



VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, ODISHA

P.O: Engineering College Burla (Siddhi Vihar), Dist: Sambalpur
Odisha– 768018, India

Website : www.vssut.ac.in, E-mail: registrar@vssut.ac.in, Ph:(0663)2430573,Fax-2430592

TENDER CALL NOTICE

Advt. No.VSSUT/EL&TCE/ 611

Date: 14/09/2017

Sealed Tenders are invited by the undersigned from the intending reputed original equipment manufacturers/Direct importers/Registered authorized dealers and experienced firms for supply of equipment for different Laboratories of Electronics and Telecommunication Engineering Department, VSSUT, Burla. The last date of submission of Tender is 16.10.2017 up to 05:00 PM. The technical bid shall be opened on 19.10.2017 at 11:00 AM. For details visit University website www.vssut.ac.in.

Sd/
Registrar

Memo No. VSSUT/ EL&TCE/ 612(7)

Date 14/09/2017

Copy to:

1. M/s Display lines, 219, Saheed Nagar, Bhubaneswar-751007 with a request to publish the above advertisement in all edition of The Samaj (Odia daily) and all India edition of The Indian Express (English daily) newspapers using minimum space at I & PR approved/lowest rates. The bills may be sent to the Registrar, VSSUT, Burla- 768018 in TRIPLICATE along with copies of the paper in which the publication is made, for necessary payment.
2. The University/Department Notice Board for publicity.
3. Dean F&P, with a request to hoist the tender call notice in the University web site www.vssut.ac.in for wide publicity.
4. HOD, EL& TCE for information and necessary action.
5. S.O. Accounts, for information and necessary action.
6. PA to Vice-chancellor for kind information of Hon'ble Vice-Chancellor.
7. Steno to Registrar for record. This is based on the allotment of funds to the Department of EL & TCE under the programme for Infrastructure Development vide VSSUT/F&P-124/1657/2017 dated 03.08.2017 and balance RUSA fund as per approval of the proposal for procurement of equipment by Hon'ble Vice-Chancellor dt. 08/09/2017.

REGISTRAR

SECTION - I: INVITATION FOR BIDS (IFB)

Sealed Bids (properly stitched separately) in two separate covers (Technical Bid and Price Bid) are invited by the “The Registrar, Veer Surendra Sai University of Technology, Odisha” from the Original Equipment manufacturers/ Importers/ authorized distributors/ dealers for supply of Instruments, equipments, machineries etc. of reputed make (National/ International) for the Department of Civil Engineering, VSSUT Burla, Odisha.

The Bidders may download the Tender Documents directly from the website available at <http://www.vssut.ac.in> and the Tender cost fee of Rs.1000/- (Non-refundable) by way of separate Demand Draft drawn in favour of “The Registrar, Veer Surendra Sai University of Technology, Burla” payable at SBI, Burla should be enclosed along with the Bid. The Tender cost fee and the EMD amount should be submitted separately in separate demand drafts. In case of any bid clarification, responsibility lies with the bidders to collect the same from the website and the purchaser shall have no responsibility for any delay/ omission on part of the bidder.

TIME SCHEDULE:

- a) Date of commencement of downloading bidding document - 15/09/2017 at 11.00 AM
- b) Last date and time for Receipt of bids - 16 /10/2017 up to 5.00PM
- c) Time and date of opening of Tender & Technical bid - 19/10/2017 at 11.00 AM
- d) PLACE OF OPENING OF TENDER, ADDRESS FOR COMMUNICATION AND RECEIPT OF BID DOCUMENTS:

THE REGISTRAR
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, ODISHA
At- Burla, PO - Burla Engineering College, Dist-Sambalpur-768018
Tel. No-0663-2430211 Fax No-0663-2430204

Sd/-
REGISTRAR
VSSUT Burla

SECTION-II: GENERAL TERMS AND CONDITIONS

1. Document Establishing Bidder's Eligibility & Qualification

The Bidders shall furnish as part of the Bid the following Documents establishing Bidder's eligibility and qualification to the Purchaser's satisfaction. Non-compliance of any of these conditions shall disqualify the eligibility.

1.1 Original Equipment manufacturers/ Importers/ authorized distributors/ dealers having valid license / certificates for the quoted item and the direct Importers holding valid Import License Manufacturer / Authorized Distributor / Dealer of the product are eligible to participate in the Bid.

1.2 The Bidder whether manufacturer/ distributor/ dealer must have experience of supply and installation of the quoted items in different IITs/ NITs/ Institutes of national repute during last preceding 3(Three) years reckoned from the date of bid opening and the details such as Performance/ Market standing certificate establishing that the Bidders have executed supply of similar items as mentioned in Schedule of Requirement of instruments and equipment to different IIT/ NIT/ Institute of national repute must be submitted along with documentary proof including purchase orders from the institute. A list of organisations / institutes with their detailed address, contact telephone and email address, to whom the quoted items were supplied is to be attached with the technical bid.

1.3 The Bidders shall have to produce document in support of their service associates preferably nearest to Bhubaneswar / Sambalpur, Odisha.

1.4 The Bidder shall quote items of one reputed Brand/model with all accessories in complete to perform functionality of Equipment/Machinery.

2. Document Establishing Goods Eligibility

The instruments and equipment offered against the schedule of requirement of instruments, equipment should be in accordance with the stipulated specifications and of one reputed brand/model (N.B: Variation in specification is allowed up to $\pm 5\%$ in case of Machineries/Equipments)

2.1 The documentary evidence establishing the brand and the model may be in the form of literature, pamphlets, manuals, drawing, circuit diagram etc.

2.2 Detailed description of instruments and equipment with essential technical and performance characteristics may also be furnished.

3. Technical Bid (COVER - A)

The following document should be submitted in cover-A.

3.1 Earnest Money Deposit

3.2 Technical details of the equipment and machineries as per Annexure-V

3.3 Copy of the manufacturing license/ import license/ Authorized Distributor/ Dealer certificates

3.4 Copy of the authorization from the Manufacturing Company in case of Authorized Distributor /Dealer.in Annexure-III along with Manufacturer Industry Registration and Tax Registration Certificate.

3.5 Tax clearance certificate up to date where applicable.

3.6 Copy of the IT PAN Card, GSTIN.

3.7 Detail name, address, telephone no. fax, e-mail of the firm and of the Director/ Managing Director/ Proprietor of the firm (As per Annexure IV)

3.8 Address, Telephone No., e-mail, Fax of the Branch Office/ Contact Person/ Liaisoning Office in Odisha. (As per Annexure IV)

3.9 Power of Attorney/ Authorization to a person for liaisoning and monitoring the business on behalf of the manufacturer / bidder but not entitled to raise the bills.

3.10 The original bid document signed & sealed by authorized person in each page as a token of acceptance of all terms and conditions of the tender with original receipt.

