



# GURU JAMBHESHWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR

## TENDER NOTICE

Sealed tenders are invited from reputed manufacturers and suppliers for the supply of following items :-

Sr.No.	Department	Name of Item
1.	Electrical Engineering	Experimental Instruments/Kits for the development of Power Electronics Lab.
2.	Chemistry	Water Aspirator (Electrical Aspirator Pump)
3.	CIL	Rotavapor System (Rotary Evaporator)

The tender document having detailed specifications may be obtained from the respective Department or may be downloaded from the University website [www.gjust.ac.in](http://www.gjust.ac.in) for which a demand draft of Rs.300/- per tender document drawn in favour of the Registrar, GJUS&T and payable at Hisar is to be submitted with the technical bid itself. Technical and Financial bids should be submitted separately with full name of the equipment on the envelope. The tender complete in all respect must reach the respective Chairman of department, GJUS&T, Hisar on or before **20.02.2020 upto 3.00 P.M.** The tenders will be opened on **20.02.2020 at 4.00 P.M.** The tenderers/representatives may remain present at the time of opening of tenders at their own cost.

**REGISTRAR**

**GURU HAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR-125001**

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**GURU HAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR-125001**

**Tender For Supply of Equipment (s)**

To

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**Subject: Invitation for tender for supply of experimental instruments/kits for the development of Power Electronics Lab.**

Dear Sir (s)

You are invited to submit your most competitive tender for the following equipment (s) with the following terms and conditions:-

**A. SCHEDULE OF EVENTS:-**

- |    |  |    |  |
|----|--|----|--|
| 1. | TENDER NO.*  | :: | 05/02/2020/EE-49   |
| 2. | TENDER FLOATING DATE                               | :: | 05-02-2020   |
| 3. | TENDER SUBMISSION CLOSING DATE & TIME::            |    | 20-02-2020 upto<br>03:00 PM  |
| 4. | TENDER OPENING DATE & TIME                         | :: | 20-02-2020 (4:00<br>PM)  |
| 5. | VENUE FOR TENDER SUBMISSION&OPENING::              |    | TB-7, Chairman,<br>Department of Electrical Engineering, GJUS&T, Hisar |
| 6. | PRE-BID CONFERENCE(IF ANY)<br>DATE, TIME AND VENUE | :: | -----<br>-----   |
| 7. | TENDER DOCUMENT COST                               | :: | Rs. 300.00   |

\*Tender number must be mentioned in all correspondence.

**B. BRIEF DISCRIPTIONOF TENDER DOCUMENT:-**

This tender document consists of four parts namely:

- i) Brief description of the equipment name;
- ii) Technical data sheet (technical specifications of the equipment);
- iii) General standard Terms and conditions; and
- iv) Special Terms and conditions (If any).

**1. Brief description of the equipment(s):-**

It mentions the name of the equipment required and its quantity. The quantity is subject to increase and decrease, at the discretion of the indenter.

**2. Technical data sheet (technical specification of the equipment):-**

It contains the technical details /specification of the equipment. It should be submitted in separate sealed envelope marked as “Technical Bid”. Bids having deviation in technical specification will be declared as “technically non- responsive” and it will not be considered for commercial evaluation.

**3. Commercial Data Sheet:-**

**This format deals with the commercial aspect of the tender. The bidder should quote the basic/ex-works rate of goods and other overhead charges only in his format.**

**4. General /standard Terms and conditions:-**

This portion contains the general/standard terms and conditions of the tender and its compliance is essential, failing which the contract may be cancelled and bidder may be liable for penal action against it.

**5. Special Terms and conditions:-**

It contains special terms and condition which may be in addition to/in super-session of the referred “General /Standard Terms and conditions” and its compliance is also compulsory in the same manner, as in the case of the General/Standard Terms and conditions.

