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| logo1COLLEGE OF ENGINEERING AND TECHNOLOGYTECHNO CAMPUS, GHATIKIA, BHUBANESWAR-751 003 |

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| No.3783(1)/ CET; Dated 11/12/2015 |

**TENDER CALL NOTICE**

Sealed tenders are invited form reputed original manufacturers up to the date mentioned in the tenders for supply of equipments through speed post only for (a) Control & Instrumentation lab. (b) Power Electronics & Drives lab. (c) Electrical Machines lab. (d) Power Systems lab. (e) Basic Electrical/ Network & Devices/ Microprocessor & Microcontroller lab. of Department of Electrical Engineering. The date of opening the various tender is mentioned in the respective tender document, which will be opened in the office of the Principal, College of Engineering and Technology, Bhubaneswar in the presence of bidders and/or their nominees. The tender bid documents with details of terms and conditions are to be downloaded from the College Website: [**www.cet.edu.in**](http://www.cet.edu.in)**.**

The authority reserves the right to reject/cancel the tenders in whole or in part without assigning any reason thereof. The authority will not be responsible for any postal delay. No hand delivery will be accepted. The Bidders must submit by Speed Post only to reach the undersigned on or before 02.01.2016 by 1:00PM.

Sd/-

 **PRINCIPAL**

**Bid Ref no. 3783(1) /CET Date: 11.12.2015**

**BIDDING DOCUMENTS AND INSTRUCTION TO SUPPLY EQUIPMENTS**

**FOR**

**CONTROL & INSTRUMENTATION LABORATORY**

**OF**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

****

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

**(A Constituent College of Biju Patnaik University of Technology)**

**Techno Campus,Ghatikia, Bhubaneswar – 751 003**

 **INVITATION FOR BIDS**

 **Principal, College of Engineering & Technology**, Bhubaneswar invites sealed bids from eligible bidders for supply of machineries/equipments to Department of Electrical Engineering.

 Interested eligible Bidders may obtain detail information and list of items with technical specifications from **the website of the College** [**www.**](http://www.nitdgp.ac.in)**cet.edu.in**

 Particulars about submission of bidding document are as follows:

(a) Price of bidding document : **Rs. 500/-(service tax is included)**

(non-refundable)

(b) First date of availability of Bidding

 Document in the website : **12.12.2015**

(c) Last date and time for submission of bids: **02.01.2016 at 01.00 P.M.**

(d) Time and date of opening of bids (Technical) : **02.01.2016 at 03.00 P.M.**

(e) Demonstration of Equipments for Technical Evaluation: **04.01.2016 at 10.00 A.M.**

(e) Time and date of opening of bids (Financial) : **11.01.2016 at 11.00 P.M.**

(f) Place of opening of bids : **Head of Dept.(Electrical Engg.)**

 **College of Engineering & Technology Techno-Campus, Ghatikia,**

 **Bhubaneswar-751003**

(g) Address for communication : **Principal/Head of Dept.(Electrical Engg.)**

 **College of Engineering & Technology**

 **Techno-Campus, Ghatikia,**

 **Bhubaneswar-751003**

Sd/

 **Principal**

Contents

[1. Scheduled Tender Activity: 3](#_Toc437521987)

[2. Eligibility of Tenderer and General Instructions: 4](#_Toc437521988)

[2.1 Eligibility: 4](#_Toc437521989)

[2.2 General Instructions: 5](#_Toc437521990)

[2.3 Procedure for Submission of Tenders: 6](#_Toc437521991)

[3. Requirements by Tenderer before Supply: 7](#_Toc437521992)

[3.1 Rating Plate, Name Plate and Labels: 7](#_Toc437521993)

[3.2 Packaging: 7](#_Toc437521994)

[3.3 Inspection: 7](#_Toc437521995)

[3.4 Environmental Condition: 8](#_Toc437521996)

[4. Requirements by Tender after Supply: 8](#_Toc437521997)

[4.1 Supply: 8](#_Toc437521998)

[4.2 Installation and Commissioning: 9](#_Toc437521999)

[4.3 Documentation: 10](#_Toc437522000)

[4.4 Trial Operation and Performance Guarantee Test: 10](#_Toc437522001)