3.11 Any deviation in the specification of the item including standard accessories / optional accessories in complete for functionality of Machine should be marked in bold letters.(N.B: Variation in specification is allowed upto $\pm 5\%$ in case of Machineries/Equipments)

4. Price Bid (COVER – B)

4.1 The hard copy of price bid giving the rates for various instruments & equipment and other items should be submitted along with sealed soft copy of price bid in Excel format through CD/Pen drive both in separate sealed cover here in after called Cover B (Price Bid). Price Bid (Cover - B) of the bidders who qualify in Technical Bid (Cover – A) will only be opened and will be communicated through E-mail/Fax.

4.2 The price of the each item shall be quoted as per the prescribed Price Schedule Format at Annexure-I along with price break up of Taxes admissible, Packing, Forwarding and Handling charges, Insurance charges, ET, Freight up to destination including unloading, commissioning including testing and training with total price per item at FOR VSSUT Burla. The bidders are required to submit the individual price of each instrument(s) and equipment(s) as indicated in the schedule of requirements. For imported equipments the quoted price should be in currency of the country of origin.

4.3 Each quoted item and all accessories should cover the warranty / guarantee for 2 (two) year from the date of commissioning (Annexure-II).

4.4 The Cover B of the technically qualifying bidders shall be only opened at the conference Hall of VC Secretariat,VSSUT, Burla on the date and time to be communicated to them after technical evaluation of Cover A by E-mail/Fax.

5 BID CONDITIONS

5.1 The bidders should verify the sites of existing laboratories of Department of Electronics and Telecommunication Engineering, VSSUT, Burla for necessary Technical Evaluation. The scope of Supply as mentioned in the schedule of requirements if not sufficient for full function of the Equipment/Machinery should be intimated in writing with the technical bid.

5.2 The quoted rate shall not vary with the quantum of order placed or destination point.

5.3 A copy of the original bid conditions and the schedules should be signed by the bidder at the bottom of each page with the office seal duly affixed and returned along with the bid. Bid schedule should be duly filled in with an index and page number for the documents, enclosures & EMD etc. Paging must be done for all the documents submitted.

5.4 Bids should be type written or Computerized and every correction/ over writing in the bid should invariably be attested with signature of the bidder with date before submission of the bids to the authorities concerned. No revision of price upward or downward will be allowed once the bid is opened. However the purchaser shall have the right for considering the exchange rate of foreign currencies on verification of documents.

5.5 Bid Price

- The contract shall be for the full quantity as described above. Corrections, if any, shall be made by crossing out, initialling, dating and re-writing.
- All duties, taxes, and other levies payable on the raw materials and components, job contract shall be included in the total price.
- Taxes in connection with the sale shall be shown separately.
- The rates quoted by the bidders shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
- The price shall be quoted in Indian Rupees only.

5.6 Tax clearance

Copies of valid Tax clearance Certificates shall be furnished by the Bidders and the originals of the above certificates shall be produced to the purchaser before placement of notification of award if asked for by the Purchaser.

5.7 EMD

All bidders are required to submit EMD not less than 2% of the quoted amount in shape of Demand draft drawn in favour of "The Registrar, Veer Surendra Sai University of Technology, Burla" payable at SBI, Burla only. The EMD shall be in Indian Rupees.

NOTE: Non-submission of EMD or submission of less EMD than the desired one or submission of EMD in any other form except Demand Draft shall result in rejection of Bid. The EMD deposited against other Bids cannot be adjusted or considered for this Bid. No interest is payable on EMD.

5.8 SUBMISSION OF BIDS

Sealing and Marking of Bids

Bid should be submitted only through REGISTERED POST /SPEED POST in two Bid system containing two parts as detailed below.

Sealed Cover-A: Technical Bid.

Sealed Cover-B: Price Bid (hardcopy & sealed soft copy in CD/pen drive)

Both the sealed envelopes should then be put in one outer cover and each cover should have the following indication:

- i) Reference No of Bid _____
- ii) Due date & time for submission of the Bid _____
- ii) Name of the Firm _____

NOTE: A. Bids submitted without following two bid system procedures as mentioned above will be summarily rejected.

B. Please Note that prices should not be indicated in the Technical Bid. The Prequalification document including EMD as required in the Bid document should invariable be accompanied with the Technical Bid (**Cover A**). The outer envelope shall indicate the name and address of the bidders to enable the bid to be returned unopened in case it is declared "late". If the cover containing the outer envelope is not sealed and marked as required, **Purchaser** will assume no responsibility for the bid's misplacement or premature opening.

The above procedure shall be adopted both for the Technical bid and price bid separately. Telex, cable, email or facsimile bids and bids submitted by hand will not be entertained.

5.9 Deadline for Submission of Bids

Bids must be received by the **Purchaser** at the address specified not later than the time and date specified in the Invitation of Bids. In the event of the specified date for the submission of

bids being declared a holiday for the **Purchaser**, the bids will be received up to the appointed time on the next working day. The **Purchaser** may, at its discretion, extend this deadline for submission of bids by amending the bid document, in which case all previous rights and obligations of the purchasers and bidders will remain same till the extended date.

5.10 Modification and Withdrawal of Bids

No Modification and Withdrawal of Bids is allowed between the interval of time of submission and the last date and time of the bids.

No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the bidders on the bid form.

5.11 BID OPENING

The **Purchaser** will open all bids, in the presence of bidder's representatives who choose to attend at **11.00 AM on dated 19/10/2017 at the Office of the Registrar, Veer Surendra Sai University of Technology, Burla**".

5.12 The bidder's representatives who are present shall sign a register evidencing their attendance. In the event of the specified date of bid opening being declared a holiday for the **Purchaser**, the bids shall be opened at the appointed time and location on the next working day.

5.13 The bidder's names, and the presence or absence of the requisite EMD and such other details as the **Purchaser**, at its discretion, may consider appropriate will be announced at the opening. No bid shall be rejected at bid opening, except for late bids, which shall be returned unopened to the bidders.

5.14 Acceptance of the Bid

- Bidders submitting bids would be considered who have considered and accepted all terms and conditions. No enquiries, verbal or written, shall be entertained in respect of acceptance or rejection of the bid.
- Genuine equipment and instrument etc. should be supplied. Bidders should indicate the source of supply i.e. name and address of the manufacturers from whom the items are to be sourced.
- Supply of equipment means – Installation and Commissioning (except civil works), Demonstration as well as Training at site. No separate charges will be paid on this account.

5.15 Rejection of the Bid

The Bid document shall be out-rightly rejected under following stipulation and no correspondence will be entertained whatsoever.

- If the Bidders has not furnished the required Tender paper cost and EMD or EMD exemption certificate from competent authority.
- If the Bidders has not submitted the Price as per the prescribed format Annexure-I
- If the bid is not supplemented with breakup of standard accessories / Optional accessories & cost of AMC separately for three years after completion of warranty period (In case of major machinery only).
- Photo copy of the up-to-date valid manufacturing license/ import license (if it is imported) /dealership certificate/Distributor certificate of the product along with Tax registration Certificate of Manufacturer issued from competent authority.
- If the bidders, whether manufacturer or authorized distributor/ dealer have not supplied the required quantity for qualification as per the eligibility criteria and not submitted the performance statement at Annexure-IV with supporting documents.