**C. EQUIPMENT DETAILS:**

**i) Brief description of the equipment name:-**

S. No.	Name of Equipment (s)	Qty. Required
1.	Experiment: To study the performance of single-phase half-wave and full-wave uncontrolled rectifiers. Major Equipment Required: Trainer Kit	1
2.	Experiment: To study the operation of single-phase full- wave phase control of a D.C. load using (i) a fully-controlled full-wave rectifier. (ii) A half-controlled full-wave rectifier. Major Equipment Required: Trainer Kit	1
3.	Experiment: To study speed control of a D.C. motor using single-phase half and fully controlled bridge converters. Major Equipment Required: Trainer Kit	1
4.	Experiment: To study speed control of a D.C. motor using three-phase half and fully controlled bridge converters. Major Equipment Required: Trainer Kit	1
5.	Experiment: To study and test buck, boost and buck- boost regulators. Major Equipment Required: Trainer Kit	1

6.	Experiment: To study Control speed of a single-phase induction motor using single phase AC voltage regulator. Major Equipment Required: Trainer Kit	1
7	Experiment: To study speed control of dc motor using single-phase dual converter. Major Equipment Required: Trainer Kit	1
8	Experiment: To study single phase diode clamp multi-level inverter. Major Equipment Required: Trainer Kit	1
9	Experiment: To study three phase PWM inverter using IGBT. Major Equipment Required: Trainer Kit	1
10	Experiment: To study single phase inverter with square wave quasi square wave and SPWM control. Major Equipment Required: Trainer Kit	1
11	Experiment: To study six pulse fully controlled rectifier feeding R and RL loads. Major Equipment Required: Trainer Kit	1
12	Experiment: To study of single phase cyclo-converter. Major Equipment Required: Trainer Kit	1
13	Experiment: To study of three phase cyclo-converter. Major Equipment Required: Trainer Kit	1
14	100 MHz DSO	3
15	Function Generator	3
16	Multimeter	4

**ii) Technical data sheet (Technical specifications of the equipment):-**

S. No.	Description of the Equipment(s)	Technical Specifications
1.	Experiment: To study the performance of single-phase half-wave and full-wave uncontrolled rectifiers. Major Equipment Required: Trainer Kit	ANNEXURE-1
2.	Experiment: To study the operation of single-phase full-wave phase control of a D.C. load using (i) a fully-controlled full-wave rectifier. (ii) A half-controlled full-wave rectifier. Major Equipment Required: Trainer Kit	ANNEXURE-1
3.	Experiment: To study speed control of a D.C. motor using single-phase half and fully controlled bridge converters. Major Equipment Required: Trainer Kit	ANNEXURE-1
4.	Experiment: To study speed control of a D.C. motor using three-phase half and fully controlled bridge converters. Major Equipment Required: Trainer Kit	ANNEXURE-1
5.	Experiment: To study and test buck, boost and buck-boost regulators. Major Equipment Required: Trainer Kit	ANNEXURE-1
6.	Experiment: To study Control speed of a single-phase induction motor using single phase AC voltage regulator. Major Equipment Required: Trainer Kit	ANNEXURE-1
7	Experiment: To study speed control of dc motor using single-phase dual converter. Major Equipment Required: Trainer Kit	ANNEXURE-1
8	Experiment: To study single phase diode clamp multi-level inverter. Major Equipment Required: Trainer Kit	ANNEXURE-1

9	Experiment: To study three phase PWM inverter using IGBT. Major Equipment Required: Trainer Kit	ANNEXURE-1
10	Experiment: To study single phase inverter with square wave quasi square wave and SPWM control. Major Equipment Required: Trainer Kit	ANNEXURE-1
11	Experiment: To study six pulse fully controlled rectifier feeding R and RL loads. Major Equipment Required: Trainer Kit	ANNEXURE-1
12	Experiment: To study of single phase cyclo-converter. Major Equipment Required: Trainer Kit	ANNEXURE-1
13	Experiment: To study of three phase cyclo-converter. Major Equipment Required: Trainer Kit	ANNEXURE-1
14	100 MHz DSO	ANNEXURE-1
15	Function Generator	ANNEXURE-1
16	Multimeter	ANNEXURE-1