[4.5 On-Site Warranty: 10](#_Toc437522002)

[4.6 Comprehensive Maintenance Contract: 11](#_Toc437522003)

[4.7 After Sales Service: 11](#_Toc437522004)

[5. Financial Terms: 11](#_Toc437522005)

[5.1 EMD 11](#_Toc437522006)

[5.2 Performance Security Deposit 12](#_Toc437522007)

[5.3 Prices: 12](#_Toc437522008)

[5.4 Sales Tax Concession: 12](#_Toc437522009)

[5.5 Discount: 12](#_Toc437522010)

[5.6 Payments: 13](#_Toc437522011)

[5.7 Penalty: 13](#_Toc437522012)

[5.8 Rate Contract with DGS&D or any other Government Organisation: 13](#_Toc437522013)

[6. Instruction to the Tenderer: 13](#_Toc437522014)

[6.1 Solving Disputes: 14](#_Toc437522015)

[7. Technical Specifications: 14](#_Toc437522016)

[PROFORMA FOR SUBMITTING ELIGIBILITY REQUIREMENT AND UNDERTAKING 23](#_Toc437522017)

**DETAILED PARTICULARS AND INSTRUCTIONS ON TENDER**

#### Purchase of Equipments and Instruments

**FOR**

**CONTROL & INSTRUMENTATION LABORATORY**

**FOR**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**College of Engineering and Technology**

**Bhubaneswar – 751003, Odisha**

**Tender no: 3783(1)/CET Date-11/12/2015**

|  |  |  |
| --- | --- | --- |
|  | **Tender Opening** | **02.01.2016 at 03 : 00 P.M.** |

#### Sealed Tenders **are invited in two part from reputed** **Original Equipment Manufacturers (OEM)/ Authorised Dealers,** for supply of equipments and instruments for theDepartment of Electrical Engineering, College of Engineering and Technology (CET), Techno Campus, Kalinga Nagar, Ghatikia, Bhubaneswar – 751003, Odisha.

# Scheduled Tender Activity:

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Activity** | **Date** |
| 1 | Last Date of Tender Document Submission | **02.01.2016** up to 01.00 PM |
| 2. | Tender Opening (Technical) | **02.01.2016** at 03:00 PM |
| 3. | Tender Opening (Financial) | **11.01.2016** at 11:00 PM |
| **Item** | **EMD (in Rupees)** | **Cost of Tender Document (in Rupees)** | **Period of complete Delivery, Installation and Commissioning** |
| Equipments and Instruments for Electrical Engineering Department | **Rs.6,500/-** | **Rs.500/-** | **30 days** |

**Financial bid & Technical bid must be enclosed separately.**

**The Tender documents can be downloaded from our website www.**[**cet.edu.in**](http://www.cet.edu.in) **and the tenderer has to submit a separate draft of Rs.500/-(nonrefundable) along with submitted tender, otherwise the offer submitted by the tenderer will be cancelled.**

# 2. Eligibility of Tenderer and General Instructions:

###  2.1 Eligibility:

 Those who fulfill the following criteria are eligible to participate in the tender.

* + 1. The tenderer is preferably be a reputed Original Manufacturer/ Authorised Distributor, who should provide the documents relating to their **Manufacturing Capabilities** as follows**.**
	1. The Company should be ISO: 9001-2008.
	2. The Company should be registered with Excise Department and Sale Tax Department.
	3. Annual turn-over of the company should be more than Rs. Two Crores.
	4. The company should have its own R&D section.
	5. The company must have cleared Sales Tax and Income Tax payment up to date. Attested copies of Sales Tax Clearance Certificate or non-assessment certificate from the concerned Sales Tax Authority valid up to date and attested copy of Income Tax Clearance Certificate or non-assessment certificate, as the case may be, from the competent authority, up to date and PAN Number must be enclosed along with the Tender documents.
	6. If the tenderer is an Authorised Distributor of a reputed manufacturer, necessary certificate to this effect from his manufacturer must be enclosed.
	7. All after sales support should be provided directly by the manufacturer only.
	8. The tenderer must have the willingness for providing comprehensive maintenance support of the Machine supplied by him.
	9. The tenderer must provide evidence of successful execution of supply orders with installation and successful after sales support in reputed organizations like NITs/IITs/Central Research Laboratories since last 3 years.