- If the quoted product of the bidders not confirms to technical specification with complete accessories for functional Equipment/Machinery and standard of workmanship required by the Purchaser.
- If the bidder has not furnished technical details of the equipments and machinery with one make & model as per Annexure-V.
- If bidder will quote items of more than one make/model.
- If the bidder has not submitted the detailed catalogue, Foundation drawings & schedule of supply of items, if required.
- If the bidders have not agreed to give bid validity.
- Furnishing of wrong/ambiguous information in the compliance statement may lead to rejection of bid and further black listing of the bidder, if prima-facie it appears that the information in the compliance statement was given with a malafide/fraudulent intent.

5.18 Purchaser's Right to accept any Bid and to reject any Bid

The Purchaser reserves the right to accept or reject any bid and to annul the bidding process and reject all the bids without assigning any reason thereof at any time prior to award of Contract, without thereby incurring any liability to the affected Bidders or Bidders on the grounds of such action of the purchaser. In case no bidder qualifies as per qualifying criteria and standards, purchaser may at his discretion relax qualification criteria for award of contract.

5.19 Evaluation and Comparison of Bids

The comparison shall be of FOR destination price basis including the price of all costs wherever applicable as well as duties and taxes paid or payable on Machineries, instruments & equipment incorporated or to be incorporated in the items including the warrantee/guarantee period from the date of installation.

- The Purchaser's evaluation of a bid will take into account, in addition to the bid price and the price of incidental services.
- The purpose of bid evaluation is to determine substantially responsive bid with the lowest evaluated cost, but not necessarily the lowest submitted price, which should be recommended for award.
- Evaluation of bids should be made strictly in terms of the provisions in the bid document to ensure compliance with the commercial and technical aspects.
- The past performance of the suppliers will be taken into account while evaluating the bids.
- Cost of the inland transportation, insurance and other costs within the Purchaser's Country incidental to delivery of the goods to their final destination;
- Alternative options of offer shall not be allowed.
- Each Bidder shall submit only one quotation with one make & model.
- The quotation would be evaluated separately for each item
- Sales Tax in connection with sale of goods shall not be taken into account in evaluation.

6.0 Supply Conditions

6.1 Delivery of Goods

The delivery of goods shall be made by the supplier to the Consignee in accordance to the order placed as shall be detailed in the Schedule of requirements & technical specifications.

6.2 Warrantee Period (comprehensive)

The Bidders must quote for a minimum period of **2 (Two) years** of comprehensive **warranty** from the date of completion of the satisfactory commissioning as per (**Annexure-II**). This also includes all accessories related to instruments & equipment quoted for.

6.3 Payment Terms

No advance payment will be made by the Purchaser to the supplier for performance of the contract. 100% of the contract price shall be paid within 30 (thirty) days after satisfactory supply, installation, demonstration, Commissioning & training and stock entry of bills of the goods within due date of delivery.

6.4 Transportation

The Supplier shall be required to meet all transport and storage expenses until commissioning of the instrument(s) / equipment covered in the contract.

6.5 Taxes and Duties

The Supplier shall be entirely responsible for payment of all Taxes, Duties etc. incurred until delivery of the contract goods to the Consignee subject to recovery afterwards in the bill as claimed in the Bid offer. Income Tax as applicable shall be deducted at source.

6.6 Period of Validity of Bids

- The bid rates should be kept open/ valid for a period of **180** days from the date the Bids are opened.
- A bid valid for a shorter period i.e less than **180** days shall be rejected, as nonresponsive.
- In absence of any indication of the date of validity in the bid, it will be presumed that the offer will remain valid for the minimum period i.e. **180** days as prescribed above.

6.7 Penalty against Non Supply

In case of non supply of Stores within the due date i.e. within the date of delivery the EMD deposited by the bidder shall be forfeited.

6.8 Annual Maintenance Contract

The Cost of Annual maintenance contract for next 3 years after warranty period shall be submitted as per the **Annexure at I(b)** . The after sales service during and after the warranty / guarantee period should be available from companies own engineers.

6.9 Jurisdiction of the Court

The Purchaser and the Supplier shall agree that the competent Court at Sambalpur shall have the jurisdiction to try and decide anything between the parties and they may approach the Competent Court at Sambalpur if required at any time.

Sd/-

**REGISTRAR
VSSUT, Burla**

SECTION – III: FORMS AND ANNEXURES
ANNEXURE-I (a)

PRICE SCHEDULE (ITEM WISE)

Name of the Firm: _____

Item Sl.No.	Item descriptio n with make & model	Quan tity/ Unit	Price for each unit							(TUP) Total unit price = (a+b+c +d+e+f)	Total= (Qty x TUP)
			Base price (a)	ED/CD ,if any (b)	P &F, if any (c)	Freight charge, if any (d)	Entry Tax,if any (e)	Unit price (a+b+c+d+ e)	GST (f)		

Note- (i) Price Bid proforma should be provided individually for all equipments.

(ii) Taxes like GST, Freight and or other taxes/ Charges, if any applicable must be explicitly mentioned in this price bid. Any type of correction/ addition in price schedule shall not be permissible. **Taxes mentioned elsewhere except this price bid will not be taken into consideration.**

ANNEXURE-I (b)

PRICE SCHEDULE (ITEM WISE) - B

PRICE SCHEDULE FOR ANNUAL MAINTANCE CONTRACT AFTER COMPLETION OF WARRANTY PERIOD.

Sl. No	Brief description of Goods Total annual	Quantity in nos.				Annual Maintenance Contract cost 3 years i.e. 3x (4a+4b+4c)
			4			
1	2	3	1st yr.	2nd yr.	3rd yr.	
			(a)	(b)	(c)	

Note:-

1. The cost of Annual Maintenance Contract (AMC) which includes preventive maintenance including testing & calibration as per technical/ service/ operational manual, labour and spares, after satisfactory completion of warranty period may be quoted for next 3 years on yearly basis for complete equipment and turnkey (if any).
2. The cost of AMC may be quoted along with taxes applicable on the date of bid opening. The taxes to be paid extra should be specifically stated. In absence of any such stipulation the price will be taken inclusive of all taxes and no claim for the same will be entertained later.
3. Cost of AMC will not be added for Ranking/Evaluation purpose. However, the cost of AMC for lowest evaluated bidder is subject to negotiation.
4. The payment of AMC will be made as per payment terms of the bid document.
5. The uptime warranty and down time penalty shall be as per the bid document.
6. All software update should be provided free of cost during AMC period.
7. The stipulations in Technical Specification will supersede above provisions.
8. The supplier shall keep sufficient stock of spares require during Annual comprehensive Maintenance Contract period. In case the spares are required to be imported, it would be the responsibility of the supplier to import and get them custom cleared and pay all necessary duties.