#### **D. GENERAL/ STANDARD TERMS AND CONDITIONS OF THE TENDER:-**

##### **1. TWO ENVELOPE BID:-**

The tender is to be submitted on two envelope bid pattern i.e. “Technical bid” and “Price/commercial bid” in separately sealed envelopes. Both of these envelopes should be put in and sealed in another envelope addressed to Chairman, Department of Electrical Engineering, Guru Jambheshwar University of Science & Technology, Hisar-125001 (Haryana), India and super-scribed in bold as “TENDER FOR SUPPLY OF ELECTRICAL MACHINE-II LABEL EQUIPMENT”.

The “Technology bid” should mention only in the “Price/commercial bid format”.

##### **2. BID SIGNING:-**

The Tender must be signed by authorized signatory of the bidding firm/company on each page, along with seal of the firm/company, as the case may be.

##### **3. Conditional Bid:-**

Conditional Bid is not acceptable. Hence, the supplier is advised neither to alter the specification nor to mention anything on the Tender form, except cost, signature with seal, otherwise his Tender will not be considered.

##### **4. Delivery Destination:-**

The Tender of the material will be handed over to the authorized official. The freight charges etc. if any need to be mentioned separately of the basic/ ex-works price of the quoted item.

##### **5. Delivery Acceptance:-**

The delivery of the material will be handed over to the authorized official of the concerned indenting department/office, however, the goods will be deemed to accept subject to the approval of the inspection committee of GJUS&T. In case of rejection of the consignment, the supplier should immediately remove the consignment from the university premises failing which it will remain there at the risk and responsibility of the

supplier and university will not be responsible for any kind of liability in this regard.

**6. Delivery Period:-**

The supply is to be made within 30 days of the date of dispatch of the supply order. However, in case of imported goods this time limit will be 60 days, instead of 30 days.

**7 Delivery Period Extension:-**

The supply order(s) shall be executed within the time specified in this regard. However, in case of Force Majeure / reasons beyond control of the supplier, he may make a written request to the Vice-Chancellor for grant of extension for delivery period. The written request in this regard should clearly spelling out such reasons.

The Vice Chancellor, if he is satisfied of such reasons and further that the requested extension will not be detrimental to the interests of the university, may grant extension for a reasonable period for delivery of the goods. The supplier would be required to indemnify the university against any loss on account of downfall of the price during the extended period.

**8. Penalty for delayed supply:-**

In the event of the delayed supply, if accepted, the Registrar will be competent to impose penalty @ 1% per day of the purchase order, provided that the entire amount of penalty shall not exceed 10% of the total amount of Purchase order. The supply will be deemed to be complete on the day when 100% supply is handed over to the indenter (in case of supply in installments) and its installation is done. An appeal against these orders shall, lie to the Vice-Chancellor whose decision shall be final.

**9. EMD for forfeiture:-**

In case of the contractor backs out the supply, the earnest money deposited by him shall be forfeited. Apart from it, he will be liable for any other action against him, as may be considered necessary by the Vice-Chancellor.

**10. Rejection of incomplete tenders:-**

Incomplete Tender such as unsigned Tender, late submitted Tender, conditional tender, not confirming to the eligibility criteria and Technical specification or with any vaguer term such as 'Extra as applicable', will be considered as rejected.

**11. Quantity Variation:-**

The quantity shall be subject to increase or decrease as the case may be.

**12. Manual/literature:-**

The detailed literature/catalogue of the quoted instrument and its accessories should also be attached with the tender. The specifications claimed by the firm should be clearly mentioned in the literature/catalogue also. Its manual should also be supplied with the equipment.

**13. Taxation:-**

Taxes/Excise duty/custom duty etc. should be quoted independent of the ex-works price of the item and it will be paid as applicable under Government rules, if so quoted by the Supplier in the tender, subject to the certificate in the bill of costs as follows. However, wherever exemption from duty (excise/custom duty) is applicable, the university will provide the exemption certificate, along with supply/purchase order itself.