**2.1.2** If for any equipments the tenderer would not have the eligibility criteria as mentioned in para 2.1.1 (a to i), then department will considered to procure those equipments from the manufacturer/authorized dealer with only the following eligibility criteria under para 2.1.2 (a to e)

* 1. If the tenderer is an Authorised Dealer of Manufacturer, necessary certificate to this effect from his Manufacturer must be enclosed.
	2. All after sales support should be provided directly by the Manufacturer only.
	3. The tenderer must have the willingness for providing comprehensive maintenance support of the Machine supplied by him.
	4. The tenderer must provide evidence of successful execution of supply orders with installation and successful after sales support in reputed organizations since last 3 years.
	5. The tenderer must have cleared Sales Tax and Income Tax payment up to date. Attested copies of Sales Tax Clearance Certificate or non-assessment certificate from the concerned Sales Tax Authority valid up to date and attested copy of Income Tax Clearance Certificate or non-assessment certificate, as the case may be, from the competent authority, up to date and PAN Number must be enclosed along with the Tender documents.

###  2.2 General Instructions:

**The selection for procurement of equipments will be based on quality and performance along with cost. In this context decision of technical committee is final based on documentary evidence or actual physical verification.**

Submission of more than one bid by a particular tenderer under different names is strictly prohibited. In case it is discovered later on that, this condition is violated, all the tenders submitted by such tenderer/s would be rejected or contract cancelled.

The tender should mention in the tender paper, the location of its service centre nearest to Bhubaneswar.

All offers should be in English and the price quoted for each item should be firm.

Warranty period, Delivery period and After-Sale-Service conditions, etc. are also to be clearly indicated.

The rates and the conditions of the offer will remain valid for three months from the date of opening of the tender and no change or alteration of the rate will be acceptable on any account.

Submitted tender forms with overwriting or erased or illegible specifications and rates will be rejected.

Request from tenderer in respect of additions, alterations, modifications, corrections, etc. of either terms & conditions or rate after opening of the bid may not be considered. However, negotiation may be made before finalization.

Tenderers shall carefully examine the bid documents and fully inform themselves of all the conditions, which may in any way affect the work of the cost thereof.

Should a tenderer find discrepancies or omissions from the specification or other documents and any doubt as to their meaning, he should at once notify the purchaser and obtain clarification in writing.

This, however, does not entitle the tenderer to ask for time beyond the due date fixed for receipt of tenders.

The tenderer must also specify minimum time and maximum time to repair/replace in the event of a failure and penalty thereof.

Verbal clarification and/or information given by the purchaser or its employees or representatives shall not be binding on the purchaser.

Submission of sealed bid will carry with the implication that the tenderer agrees to abide by the conditions laid down in the detailed particulars of the bid notice.

Conditional offers and offers qualified by vague and indefinite expression, as ‘subject to immediate acceptance’ ‘subject to prior sale’, etc. will not be considered.

While tenders are under consideration, tenderers and their representatives or other interested parties are advised to refrain from contacting by any means, to the purchaser's personnel or representatives on matter relating to the tenders under study.

The purchaser, if necessary, will obtain clarification on tenders by requesting such information from any or all the tenderers either in writing or through personal contact as may be necessary.

The tenderer will not be permitted to change the substance of his offer after the tenders have been opened.

In the event of non-compliance with this provision, the tenderer is liable to be disqualified.

###  2.3 Procedure for Submission of Tenders:

a) The Tenderers must submit their bids as required in two parts in separate sealed covers prominently super scribed as Part-I “ **Technical Bid**” and Part-II “**Financial Bid**” and also indicating on each of the covers the “**Tender call Notice Number & Date**” and **due date and time of submission** as mentioned in Tender Cal Notice.

**Part-I (Technical Bid)**

Excepting the price schedule, all other documents as mentioned in paragraph 2.1 i.e. details of **technical specifications, leaflet, Copy of Firm Registration Certificate from the competent authorities, Sale Tax clearance, Income Tax Clearance, PAN Card copy, list of clients, authorization certificate from Manufacturer in case of Dealer**, **etc**. along with **tender document duly signed** by the authorised person in each page shall be covered in Part-I (Technical Bid).