Place:

Date:

Signature of Bidder
Business Address
Seal of the Bidder

ANNEXURE - II

WARRANTY MAINTENANCE CONTRACT AGREEMENT.

THIS AGREEMENT made the.....day of, 20___ between the “**The Registrar, Veer Surendra Sai University of Technology, Burla**” (hereinafter “the Purchaser”) of the one part and M/s..... (Herein after called “the Supplier”) of the other part: WHEREAS the Purchaser invited bids for certain Goods & ancillary services viz, supply and commissioning of the instruments & equipment at Burla including Comprehensive Warranty Maintenance Services and has accepted a bid by the Supplier for the instruments & equipment specified below at the Consignee site including Comprehensive Warranty maintenance Services for a period of 2 (Two) year from the date of installation & commissioning of the instruments & equipment as per award of Contract No..... Dated.....

Name of the Equipment & machineries	Qty
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(To be filled in as per details of goods in the award of Contract)

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. Maintenance Services shall consist of Preventive and Corrective maintenance of equipment specified above & will include repair and replacement of parts free of cost.
2. Preventive maintenance, monthly once, which includes:
 - 2.1 Check-up to ensure that device connection is proper, cabling is at proper condition etc.
 - 2.2 Cleaning of the above instruments & equipments and checking the System Performance.
3. The Supplier is to furnish the tentative schedule of the preventive maintenance of Warranty Maintenance Contract (WMC) to be carried out.
- 4 The parts replaced must be new parts or equivalent in performance to new parts.
5. The Supplier will also provide the same maintenance service in case of the movement of equipment from the place of original installation to a different place or location, if the equipment is shifted by the Purchaser to another place or location at the cost and risk of the purchaser.

6. Any complaint informed through telephone must be acknowledged with a Complaint No. by the Supplier which will be noted by Consignee. All further contact with the Supplier on such complaint will be initiated through that Complaint No. Once rectification is done; that number will be cancelled by both parties. A register is to be maintained by the Supplier where complaints are to be noted along with Complaint No.
7. The maintenance shall normally be done at the earliest.
8. The Service Engineer of the Supplier will be allowed to handle the respective plant & machineries only in presence of the officer in charge at the Consignee site.
9. The Supplier should ensure that maintenance job is not hampered/ delayed due to paucity of spares/inadequate manpower etc.
10. The Supplier should submit the services call report, to the Consignee for each and every service call without fail.
11. The Supplier evaluation data format for the WMC of Consignee systems may be filled up for necessary action.
12. All formats after filled up should be signed at the end of each page by the Supplier.
13. After completion of the work/repair/maintenance, the Purchaser shall issue a certificate of completion to the supplier to that effect.

Signature

Signature

For the Purchaser

For the Supplier

Name:

Name:

Designation:

Designation:

Address:

Address:

Telephone No:

Telephone No:

ANNEXURE-III

MANUFACTURES' AUTHORISATION FORM

No. _____ / Date _____ /

To
The Registrar,
VSSUT Odisha
Burla, Sambalpur.

Dear Sir, Bid No. _____

We _____ who are established and reputable manufacturers of _____ having factories at _____ (Address of Factory) do thereby authorize M/s. _____ (Name and address of Agent) to submit a bid and sign the contract with you against the above bid.

* No company or firm or individual other than M/s. _____ are authorized to bid and conclude the contract in regard to this business against this specific invitation for bid.

We hereby extend our full guaranty and warranty as per general conditions of contract for the goods and services offered by the above firm against this bid.

Yours faithfully,
(Signature for and on behalf of Manufacturers)

Note: This letter of authority should be on the letterhead of the manufacturer and should be signed by a person, competent and having the power of attorney to bind the manufacturer. It should be included original by the Bidders in its bid.

- This para should be deleted for simple items where manufacturers sell the product through different stockiest.

ANNEXURE-IV

DETAILS OF THE BIDDERS

Bid Reference No.

Name and address of the Bidder:

01 Name of the bidder

- a) Full postal address
- b) Full address of the premises
- c) Telegraphic address
- d) Telephone number
- e) Fax number
- f) E mail:
- g) PAN No
- h) TIN No

02 Total annual turn-over (value in Rupees)

03 Quality control arrangement details

04 Test certificate held

- a) Type test
- b) BIS/ISO certification
- c) Any other

05 Details of staff

- a) Technical
- b) Skilled
- c) Unskilled

06 Branch Office/ Contact Person/ Liaisoning Office in Odisha.

- a) Address
- b) Telephone No.
- c) e-mail,
- d) Fax

Signature and seal of the Bidder

ANNEXURE-V

Technical details of the Machineries & Equipments to be supplied by the bidder

Bid SI No. of the item	Tender specification	Bidders Specification with make and model no (Enclose manufactures catalogue / brochure for each item)	Deviation if any With university specification

Signature and seal of the Bidder

**ELECTRONICS AND TELECOMMUNICATION ENGINEERING DEPARTMENT
SCHEDULE OF REQUIREMENTS AND TECHNICAL SPECIFICATIONS**

SI No.	Name & Specification of articles/materials	Quantity
A. BASIC ELECTRONICS LAB		
1.	<p>Analog Oscilloscope</p> <p>Bandwidth – DC – 30MHz (DC coupled), 10Hz – 30MHz (-3dB) ac coupled Vertical Deflection:-1 mV to 20 V/div 12 calibrated steps, 5 mV/div to 20 V/div in 1-2-5 seq with variable to 2 mV/div Time Base:-18 calibrated steps in 1-2-5 seq 0.5µs/div to 0.2s/div with variable to 0.2µs/div with X 10 to 20ns/div. Calibrator:-Square wave 0.2V and 2V ± 1%, 1kHz for probe compensation. Power:-220 - 240 V + 10%, 50 Hz, 40 VA (approx) , Standard accessories are to be provided with the system.</p>	10
2.	<p>Bench Type 4 ½ Digital Multimeter</p> <p>DC voltage:- 200mV/2V/20V/200V/1000V, accuracy - ± (0.05%+4) AC Voltage - 200mV/2V/20V/200V/750V, accuracy - ± (0.5%+40) DC Current - 0.2mA/2mA /20mA/200mA/10A, accuracy - ± (0.2%+10) AC Current - 0.2mA/2mA /20mA/200mA/10A, accuracy - ± (0.8%+30) Resistance: 200Ω/ kΩ/ 0kΩ/ 00kΩ/ MΩ/ 0MΩ/ 0MΩ, accuracy - ± (0.2%+5) Capacitance : 10nF/100nF/1000nF/10 F/100 F/1000 F, accuracy - ± (5%+5) Frequency – 10Hz- 10MHz Measurement Speed - Quick: 20meas/s, Slow: 3meas/s Input Impedance – 10MΩ Bandwidth – 1KHz Display Counts – 22000, Display – LCD Other Functions - Auto Manual Ranging, Diode test, Continuity test, MAX/MIN/AVG, Relative Measurement, Data Hold PC Interface – USB Power Supply – 220V AC, 50Hz Mains Cord, CD, Test Leads are to be provided</p>	05
B. ADVANCED ELECTRONIC CIRCUIT LAB		
3.	<p>Analog Oscilloscope (Specification same as sl no.1)</p>	07
4.	<p>Function Generator – 3 MHz</p> <p>Waveforms: Sinusoidal, Triangular, Square wave, DC, impulse. D.C. off-set:-All waveform. Frequency range: - 0.5Hz to 3 MHz. Output Voltage: -20mv to 20V (P-P). Frequency Display: 4 digit LCD</p>	06