“Certified that the taxes/duties charged in this bill is leviable under Government Rules”.

In case of imported goods the custom clearance is to be arranged by the supplier at his own. Charges, if any, in this regard, however, need to be mentioned accordingly in the quote itself. University will provide necessary documents for this purpose. In case the quote is silent with regard to taxation and clearance charges etc., no such charges will be paid by the university.

**14. Right to Bid rejection:-**

The University reserves the right to reject any or all offers without assigning any reason.

**15. Packaging of Consignment:-**

The material should be packed in a strong case so as to avoid any damage, theft or pilferage in the transit, in which case the responsibility shall be that of the supplier.

**16. Warranty:-**

The warranty should not be less than 24 months from the date of installation of the equipment.

**17. Performance Warranty:-**

Before release of the payment, the successful bidders will be required to submit a performance warranty in form of bank guarantee equal to 10% of the purchase order for the warranty period of the Equipment's.

In case of imported goods requiring opening of LC or advance copy of the draft, the bank guarantee on account of performance warranty, having validity for warranty period plus 4 months, should be submitted before issuance of the purchase order by the indenter. If required, its validity will be got suitably extended by the supplier before release of his EMD.

**18. Payment:-**

The payment will be made within 30 days of the successful installation and its inspection and further after the on-site training imparted, if it is the requirement of the tender document.

**19. Currency:-**

The rates be quoted in Indian Currency (INR). However, in case of imported item it may be quoted in foreign currency where in the date of floating of tender will be taken as the conversion date for bid evaluation and comparison purpose

**20. Earnest Money Deposit (EMD):-**

The earnest money of the amount, as per the slab given below, in the form of bank draft Payable at Hisar and drawn in favor of the Registrar, Guru Jambheshwar University Of Sc. & Tech. Hisar or an irrevocable bank guarantee, will be required to be remitted with the tenders. **EMD should be enclosed with price bid and the same should be indicated in the Technical bid also.**

**21. Arbitration :**

In case of any dispute both the parties will be bounded by the decision of the Vice-Chancellor, GJUS&T, Hisar, as the arbitrator.

**22. Jurisdiction:-**

All disputes shall be subject to Hisar jurisdiction.



**23. EMD Slab:-**

<b><u>Sr. No.</u></b>	<b><u>Contract Value</u></b>	<b><u>Earnest Money</u></b>
1.	Rs.3,00,001/- to Rs.5,00,000/	Rs.20,000/-
2.	Rs. 5,00,001/- to Rs. 10,00,000/-	Rs.40,000/-
3.	Rs. 10,00,001/-to Rs.20,00,000/-	Rs.70,000/-
4.	Above Rs. 20,00,000/-	Rs. 1,00,000/-

The terms & conditions of tender have been read and I/We certify that I/We clearly understand the same and undertake for its compliance

Place:-----

Dated: \_\_\_\_\_

Signature of authorized  
Representative of the bidding  
Firm/company with seal.  
(Affix Rubber Stamp of the firm)

**GURU HAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR-125001**

**TENDER NO.:** 05/02/2020/EE-49

**DATE:** \_\_\_\_\_

**SPECIAL TERMS & CONDITIONS, IF ANY:** \_\_\_\_\_

**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR**

**Format of Tender – Price/commercial bid**

**TENDER NO & DATE : 05/02/2020/EE-49**

**A. BASIC/ EX -WORKS PRICE.**

<b>Sr. No.</b>	<b>Brief Description of the Equipments/ Software/ Furniture</b>	<b>Specifications</b>	<b>Qty</b>	<b>* Cost per Unit</b>	<b>* Total Cost</b>

**\* SPECIFY CURRENCY**

**B. Over Head Charge (Taxation etc.)**

Sr.No	Nature of Overhead Charges (Tax/insurance/freight etc.)	Rate	Total amount (Rs)

Total A +B = Rs ----- ( in words Rs.....)