**Part-II (Financial Bid)**

All indications of price shall be given in Part-II (Financial Bid)

#### b) Both sealed covers Part-I **“ Technical Bid”** and Part-II “**Financial Bid**” should be placed in a third cover along with requisite **EMD & cost of Tender documents** (separately in the form of DD drawn in favour of **Principal, College of Engineering & Technology, Bhubaneswar** at any Nationalized Bank payable at Bhubaneswar) , others requisite supporting documents etc. and sealed. The sealed cover containing tender documents as per procedure indicated above should be submitted by speed post / Registered Post / Courier to the office of the **Principal, College of Engineering & Technology, Techno-campus ,Ghatikia , Kalinga Nagar, Bhubaneswar-751003, Odisha** within the due date and time as stipulated in Tender. **No Hand delivery is accepted.** The sealed envelope must show the name of the tenderer and his address and should be super scribed as **“*Tender for supply of Equipment for Control & Instrumentation Lab. of Electrical Engineering Department****”* on the top of the envelope.

**c)** All the documents submitted must be in the papers showing signature of the tenderer and printed office name of the tenderer on official seal.

**d)** All the documents must be submitted in a **sequential manner** with **separator/flags** to help in quick scanning of the topics. Wherever possible, data in tabular form should be given.

# 3. Requirements by Tenderer before Supply:

###  3.1 Rating Plate, Name Plate and Labels:

Each of the equipment is to have permanently attached to it, a rating plate of non-corrosive material in a conspicuous position, upon which the total specifications along with the manufacturer’s name, address, etc. are to be engraved.

### 3.2 Packaging:

All the equipment are to be suitably protected, covered in water -proof packing and crated to prevent damage or deterioration during transit and storage till the time of installation. The supplier shall be responsible for any loss or damage caused during transportation, handling or storage till their successful installation.

###  3.3 Inspection:

All materials / equipment shall be inspected and tested for completeness, proper assembly, operation, cleanliness and state of physical condition and performance as per quoted specification.

The test shall be conducted, reported and certifications to be provided by the tenderer.

The tenderer shall provide all test and measuring equipment/tools required for inspection / testing.

The cost of all such tests shall be borne by the Tenderer.

CET reserves the right to reject any equipment if it does not comply with the specifications during site testing, installation and commissioning stage.

Inspection & testing would be conducted, jointly, at various stages as applicable during unpacking, installation and commissioning of respective equipment / components at the manufacturing site.

###  3.4 Environmental Condition:

All the equipment supplied shall be rugged and should operate without any deviation in quality, or degradation of equipment performance. All the specification/parameters shall be guaranteed over the following environmental conditions:

\* Storage Temperature 0 to 70 degree Celsius

\* Operating Temperature 0 to 50 degree Celsius

\* Humidity 95% RH (non-condensing)

All the equipment is intended to operate under 220 V/ 440V, 50 Hz power supply.

# 4. Requirements by Tender after Supply:

###  4.1 Supply:

The material would be delivered by the supplier at **Department of Electrical Engineering, College of Engineering & Technology, Techno Campus, Kalinga Nagar, Ghatikia, Bhubaneswar – 751003, Odisha**.

The items should be supplied directly from the manufacturing terminal having passed all tests successfully with Certifications as required.

The equipment should conform to the latest relevant National/International standards and shall be completed in all respect.

Any component, fitting etc. which may not have been specifically mentioned in the specifications but which are usual and necessary for the equipment, shall be supplied by the tenderer at no extra cost.

In case, articles are found damaged in transit or found short at the time of delivery the full cost of the same will be deducted from the bill of the supplier in case the supplier does not replace the stock within a week from the date of the complain.

The articles ordered must be supplied in one lot within 4 (four) weeks of placing of the order.

In case of delay in delivery or successful installation, a penalty of 1% (one per cent) per week shall be levied.

CET reserves the right to procure the materials from alternative sources at the risk and cost of the successful tenderer giving 15 days notice.

Any increase in tax and duties after expiry of delivery period will be bourne by the supplier.

In case the items supplied by the supplier are found not up to the specification shall be rejected.