<p>5.</p>	<p>Modulation:- Internal sweep or External Frequency</p> <p>Power requirement:- 230V AC +/- 10% 50Hz.</p> <p>Handheld Digital Multimeter(4 ½ Digit)</p> <p>DC voltage: -Manual mode only</p> <p>Range :200mV, 2V, 20V, 200V, 1000V</p> <p>Resolution:10µV, 100µV, 1mV,10mV,100mV</p> <p>Accuracy :200mV - 200V:± (0.02%o.rdg. +0.02%o.r.+1d)</p> <p>1000V:± (0.03%.o.rdg+0.02% o.r.+1d)</p> <p>Protection:</p> <p>Manual: 200mV - 2V: ±380V Auto: ±550V</p> <p>20V -200V: ±1000V</p> <p>1000V: ±1200V</p> <p>AC voltage: -Manual mode only</p> <p>Range 200mV, 2V, 20V, 200V, 750V/ 300V Auto</p> <p>Resolution: 10µV, 100µV, 1mV,10mV,100mV</p> <p>Protection</p> <p>Manual: 200mV - 2V Auto :20V -200V</p> <p>200V - 750V:± (0.3% o.rdg. + 0.2% o.r.+ 3d)</p> <p>Manual: 200mV - 2V:750V:</p> <p>DC CURRENT:</p> <p>Range :200µA, 2mA, 20mA, 200mA, 2000mA, 20A</p> <p>Resolution: 10nA, 100nA, 1µA,10µA,100µA, 10mA</p> <p>Accuracy: 200µA - 2000mA:± (0.1% o.rdg. + 0.05% o.r.+2d)</p> <p>AC CURRENT:</p> <p>200mA/20A, Accuracy: ± (1.5%+25)</p>	<p>06</p>
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6.	<p>Trainer boards for the following:</p> <ul style="list-style-type: none"> i. RC phase shift oscillator ii. BJT Biasing iii. JFET Biasing iv. Enhancement MOSFET v. Wein bridge oscillator vi. RC coupled amplifier using BJT vii. Opamp and its application as integrator, differentiator and comparator viii. Class A, class B and class AB BJT power amplifier <p>The above trainer boards should be enclosed in a box having inbuilt power supply, Circuit diagrams should be there on the board, points to be provided for observing voltage and waveforms in the circuit. Instruction manual, patch chord with 4mm jack to be supplied.</p>	(1x8)
C. DESIGN AND SIMULATION LAB		
7.	<p>Online UPS, 6 KVA, 1 Hour backup with 65Ah Batteries of reputed brands for computer lab application</p> <p>Specification:</p> <p>Capacity - 6K VA / 4800 W, true online double conversion design, Nominal Input Voltage - 208/220/230/240V, Nominal Input Frequency - 50Hz with range of 46 - 54Hz, Input Power Factor - ≥ 0.99 at 100% Load, Type of Rectifier – IGBT based, Nominal voltage regulation - 1%, Charging Method - Constant voltage constant current (CVCC), Charging current Capacity - 4 - 6Amps, Load power factor – 0.8, Nominal Output voltage - 208/220/230/240VAC,</p> <p>Output Frequency - Frequency Range (Batt. Mode): 50 Hz \pm 0.1 Hz, (Synchronized Range): 46Hz ~ 54 Hz @ 50Hz system</p> <p>Output Waveform – pure sine wave, Total Harmonic distortion (THD) - $\leq 3\%$ for Linear load & $\leq 7\%$ for Non linear load, Inverter - IGBT based PWM with Instantaneous Sine wave control, Power Rating- 6KVA / 4.8KW, Crest factor – 3:1,</p> <p>Overload Capacity - AC mode:100%~110%: 10min, 110%~130%: 1min, >130% : 1sec ; Battery mode: 100%~110%: 30sec, 110%~130%: 10sec, >130% : 1sec</p> <p>Frequency synchronization Band for Static. Bypass - 46 - 54Hz, Transfer (Inverter to Bypass) – 0ms,Retransfer (Bypass to Inverter) – 0ms, Automatic Bypass – inbuilt,</p> <p>Inverter Efficiency (DC to AC) - AC mode : > 93%, Overall efficiency (AC</p>	03

	<p>to AC) - Upto 91%</p> <p>Acoustic Noise Level - Less than 58dB @ 1 Meter, Ambient Temperature - 0 - 40 Deg C,</p> <p>Storage Temperature – (-15°C~60°C), Humidity - <95 % and non-condensing,</p> <p>Digital display of voltages, LED indication display, Protection for Overload/Short Ckt/Battery Deep Discharge/Low Battery/Reverse Battery/Inverter Current Limitation/Over Temperature/Output Overvoltage,</p> <p>Safety, surge and EMI standard to be mentioned.</p> <p>Battery rack to be provided.</p>	
8.	600VA UPS with inbuilt battery for desktop PC	05
9.	Split AC – 2 tons (5 star rating)	03
	Stabilizer for AC – 5 KVA, 90V – 270V	03
	The ACs are to be delivered and installed in the laboratory of the Dept. with accessories.	
D. COMMUNICATION LAB		
10.	Function Generator - 3MHz (Specification same as sl no. 4)	05
11.	<p>Communication Trainer Kits</p> <p>i. Amplitude modulation and demodulation</p> <p>ii. Balanced modulator and demodulator</p> <p>iii. FM generation and demodulation</p> <p>iv. Study of PLL (Phase locked loop)</p> <p>v. Study of VCO(Voltage controlled oscillator)</p> <p>The above trainer boards should be enclosed in a box having inbuilt power supply, Circuit diagrams should be there on the board, points to be provided for observing voltage and waveforms in the circuit. Instruction manual, patch chord with 4mm jack to be supplied.</p>	(1x5)
12.	<p>Satellite communication Trainer</p> <p>Features:</p> <ul style="list-style-type: none"> • For Simultaneous communication of three different signals • Communicate Audio, Video, Digital data, PC data, Tone, Voice, 	01