We agree to supply the above Equipments/software/Furniture in accordance with the above technical specifications for a total contract price referred as above, with in the period specified in the Invitation for Tender. We also confirm that the normal commercial warranty/guarantee as per tender document shall apply to the offered Equipments/Software/Furniture.

Signature of Supplier

Correspondence address of the company

With phone, Fax, and E-mail and

Name & address of contact person.

Place:-

Date:-

Signature with seal

## ANNEXURE-1

**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY HISAR**

**TENDER NO & DATE: 05/02/2020/EE-49**

### **TECHNICAL SPECIFICATION / TECHNICAL DATA SHEET OF THE EQUIPMENT/ITEM REQUIRED**

S. No.	Description of the Equipment(s) with Technical Specifications
1.	<p><b>Experiment:</b> To study the performance of single-phase half-wave and full-wave uncontrolled rectifiers.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p> <p>Rectifier. : Two or more</p> <p>Switch : One to select half OR full wave uncontrolled rectifier</p> <p>Step down transformer : One 12/0/12 @ 0.2Amp</p> <p>Resistive load : One fixed Wire wound</p> <p>Meters : Two analog (AC / DC volts)</p> <p>Test Points : Input / Output</p> <p>Input Mains : 220V/50Hz AC</p> <p>Instruction manual : One</p>
2.	<p><b>Experiment:</b> To study the operation of single-phase full- wave phase control of a D.C. load using (i) a fully-controlled full-wave rectifier. (ii) A half-controlled full-wave rectifier.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p> <p>S.C.R. : Four or more</p> <p>Switch : One to select half controlled OR full controlled full wave Rectifier.</p> <p>Trigger circuit : Digital, Ramp/Comparator</p> <p>Freewheeling Diode : One through switch select</p> <p>Pulse transformer : Two (1:1):1</p> <p>Power diodes : Two</p> <p>Resistive load : Fixed Wire wound</p> <p>Inductive load : Fixed Inductance</p> <p>AC Supply : Fixed AC supply</p> <p>Trigger supply : AC 10-0-10V</p> <p>Test Points : Separate for waveforms of gate and power circuit.</p> <p>Mains : 220V/50Hz AC</p> <p>Instruction manual : One</p>
3.	<p><b>Experiment:</b> To study speed control of a D.C. motor using single-phase half and fully controlled bridge converters.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p> <p>S.C.R. : Four or more</p> <p>Switch : One to select half controlled OR full controlled full wave Rectifier.</p> <p>Trigger circuit : Digital, Ramp/Comparator</p> <p>Freewheeling Diode : One through switch select</p> <p>Pulse transformer : Two (1:1):1</p> <p>Power diodes : Two</p> <p>Load : Sep - ex dc motor FHP rating.</p>

	AC Supply : Fixed AC supply Trigger supply : AC 10-0-10V & +5V. Test Points : Separate for waveforms of gate and power circuit Mains : 220V/50Hz AC Instruction manual : One
4.	<b>Experiment:</b> To study speed control of a D.C. motor using three-phase half and fully controlled bridge converters. <b>Major Equipment Required:</b> Trainer Kit <b>Technical Specification</b> S.C.R. : Six or more Switch : One to select half controlled OR full controlled full wave Rectifier. Trigger circuit : Digital, Ramp/Comparator Freewheeling Diode : One through switch select Pulse transformer : Six (1:1) Power diodes : Three Load : Sep - ex dc motor FHP rating. AC Supply : 3 phase step down AC supply Trigger supply : AC 10-0-10V and +5V. Test Points : Separate for waveforms of gate(3) and power circuit Mains : 3 phase 50Hz AC
5.	<b>Experiment:</b> To study and test buck, boost and buck- boost regulators. <b>Major Equipment Required:</b> Trainer Kit <b>Technical Specification</b> MOSFET : One Trigger circuit : Variable pulse width Fast recovery Diode : One Optocoupler : One with MOSFET driver Inductor : One (200uH / 1.5Amp) Capacitor : One (high ripple rated) load : Fixed Resistive DC Supply : 12V / 0.75Amp short circuit protected. Test Points : gate, inductor current, output etc. Mains : 220V 50Hz AC Instruction manual : One Meter : Voltmeter
6.	<b>Experiment:</b> To study Control speed of a single-phase induction motor using single phase AC voltage regulator. <b>Major Equipment Required:</b> Trainer Kit <b>Technical Specification</b> S.C.R. : Two (anti parallel) Trigger circuit : UJT relaxation oscillator line synchronized Pulse transformer : One (1:1):1 Load : AC induction motor FHP rating. AC Supply : Fixed AC supply Trigger supply : AC 10-0-10V and +12V. Test Points : Separate for waveforms of power circuit. Mains : 220V/50Hz AC Instruction manual : One