The supplier will be intimated to take back the stocks at his own cost within three days from the date of rejection and to replace the same within 7 days, failing which the EMD will be invoked in addition to taking legal actions.

Imported consignment, if any, should be destined to **“The HOD Department of Electrical Engineering, College of Engineering & Technology, Techno Campus, Kalinga Nagar, Ghatikia, Bhubaneswar – 751003, Odisha, India** through nearest custom clearing Airport (Bhubaneswar Air Port).

The suppliers shall be responsible for releasing the consignments from the carriers/transporters.

The equipment shall be delivered and installed at site at the cost of the tenderer.

All taxes, levies, surcharges including the customs clearance and handling freight and insurance should be paid and handled by the tenderer.

### 4.2 Installation and Commissioning:

Installation and Commissioning shall include the following:

1. Installation and Testing of the Equipment, Machineries etc. should be supplied by the tenderer.
2. It will be the responsibility of the tenderer to provide all necessary spares and consumables, which may be required during installation and commissioning, at no extra cost to purchaser.
3. The tenderer is to bring their own testing and measuring instruments required for installation, testing, commissioning, which can be taken back after completion.
4. Installation must complete within 15 days after delivery on site.
5. The tenderer should provide all necessary raw materials for running of the machine during commissioning.

### 4.3 Documentation:

Detailed **technical manuals**, **handbooks**, **drawings**, **Warranty card** and **Factory Quality Assurance checklist**, **test results** and any other certifications mentioned in the Technical specifications shall be supplied along with the consignment.

Supplied manuals/handbooks must cover detailed technical specifications and installation, operation, maintenance and System Safety procedures.

For Experimental setups **details of theory, procedure and methods of taking measurements etc. should be provided in the form of hand books for each experiment**.

The receipts for taxes paid, if any, for the supplied materials should also be submitted

### 4.4 Trial Operation and Performance Guarantee Test:

After successful completion of Installation and Commissioning of the equipment, a 7-day continuous trial operation putting those on optimum use shall be conducted by the tenderer at site, during which the performance of the equipment shall be demonstrated for trouble-free continuous operation, meeting the specified standards and proper training shall be imparted to two persons of the purchaser.

During trial operation, tenderer shall do all necessary adjustments required to ensure the performance as per the acceptable level.

In case, guaranteed performance is not established, the tenderer shall be given opportunity to rectify/replace the equipment/components, and restart the 7 days continuous trial operation, at the risk and cost of the tenderer.

### 4.5 On-Site Warranty:

1. The entire materials may be used continuously. The reliability and safety of the total installed system and trouble-free operation are, therefore, of prime importance. The supplied devices/equipment and components shall be covered under **Two-years or more** comprehensive on-site warranty from the date of issue of successful completion of Performance Guarantee Report.
2. During the period of warranty, it shall be the responsibility of the tenderer to provide all essential spares and consumables, which may be required for maintenance and trouble-free operation of the devices / components at the tenderer’s cost.
3. Software, if any, has to be tested with at least one-year warranty for trouble free operation.

### 4.6 Comprehensive Maintenance Contract:

The tenderer shall be under the obligation of entering into a Comprehensive Maintenance Contract (CMC) with CET for a minimum period of two years, renewable if felt necessary, on mutually acceptable rates, terms and conditions. CMC shall start after the completion of Warranty.

The scope of CMC shall cover maintenance and supply/replacement of materials and components, for smooth and reliable operation of the systems without trouble.

Accordingly, the tenderer has to offer rates for the CMC structure per equipment along with the price for the Systems and other associated Equipment supplied.

### 4.7 After Sales Service:

During the warranty period and subsequently, after signing of Agreement for CMC the tenderer shall attend to the problems reported by the users of CET on a priority basis.

For any problem reported the tenderer shall attend and rectify the problem within 7 (seven) days or provide a standby system of the similar configuration.

The report on any problem will be informed through phone or fax number of which shall be given by the tenderer.

The branch office of the concerned manufacturing firm will be fully responsible to provide maintenance service, in case of any negligence, in providing the service by the tenderer.

On failure to comply with those instructions, the Bank Guarantee provided for the warranty period shall be invoked.