	<p>function generator waveforms etc</p> <ul style="list-style-type: none"> • 2414 - 2468MHz PLL microwave operation • Communication of external broad band digital signal • Choice of different transmitting and receiving frequencies • Should have Built-in Speaker and Microphone for Voice and Audio link • Remote detection of Light intensity and environment temperature • Detachable Dish Antenna at each station • USB port for PC communication <p>Technical Specifications :</p> <p style="text-align: center;">Uplink Transmitter :</p> <ul style="list-style-type: none"> • Transmitter with selectable frequency conversion • 2450-2468 MHz up-linking selectable frequencies • Wide band RF amplifier • 16 MHz Bandwidth • Frequency select switch and LED indication. • FM Modulation of Audio and Video. • Coverage area apppx.35m Indoor and 100m outdoor • Transmit Audio, Video, Digital data, PC data, Tone, Voice, function generator waveforms etc. • Separate section for telemetry operation. • Tone generator: • Frequency: 100Hz to 1 KHz. • Amplitude: 0V to 1Vpp. • Separate terminals to be provided for different inputs. • Power Supply: 230 V AC ± 10 %, 50 Hz <p>Satellite Link :</p> <ul style="list-style-type: none"> • Transponder with selectable Uplink and downlinks frequency conversion. • Light and Temperature sensors for telemetry operations. • Delay knob to be provided for simulated Transition delay experiment. • Detachable Dish Antennas. • Power Supply: 230 V AC ± 10 %, 50 Hz <p>Downlink Receiver :</p> <ul style="list-style-type: none"> • Receiver with selectable frequency conversion. • For demodulation of three signals simultaneously. • Built in speaker for audio and video output. • Detachable Dish Antenna. <p>Accessories to be included :</p> <p style="text-align: center;">Audio-Video Cable 2 Pin: 2 nos.,Patch Cord 16”(4 mm): 2 nos.,</p>	
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<p>13.</p>	<p>Microphone : 1 no., Dish Antenna : 4 nos, USB Cable: 2 nos, Pencil Cell (Microphone): 1 no., Mains cord : 3 nos., PC Software</p> <p>Experiments to be performed:</p> <ul style="list-style-type: none"> • Transmitting & receiving three separate Signals (Audio, Video, and Tone/ Voice) simultaneously through satellite link and perform Link Fail Operations • Transmitting & receiving Function Generator Waveforms through Satellite Link • Transmitting and receiving PC data through satellite link • Study the delay between Uplink transmitter and Downlink receiver during data transmission • Send Tele-command and receive Temperature & intensity of light from satellite • Calculate the carrier to noise ratio for a satellite link • Calculate signal to noise ratio for a satellite link <p>Optical fiber communication Trainer</p> <p>should have following features:</p> <ul style="list-style-type: none"> • Full Duplex Analog & Digital Trans-receiver • 660 nm & 950 nm Fiber Optic LED channel with Transmitter & Receiver • LED Source • AM-FM-PWM modulation / demodulation • PC-PC comm. with RS232 ports & software • On board Function Generator • Crystal controlled Clock • Functional blocks to be indicated on-board • Input-output & test points • On board voice link • Built in DC Power Supply • Numerical Aperture measurement jig and mandrel for bending loss measurement • Data Generator with selectable clock (64/ 128/ 256 KHz) • Noise Generator with variable gain • Eye pattern observation and Bit Error Rate measurement • Four digits Bit Error Counter • Switched faults on Transmitter & Receiver <p>Technical Specifications:</p> <p>Transmitter - 2 nos., Fiber Optic LED having peak wavelength of emission 660 nm & 950 nm</p>	<p>01</p>
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Receiver	:	2 nos., Fiber Optic Photodetector
Modulation Techniques:		AM, FM, PWM.
Drivers	:	1 no. with Analog & Digital modes
AC Amplifier	:	2 nos.
Clock	:	Crystal controlled Clock 4.096 MHz
PLL detector	:	1 no.
Comparator	:	2 nos.
Filters	:	2 nos. 4 th order Butterworth, 3.4 KHz cut-off frequency
Analog Band Width	:	350 KHz
Digital Band Width	:	2.5 MHz
Function Generator	:	1 KHz Sine wave (Amplitude adjustable) 1 KHz Square wave (TTL)
Voice Link	:	Fiber Optic voice link using microphone & speaker
PC-PC Communication	:	Using 2 channel RS232
Port	:	RS232 (9 Pin)
Baud Rate	:	19200
Switched Faults	:	4 in Transmitter & 4 in Receiver
Fiber Optic Cable	:	Connector type standard SMA
Cable Type	:	Step indexed multimode PMMA plastic
Core Refractive Index	:	1.492
Clad Refractive Index	:	1.406
Numerical Aperture	:	Better than 0.5
Acceptance Angle	:	Better than 60 deg.
Fiber Diameter	:	1000 microns
Outer Diameter	:	2.2 mm
Fiber Length	:	0.5m & 1m

14.	<p>Test Points : appx. 50 nos. (Gold plated)</p> <p>Inter connections : 2 mm sockets</p> <p>Power Supply : 110 -220 V, \pm 10%, 50 / 60 Hz</p> <p>Power Consumption : 4.5 VA approximately</p> <p>Operating Condition : 0-40° C, 80% RH</p> <p>Product Tutorial : to be supplied</p> <p>Accessories : Numerical Aperture measurement jig, Mandrel, Fiber Cables, Microphone, Headphone, Set of Patch Cords, PC-PC communication Software, Eye pattern and BER measurement module, Power Supply.</p> <p>Experiments to be performed</p> <ul style="list-style-type: none"> • Setting up Fiber Optic Analog & Digital link • AM system using Analog & Digital input signals • Frequency Modulation system and Pulse Width Modulation system • Study of Propagation Loss, Bending Loss & measurement of Numerical Aperture • Characteristics of Fiber Optic communication link • Setting of Fiber Optic voice link using Amplitude, Frequency & PWM Modulation • Study of Switched Faults in AM, FM & PWM system • Full Duplex Computer Communication using RS232 ports and software • V-I characteristics of LED (E - O converter) • Characteristics of Photo Detector • Measurement of Bit Error Rate • Study of Eye pattern <p>Radar communication Trainer</p> <p>Should have following features</p> <ul style="list-style-type: none"> • Study of signals on software or oscilloscope • Object counter • Real time fan RPM measurements and vibration measurement • Indicator for Doppler echo signal and alarm for detected signals <p>Technical Specifications:</p> <p>Transmitter frequency – 10GHz, output power – 10mW appx., operating voltage – 8.5V appx, Antenna – parabolic dish having gain – 16dB, sensitivity – (-50 to -70dBm), IF output – audio range, power supply – (230V\pm 10%, 50Hz), detected signal indicator, real time storage mode, Display – Real time storage mode, Display- Vpp, speed – km/hr, miles/hr, m/s and</p>	01
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	<p>rpm, frequency : Hz, KHz, Display in time domain and frequency domain window.</p> <p>User interface for measurement of Doppler frequency, amplitude, velocity and RPM</p> <p>Accessories ; Audio cable, connector cable, tripod stand</p>	
15.	<p>Mobile communication trainer</p> <p>The system must be able to explore MOBILE applications.</p> <ul style="list-style-type: none"> · 240 x 128 Graphical LCD, Facility for learning AT command SET thru LCD Display, · 4x4 multiplexed keypad.· Alpha numeric keypad for AT Command set.· Fixed / variable SMS to any number thru keypad .RS- 232 Serial interface.GSM Frequency 850MHz · based on Processor Core: SST. DTM Decoder circuitry.Programming software with serial port module.GPRS Frequency: Dual-band EGSM 850/1900MHz Complaint with ETSI GSM Phase 2+ standard class 4 (2W @ 850/1900MHz),Enhanced Full rate and half rate · (FR/EFR/HR), Dual Tone Multi Frequency (DTMF),· Data: Asynchronous - non transparent up to 9.6 kbps,· Short Message Services (SMS): Text and PDU, Software Interface: General purpose RS-232 serial interface, remote control by AT commands (GSM 07.07 and 07.05), Serial Baud rate from 300 to 115200 bits/s, Auto Bauding (300 to 38400 bits/s) <p>Experiments to be performed -</p> <p>To study hardware of mobile trainer, to study call,halt sms,sms deletion,sms read using on board key commands, to study sms read processing using on board keys commands, to study the signal strength ,frequency band of network.</p>	01
16.	<p>Digital storage oscilloscope</p> <p>Bandwidth- 70 MHz No. of Channel-2 Sampling Rate- 1GSa/s Max input: -400V(peak ac+dc, 1MΩ input impedance) Record Length-2 Mega points Display- High Resolution TFT LCD Display Vertical Base: - 2mV /div to 5V/div of Vertical Range Time Base: - 5ns/div to 50s/div of Time Base Range Waveform Update Rate: - 200 wfm/s Memory: -16Kpts Resolution: 8 bit Trigger sensitivity: 1 div from DC to 10MHz, 1.5 div from 10 MHz to max BW Measurement of different voltage and time parameters Provision for USB interface</p>	08