7	<p><b>Experiment:</b> To study speed control of dc motor using single-phase dual converter.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p> <p>S.C.R. : Eight or more</p> <p>Trigger circuit : Digital, Ramp/Comparators</p> <p>Pulse transformer : Four (1:1):1</p> <p>Load : Sep - ex dc motor FHP rating under load.</p> <p>Inductor : One intergroup inductor</p> <p>AC Supply : Fixed isolated AC supply</p> <p>Trigger supply : AC 10-0-10V, <math>\pm 12V</math> &amp; <math>+5V</math>.</p> <p>Test Points : Separate for waveforms of gate1 and gate2 and power Circuit.</p> <p>Meter : One analog (centre zero) ammeter.</p> <p>Mains : 220V/50Hz AC</p> <p>Instruction manual : One</p>
8	<p><b>Experiment:</b> To study single phase diode clamp multi-level inverter.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p> <p>MOSFET : Eight or more</p> <p>Clamp diodes : Four</p> <p>Trigger circuit : Pulse steerer (1) with opto-coupler and driver (8).</p> <p>Pulse Generator : PIC uC based (fixed clock frequency).</p> <p>Modulation : EPWM (fixed frequency)</p> <p>Load : Fixed resistive load.</p> <p>Capacitors : Two large surge current rated.</p> <p>Bleeding resistors : Two wire wound.</p> <p>DC Supply : Fixed 24V / 1Amp short circuit protected.</p> <p>Trigger supply : DC 5V / 0.5A</p> <p>Test Points : gating and output.</p> <p>Mains : 220V/50Hz AC</p> <p>Instruction manual : One</p>
9	<p><b>Experiment:</b> To study three phase PWM inverter using IGBT.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p> <p>IGBT : Six or more</p> <p>Trigger : Optocoupler with driver (6)</p> <p>Pulse gen : PIC uC based</p> <p>Frequency : 10 - 50 Hz.</p> <p>Modulation : SPWM (fixed clock, variable width upto 256 ordinates).</p> <p>Dead time : 1.5 microsec.</p> <p>Load : Fixed 3 phase inductive load (star).</p> <p>Bleeding resistor : One wire wound.</p> <p>DC Supply : Fixed 110V / 1Amp short circuit protected.</p> <p>Trigger supply : DC 5V / 0.5A</p> <p>Test Points : gating (3) and output voltage (3) &amp; current (1).</p> <p>Mains : 220V/50Hz AC</p> <p>Instruction manual : One</p>
10	<p><b>Experiment:</b> To study single phase inverter with square wave quasi square wave and SPWM control.</p> <p><b>Major Equipment Required:</b> Trainer Kit</p> <p><b>Technical Specification</b></p>