# 5. Financial Terms:

### 5.1 EMD

The tenderer has to submit a Demand Draft / Banker’s Cheque / Pay order of Rs.6500**/ -** in favour of **Principal, College of Engineering and Technology, Bhubaneswar** payable at Bhubaneswar in any Nationalised Bank towards EMD. **Without EMD, the tender will be summarily rejected.**

There will be no interest paid to the tenderer towards EMD money.

In no case, the EMD Money in cash or other forms will be accepted at the time of opening of the bid.

No request for adjustment of claims, if any, will be accepted.

The EMD of unsuccessful tenderers will be refunded as soon as possible after the tenders are finalized.

### 5.2 Performance Security Deposit

In case of successful Bidder **EMD** will be kept as **Performance Security Deposit** and will be **refunded after expiry of stipulated warranty periods from the completion date of installation and commissioning on satisfactory performance of the equipment.**

### 5.3 Prices:

Price quoted should be **FOR College of Engineering & Technology, Bhubaneswar only. Tax components as applicable should be mentioned clearly in the financial bid.**

Price should be quoted for unit item; however, the actual requirements may be much more. (A tenderer may propose to give discounts if any for purchase of more than one unit of a particular item.).

Purchase order will be placed as a single lot for each type of item or for all the items together, as the case may be.

In case of items of import, the tenderer should take full responsibility for customs clearance, handling, tax payment, etc. and specify the charge for the same in the price bid.

### 5.4 Sales Tax Concession:

Central Sales Tax Concession is to be availed on production of the required certificates applicable to Educational Institution.

### 5.5 Discount:

Our Institute is a pioneer Institution in the field of Teaching and Research in Engineering and allied disciplines and do not run with profit motive.

As such we are availing price discount for purchase of equipment/instruments.

The rate of discount or any other Institutional benefit arising out of Govt. Policy etc., on each item may also be indicated in the bid specifically.

### 5.6 Payments:

1. In case of imported items, payment will be made by opening LC in the name of the manufacturer subject to the condition that a Bank Guaranty for an equal amount will be submitted by the selected tenderer to CET for the period of completion of installation and commissioning.
2. In case of purchase in Indian Rupees, payment of 100 percent of the ordered value will be made after successful installation and commissioning of the equipment subject to submission of satisfactory performance report by the concerned Head of Department

### 5.7 Penalty:

If the delivery, installation and commissioning is not carried out in time as specified in other part of the tender document, the tenderer/manufacturer will be charged @ 1 % (one per cent) per week of the total value of the concerned machine / equipment.

### 5.8 Rate Contract with DGS&D or any other Government Organisation:

In case the tenderer has entered into a Rate Contract with DGS & D or any other Government Organisation such as EPM, rate contract preference, number & copy of rate contract have to be submitted along with tender.

# 6. Instruction to the Tenderer:

Some of the minimum specifications specified may be redundant, obsolete or incompatible and in these cases, quote the particulars of correct specification of latest trend and technology.

Higher specifications instead of minimum specifications are allowed if a minimum specification is not available, obsolete or incompatible.

Otherwise, model with higher specification should be in addition to the model with minimum specifications.

Specify brand name and full model name and number for each offer.

Include the printed catalogue and pricelist if any for each of the equipment quoted.

Specify the list of Accessories required along with each of the equipment.

Quote the additional price of the accessories; only those, which are fully compatible with the quoted model, should be furnished.

Specify the list of Accessories to be given free of cost, along with the equipment as “**Free Accessories”**; these should be fully compatible with the quoted models.

All tenderers must arrange for a **demonstration of equipments on specified date (04/01/2016 at 10AM)** for technical evaluation (Evaluating features and performance on conducting specified experiments)**.**

The demonstration will be held at **Laboratory building**, **Department of *Electrical Engineering, College of Engineering & Technology, Ghatikia, Kalinga Nagar, Bhubaneswar – 751003*.**

**Financial Bid will be opened only if Tenders must qualify in Technical evaluation and successful demonstration.**

### 6.1 Solving Disputes:

CET, the tenderer and the manufacturer shall make all efforts to resolve amicably by direct informal negotiation on any disagreement or dispute arising between them under or in connection with this contract.

All disputes arising out of the contract shall be referred to courts under the jurisdiction of the Bhubaneswar court only.