17.	<p>Trainer boards for the following:</p> <ul style="list-style-type: none"> .i. Delta and adaptive delta modulation demodulation ii. QPSK modulation & demodulation iii. ASK,FSK, PSK modulation & demodulation iv. TDM-PAM v. PAM-PPM-PWM Modulation & Demodulation <p>The above trainer boards should be enclosed in a box having inbuilt power supply, Circuit diagrams should be there on the board, points to be provided for observing voltage and waveforms in the circuit. Instruction manual, patch chord with 4mm jack to be supplied.</p>	(1x5)
E. MICROPROCESSOR LAB		
18.	<p>Embedded Trainer Kit</p> <p>Should support different microcontroller daughter boards like 8051, PIC, AVR, ARM7, Arduino, etc and having following features</p> <p>USB interface for downloading and communications (using FT232B)</p> <ul style="list-style-type: none"> • RS232 serial port for the user Design. • Toggle switch for following Selection <ul style="list-style-type: none"> -Downloading the Program into the Microcontroller using Serial port -Downloading the Program into the Microcontroller using USB Port • 8 channel ADC with potentiometers for giving input • DAC Chip (with 2 mm socket for Output) • 16*2 LCD Display • 4 seven segment Display • 4 Pulled up and pulled down Keys • 8 LED Outputs, Two Relays (220V) • Two Opto Isolated Inputs • Stepper Motor Controller Driver • DC Motor Controller • Serial EEPROM • Thermister Temperature sensor • LDR sensor • Buzzer output <ul style="list-style-type: none"> • Interface for servo motor • Bluetooth interface for communication with mobile phone • 8x8 DOT LED Matrix interface 	06

19.	<ul style="list-style-type: none"> • RTC -1302 • Amplifier section for sensors like RTD, Load cell and Thermocouple • Built in Power Supply • On board Supply of +5, GND, +12V, -12V for giving supply to interfacing Modules <p>The kit should be enclosed in a box. The user manual, connecting wires, CD with sample programs, data sheet and necessary software are to be provided.</p> <p>Interfacing module for embedded trainer</p> <ol style="list-style-type: none"> i. DC motor control ii. GSM iii. Traffic light controller iv. Keyboard v. Ultra sonic distance measurement <p>The modules should be enclosed in box. The user manual, connecting wires, CD with sample programs, data sheet and necessary software are to be provided</p>	(2 x5)
F. MICROWAVE LAB		
20.	<p>Microwave test bench (X band) Gun Oscillator based for antenna measurement</p> <p>Experiment to be conducted : Measurement of Radiation Pattern & Gain of Antennas</p> <p>Components and Instruments required :</p> <p>Gunn Oscillator, PIN Modulator, Isolator, Frequency Meter, Variable Attenuator, Detector Mount, Mechanical Turn Table, Standard Gain Horn, E-plane Bend, Waveguide stand, VSWR Meter, Gunn Power Supply, Cooling Fan with stand, BNC Cable, TNC Cable</p> <p>Component under test:</p> <p>Pick up horn, Slotted Antenna - Broad Wall, Slotted Antenna - Narrow Wall, Dielectric Antenna, E-Sectoral Horn, H-Sectoral Horn, Parabolic Dish (with feed) 8" dia, Pyramidal Horn</p> <p>Necessary stand, cable and manual are to be provided.</p>	01

21.	<p>Ansys academic research HFSS package</p> <p>The package should be for five users including the following tools</p> <ul style="list-style-type: none"> • Ansoft Designer (RF&SI) • HFSS • SIwave • Q3D Extractor • Optimetrics • ECAD Translators (Ansoft Links) • MCAD Translators <p>The technical support and product updates should be provided.</p>	01 unit
22.	<p>Antenna trainer system</p> <p>For teaching of various antennas in the frequency band mentioned. The trainer should be motorized and can be used in stand alone or interfaced with PC via USB. System should have base for mounting transmitter and receiver antennas.</p> <p>The different experiments to be performed are:</p> <p>Variation of field strength with distance, plotting radiation pattern of directional/omni directional antenna, polarization of antenna, study of resonant/non resonant antenna with VSWR and impedance, current distribution along antenna elements, verifying reciprocity theorems, study of gain, polar plot, beam width and FBR.</p> <p>Transmitter: Frequency 50 – 1000MHz, crystal controlled</p> <p>Intervals: 50MHz</p> <p>RF level: 90dBμV typical</p> <p>Measurement: RF level in dBμV, dBm, pW with 0.1dB resolution</p> <p>Dynamic range: 70dB log</p> <p>Auto mode: data logging for polar/Cartesian plot</p> <p>USB Interface: connectivity to PC using polar pattern plot software</p> <p>Rotation: 0 to 360 degrees with 1 degree resolution</p> <p>Angular steps: 1, 5, 10, 45 dgrees</p> <p>Display : LCD</p> <p>Functions: Menu, enter, escape, up and down</p> <p>Memory: 1000 memories for storing angular position for quick recall</p>	01

