacing facility power ON/OFF switch with indicator.</p> <p>SINGLE PHASE TRANSFORMER SET-UP</p> <p>* One no. of 24/24V Single phase transformer with primary and secondary side inter winding termination for fault creation.</p> <p>* One no. of 230V /24V transformer provided for fault transformer input voltage.</p> <p>* Lamp provided for load.</p> <p>* Diff types of fault L-L, L-N, S/C can be created using termination.</p> <p>* One no. of rheostat provided for variation of short circuit resistance.</p>	
14.	<p>BUCHOLTZ RELAY STUDY TRAINER</p>	<p>This test set-up consists of (1) Bucholtz relay (2) Oil test set-up</p> <p>* One no. of mechanical type oil and gas operated relay (bucholtz relay) one number of 'NO' contact for alarm one number 'NC' contact for TRIP.</p> <p>* One no. of conservator used to fill the oil to the buchlotz relay.</p>	1 set

		<ul style="list-style-type: none"> * One no. of reservoir to store the transformer oil. * One foot pump used to create the bubbles in the buchlotz relay. <p>EXPERIMENTS:</p> <ul style="list-style-type: none"> * To study and testing the operation of Buchlotz relay. 	
15.	AC TRANSMISSION LINE ANALYSER	<p>This set-up consists of four individual modules.</p> <p>i) Input AC Source, ii) Transmission Line model, iii) Transmission line parameter measurement module, iv) Load setup</p> <p>INPUT AC SOURCE</p> <ul style="list-style-type: none"> * One no. of variable AC source at 1250 Hz. With two mode of variable voltage. * 0-25V peak for shaft transmission line and 35V for medium and long line * One no. of toggle switch to select 25/35V AC * One no. of potentiometer used for Voltage variation. * One no. of ON/OFF switch and Fuse provided for AC output * Output terminated with banana socket fuse. <p>TRANSMISSION LINE MODEL</p> <ul style="list-style-type: none"> * Simulated value of R-L at 80 km length for short transmission line. * Simulated value of R-L-C at 150 km length for MEDIUM LINE with PL & T network. * Simulated value of R-L-C at 300 km LONG transmission line. * All input and output terminals are terminated at front panel.. <p>TRANSMISSION LINE PARAMETER MEASUREMENT MODEL</p> <ul style="list-style-type: none"> * One no. of PIC Micro controller used to measure all parameters. * One no. of LCD display to indicate Sending end voltage (V_s), Sending end current (I_s), Receiving end voltage (V_r), Receiving end current (I_r), Phase angle between V_s/V_r, Phase angle between V_s/I_s, Phase angle between V_s/I_r, Phase angle between V_r/I_r * One no. of PIC Microcontroller can be used to calculate the A, B, C, D values * One number of LCD display to indicate A, B, C, D value of transmission line in rectangular form * Provision to interface with PC. <p>LOAD SET-UP FOR TRANSMISSION LINE MODEL</p> <ul style="list-style-type: none"> * Three sets of R-L load for all three types of transmission line. * Facility to load transmission line up to 75% of load regulation & 85° of lag P.F * 3 Toggle switches provided to select R, RL Load (All 3 sections) * Rotary switch provided for load R, L value selection. * Input & output are terminated at banana sockets. <p>POWER SYSTEM SOFTWARE:</p> <ul style="list-style-type: none"> * Windows based software to calculate A, B, C, D Value and draw power circle diagram. <p>EXPERIMENTS:</p> <p>1.Measurement of sending end, receiving end parameter of SHORT / MEDIUM / LONG transmission line.</p>	1 set

		<ol style="list-style-type: none">2. Calculation and checking of A, B, C, D constant of all three lines.3. Calculation of sending end voltage of all three lines using A, B, C, D value.4. Plotting of power-circle diagram in all three lines in PC.	
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