***The above terms and conditions except those otherwise agreed upon, shall form a part of the Purchase Order***.

***Sign on each page of this tender document and Return it along with the offer enclosing this part together with the Technical Offer.***

***\*\* \* The CET authority has all rights to accept / reject any tender without assigning any reasons thereof.***

# 7. Technical Specifications:

Following are the minimum specifications of the equipment.

The minimum specifications are indicative and not exhaustive.

The models with higher specifications may be quoted.

The quoted materials should be of latest trend and technology.

Each equipment should be complete in itself without needing any extra requirements except the requirement of general test and measuring instruments.

All tenderers must arrange for a **demonstration of equipments on specified date (04/01/2016 at 4PM)** for technical evaluation (Evaluating features and performance on conducting specified experiments)**.**

The demonstration will be held at **Laboratory building**, **Department of *Electrical Engineering, College of Engineering & Technology, Ghatikia, Kalinga Nagar, Bhubaneswar – 751003*.**

**Financial Bid will be opened only if Tenders must qualify in Technical evaluation and successful demonstration.**

**List of equipments with technical specification required for Control & Instrumentation Lab. of Electrical Engineering Department:**

**A**.

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Name of Equipments and Instruments**  | **Specifications** | **Qty. Required** |
| **1** | **DC motor driven position control system** | **Features**:* Position control of a 12V, 1A DC gear motor (50rpm)
* Calibrated dials for reference and output position: resolution 10
* Servo-potentiometer with full 3600 rotation.
* Separate unit for motor
* Graphics LCD display provided to display the actual & reference position waveform
* The main unit should house the command unit, error detector, driver, gain controls of the forward path and the tacho-generator channels, power stages and the waveform capture/display units.
* No external dc supply should be connected to the unit.

**List of Experiments:*** Operation of the position control system for different value of the forward gain angular position commands.
* Step response studies for various value of forward gain for P, PI, PID controllers.
* Study of the effect of velocity feedback on the transient and steady state performance of the system as well as its stability.
 | 02 No. |
| **2** | **Lag-Lead compensator frequency response trainer** | **Features**:* Built-in Function generator (Sine & Square wave)
* Inbuilt power supply.
* Provision for incorporating user-designed Compensation system components
* Connector provisions to connect external R&C values of the network

**List of Experiments:*** Frequency response of Lag network, Lead network, Lead-Lag network
* Lag network compensation using Lead - Lag network
 | 02 No. |
| **3** | **Second order process trainer with P, PI and PID control to servomotor** | **Features**:* Simulated blocks -Dead time (transportation lag), Integrator, Time Constant, Error detector and gain
* (Configuration as P, PI, PD or PID) Prop. Band: 5% to 50% (Gain 2-20).
* Integral time: 10msec-100msec. Derivative time: 2-200msec.
* Built-in signal sources.
* Set Value of -1V to +1V. - Square wave of 1V p-p (min) at 40Hz. - Triangular of 1V p-p (min) at 40Hz.
* Provision for interface with a dc servomotor to study the effects of PID control on the position/speed of dc servomotor

**List of Experiments:*** Open loop response of various process configurations like Combination of time constants, delays etc.
* Study of closed loop response for above. P, PI, PD and PID design and performance evaluation in each case
* Application of P/PI/PID controller to DC Servomotor speed/position control
 | 02 No. |
| **4** | **Relay control system Trainer** | **Features:*** Simulated 2nd order linear plant.
* Facility for displaying x and y signals.
* Dead zone variable from 0-600mV. Hysteresis variable from 0-500m.
* Built-in Signal source- Sine and Square Amplitude: 0-1V (min) of variable Frequency (10-1000Hz)

**List of Experiments:*** Study of the relay characteristic and display of the same on CRO for different values of hysteresis and dead zones.
* Study of the effect of hysteresis on system stability.
* Graphical analysis to predict sustained oscillations.
* Phase plane analysis of relay control system for various values of Hysteresis and Dead Zones.
* View the trajectory for different hysteresis and dead zones.
 | 02 No. |
| **5** | **Temperature control system Trainer** | **Features:*** Temperature controller with facilities for P, I, D and relay control blocks.
* Operating temperature: Ambient to 90 C.
* Separate controls for P, I, D channel gains.
* Settings for relay hysteresis.
* Oven fitted with IC temperature sensor.
* Digital display of set and measured temperature
* In-Built Power Supply with Power ON indication should be available