	<p>Auto mode: Automatic rotation with receiver interface</p> <p>Clockwise/anticlockwise rotation, fast/slow speed</p> <p>Receiver frequency: 86MHz – 860MHz PLL synthesized</p> <p>Step size: 0.05, 0.1, 0.25, 0.5, 1, 10, 100 MHz</p> <p>Display : LCD, Functions: Menu, enter, escape, up and down</p> <p>Memory: 1000 memories for storing angular position for quick recall</p> <p>Output impedance: 50ohms</p> <p>The different antennas and accessories to be included are:</p> <p>Different Microstrip patch antennas, Directional coupler SMA(M), log periodic, dipole, folded dipole, monopole, helix, broadside and endfire array, yagi uda, square loop, phase array, sleeve etc.</p> <p style="text-align: center;">Transmitter/receiver tripod, USB connecting lead, antenna plotting software, necessary cables and connectors and experiment manual.</p>	
	G. VLSI LAB	
23.	<p>Cadence Research bundle analog and digital Front end and Back End with following tools:</p> <p>Analog and Digital Front end and Back End : Advanced Tool Set</p> <p>Options with Advanced Tool Set</p> <ul style="list-style-type: none"> • Synthesis • Test • Verification bundle • Extraction • Device modeling • Design for manufacturing • Sign off power analysis • Sign off timing analysis • Characterization • Digital implementation <p>Silicon package board products</p> <ul style="list-style-type: none"> • PCB design and layout • Signal integrity analysis • IC packaging <p>The technical support and product updates should be provided.</p>	01

H. INSTRUMENTATION LAB

	H. INSTRUMENTATION LAB	
24.	<p>Study of Strain Gauge</p> <p>The instrument should have following features :</p> <ul style="list-style-type: none">Test-points to observe input output of each blockOnboard gain adjustmentOnboard offset null adjustmentBuilt in DC Power Supplies3½ digits LED displayOnboard Cantilever arrangement <p>Technical Specifications :</p> <ul style="list-style-type: none">Strain Gauge (350Ω) : 4 nos.Gauge factor : 2.1Maximum bearable weight : 500 gmCantilever material : Stainless SteelCantilever width : 2.5 cmCantilever thickness : 0.16 cmCantilever length : 20 cmBridge Voltage : +8 V DCBridge configuration : Full BridgeDisplay : 3½ Digit LEDTest pointsPower Supply : 230 V ±10 %, 50 Hz .Power Consumption : 3 VA (approx.)Operating Conditions : 0-40 C, 85% RH <p>Accessories to be included : Mains cord-1no., Standard Weights-1set., USB cable -1no.</p>	02

25.	<p>Study of LVDT</p> <p>should have following features :</p> <ul style="list-style-type: none"> <input type="checkbox"/> Functional blocks on board <input type="checkbox"/> 3½ digit LED display with polarity indicator <input type="checkbox"/> Onboard LVDT displacement measurement jig with micrometer <input type="checkbox"/> Onboard Excitation Generator <input type="checkbox"/> Amplitude adjustment for Excitation Generator <p>Technical Specifications :</p> <p>Measurement Range : 20 mm (±10 mm)</p> <p>Excitation Frequency : 4 KHz (approx.)</p> <p>Excitation Voltage : 4 VPP (approx.)</p> <p>Sensitivity : 10 mV DC/ mm</p> <p>Linear Range : Full Scale</p> <p>Signal conditioner output : 0.1 V DC or Maximum Displacement</p> <p>Display : 3½ Digit LED with Polarity Indicator</p> <p>Micrometer Scale : 25 mm</p> <p>Micrometer Least count : 0.01 mm</p> <p>Test points</p> <p>Learning Material : CD , Power Consumption : 2 VA (approximately)</p> <p>Power Supply : 110V - 260V AC, 50/60Hz</p> <p>Operating Conditions : 0-40° C, 85% RH</p> <p>Accessories : Mains cord-1no., Patch cord 16" (2mm) -2nos., USB Cable- 1no</p>	02
26.	<p>Study of Temperature Transducer</p> <p>should have following features :</p> <p>On Board Digital Voltmeter</p>	02

	<p>On board touch switch</p> <p>4 different Temperature Transducers</p> <p>Study of Transducer controlled switching / alarm systems</p> <p>On board signal conditioning circuitry</p> <p>Built-in DC Power Supply</p> <p>Functional blocks on-board</p> <p>Technical Specifications :</p> <p>Transducers : 4 Nos.</p> <p>a. N.T.C. Thermistor</p> <p>b. Platinum R.T.D.</p> <p>c. K Type Thermocouple</p> <p>d. IC Temperature Sensor</p> <p>Heating Element : Wire wound resistance 47 Ω , 10 W</p> <p>Signal Conditioning Circuitry : 1. Instrumentation Amplifier</p> <p>2. X100 Amplifier</p> <p>3. DC Amplifier</p> <p>4. Comparator</p> <p>5. Electronic Switch</p> <p>Input Circuits : Rotary & Slide Potentiometers</p> <p>Output Circuits : 1. Relay</p> <p>2. Buzzer</p> <p>3. Digital Voltmeter</p> <p>Interconnections : 2mm. banana sockets (Gold plated)</p> <p>Power Supply : 100 V – 240 V AC, 50/60 Hz</p> <p>Power Consumption : 2 VA (approx.)</p> <p>Learning Material : CD</p> <p>Operating Conditions : 0-40 C, 85% RH</p>	
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<p>27.</p>	<p>Included Accessories : Mains cord-1no. Patch Cord 16" (2mm) -8nos. Patch Cord 8" (2mm) -7nos.</p> <p>Study of Optical Transducer</p> <p>should have following features :</p> <ul style="list-style-type: none"> <input type="checkbox"/> 4 different Optical Transducers <input type="checkbox"/> Study of Transducer controlled switching <input type="checkbox"/> On board signal conditioning circuitry <input type="checkbox"/> Built in DC Power Supply <input type="checkbox"/> Functional blocks on board <p>Technical Specifications :</p> <p>Transducers : 4 Nos.</p> <ol style="list-style-type: none"> a. Photo conductive Cell b. Photovoltaic Cell c. Photo Transistor d. PIN Photodiode <p>Heating Element : Filament Lamp</p> <p>Signal Conditioning Circuitry : 1. Power Amplifier</p> <ol style="list-style-type: none"> 2. Current Amplifier 3. DC Amplifier 4. Comparator 5. Electronic Switch 6. Buffer <p>Input Circuits : Rotary & Slide Potentiometers</p> <p>Output Circuits : 1. Relay, 2. LED</p> <p>Interconnections : 2mm. banana sockets (Gold plated)</p>	<p>01</p>
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	<p>Power Consumption : 2 VA (approx.)</p> <p>Power Supply : 100 V – 240 V AC, 50/60 Hz</p> <p>Operating Conditions : 0-40 C, 85% RH</p> <p>Included Accessories : Mains cord-1no.</p> <p>Patch Cord 16" (2mm) -8nos.</p> <p>Patch Cord 8" (2mm) -7nos.</p>	
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