	MOSFET : Four Trigger : Optocoupler with driver (4) Pulse gen : Comparator and inverter based. Frequency wave : Fixed, sine / Triangular / square. Modulation : Square wave (dead time 10 uS), Quasi square wave (pulse width adjustable for d.f.0.2 to 0.98) and SPWM with 36 ordinates. Load : Fixed resistive and inductive load. Select switch : Three DC Supply : Fixed 24V / 1Amp short circuit protected. Trigger supply : DC $\pm$ 12V / 0.5A. THD filter : One Test Points : gating (2) output voltage & current. Mains : 220V/50Hz AC Instruction manual : One
11	<b>Experiment:</b> To study six pulse fully controlled rectifier feeding R and RL loads. <b>Major Equipment Required:</b> Trainer Kit <b>Technical Specification</b> S.C.R. : Six (prewired in full wave configuration) Trigger circuit : Digital, Ramp/Comparator Pulse transformer : Six (1:1) Load : Fixed resistive and inductive. AC Supply : 3 phase step down AC supply Trigger supply : AC 10-0-10V Test Points : Separate for waveforms of gate(6),and for voltage, current Mains : 3 phase 50Hz AC Instruction manual : One
12	<b>Experiment:</b> To study of single phase cyclo-converter. <b>Major Equipment Required:</b> Trainer Kit <b>Technical Specification:</b> S.C.R. : Four or more Trigger circuit : Digital, for frequency 25, 16.3 & 12.5 Hz. Pulse transformer : Two (1:1):1 Load : AC induction motor FHP & Resistive load. Inductor : One intergroup inductor AC Supply : Fixed isolated AC supply (120 - 0 - 120V / 2A) Trigger supply : AC 10-0-10V and +5V. Test Points : Separate for waveforms of P -N group and, voltage, current Mains : 220V/50Hz AC Instruction manual : One
13	<b>Experiment:</b> To study of three phase cyclo-converter. <b>Major Equipment Required:</b> Trainer Kit <b>Technical Specification:</b> S.C.R. : 36 Trigger circuit : Digital, frequency variable upto 25Hz. Pulse transformer : 36 (1:1) Load : Resistive load (3-phase star). Inductor : Three intergroup inductors AC Supply : Fixed isolated 3 phase AC supply (60/2A phase) Trigger supply : DC $\pm$ 12V / 0.3A and 3 phase line sync voltage. Test Points : power circuit

	Mains : 3 phase /50Hz AC Instruction manual : One
14	<b>100 MHz DSO</b> <b>Technical Specification:</b> No of Channels : 02; Bandwidth: 100 MHz Sampling Rate (Each Channel simultaneously ) :1GS/s on both channels simultaneously FFT Function: Dedicated short key for FFT, Zoom on FFT and Simultaneous display of Time & FFT Display: 7 inch WVGA or better Frequency Counter Function: Dual Channel, 6 digit or better No. of Direct Measurements: 34 or more Courseware Feature: DSO should have capability of course content storage/integration up to 100MB and direct report generation Auto set : Enable/Disable function protected with password Interface :USB Host on front panel , USB device port on back panel Accessories : Probes : 2 Nos., Certificate of Calibration, CD: containing product documentation and software for Course Content Generation compatible with DSO Manufacturer should have service centre & NABL Accredited Lab in India
15	<b>Function Generator</b> <b>Technical Specification:</b> Output (Square wave, sine wave, triangle wave, TTL pulse, positive and negative ramp, pulse and skewed sine wave, AM, and sweep functions) 01 Hz to 10 MHz, up/down range switchable in eight decade steps.
16	<b>Multimeter</b> AC/DC voltage up to 1000 volts, AC/DC current up to 10Amperes, and resistance up to 50 Mega Ohm, frequency up to 100KHz, capacitance up to 10 Microfarad, read true RMS value of AC current and voltage.

HISAR  
DATED:

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SIGNATURE  
{ CONCERNED CHAIRPERSON, UNIV. TEACHING DEPTT }  
(WITH OFFICE SEAL)  
=====

BIDDER'S ACKNOWLEDGEMENT

I UNDERTAKE TO SUPPLY THE EQUIPMENT / ITEM AS PER ABOVE TECHNICAL SPECIFICATIONS

PLACE: (SIGN WITH SEAL OF THE BIDDER)

DATED :