**List of Experiments:*** Identification of the oven parameters.
* Study of ON-OFF temperature control (with adjustable relay characteristics).
* Study of P, PI, PD and PID controls having adjustable coefficients.
 | 02 No. |
| **6** | **Position control system using Synchros Trainer** | **Features:*** Display for input and angular displacements.
* Two rotor terminals (R1 & R2) three stator terminals (S1, S2 and S3) should be brought out on the front panel.
* Test points should be provided to analyze signals at various points.
* Synchro transmitter-receiver pair with calibrated dials should be provided.
* Locking system for receiver rotor should be available.
* Provision for use of control transformer as a Receiver.
* Built-in balanced demodulator circuit
* Panel meter for ac/dc voltages

**List of Experiments*** Basic characteristics study - stator voltages as a function of the rotor angle.
* Operation and error study of the transmitter-receiver pair as a simple open loop position control system at a very low torque.
* Plotting the error voltage output as a function of the transmitter rotor angle with the receiver rotor locked.
* Use of balanced demodulator to develop dc error signal with appropriate polarity and compare it with the ac error
 | 02 No. |
| **7** | **Two phase AC servomotor trainer** | **Features:*** Two phase AC Servo Motor 12V/50Hz per phase
* Electronic speed sensor with 4-digit display in RPM
* Ammeter for load current.
* An electrical /Spring Balance loading system to compute torque
* Separate Circuitry for Electrical load (e.g. Speed controller for dc motor load/ a digital voltmeter for dc generator load measurement)
* 3-digit time constant display.
* 3 ½ digit r.m.s. voltmeter.
* 3 ½ digit d.c. panel meter.

**List of Experiments** * Determination of Inertia and Transfer function parameter.
* Determination of Time Constant.
* Determination of Transfer function.
 | 02 No. |

**B.**

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| --- | --- | --- | --- |
| **Sl. No.** | **Name of Equipments and Instruments**  | **Specifications** | **Qty. Required** |
| **1** | Measurement of unknown resistance, inductance and capacitance using bridges | **Features:*** Range of Measurement : 5Ω - 100KΩ
* Accuracy (Min to Max.) : ±0.2 ±5Ω
* Tolerance : ±5%
* Built-in power supply
* Resistance Box- To vary resistance in steps of 100Ω

**Experiments:** * Measurement of unknown resistance
 | 01 No. |
| 1. **Wheatstone Bridge**
 |
| 1. **Maxwell Inductance Bridge**
 | **Features**:* Audio amplifier with speaker to detect the bridge balancing conditions (optional)
* Measurement Range :10mH - 200mH
* Tolerance : ±5%
* Built-in power supply
* Inductance Box (Min - 100µH to Max – 100mH)

**Experiments:** * Measurement of unknown inductance
 | 01 No. |
| 1. **De-sauty’s Bridge**
 | **Features**:* Measurement Range: 0.02µF to 0.9µF
* Sensitivity : ±0.03µF
* Audio amplifier with miniature speaker to detect the balance condition of the bridge (Optional)
* Capacitance Box : Range 100pf to 11.11µfd in steps

**Experiments:** * Measurement of unknown capacitance
 | 01 No. |
| 1. **Kelvin’s Double Bridge**
 | **Features**:* Range of Measurement : 0.1Ω - 0.82Ω
* Tolerance : ±5%
* Built-in power supply

**Experiments:** * Measurement of unknown resistance
 | 01 No. |
| 1. **Schering Bridge**
 | **Features**:* Measurement Range : 0.01µF to 2µF
* Sensitivity : ±0.1µF
* Tolerance : ±5%
* Audio amplifier with miniature speaker to detect the balance condition of the bridge (Optional)

**Experiments:** * Measurement of unknown capacitance
 | 01 No. |
| 1. **Hay’s Bridge**
 | **Features**:* Audio amplifier with speaker to detect the bridge balancing conditions (optional)
* Measurement Range : 5mH - 500mH
* Sensitivity : ±5mH
* Built-in power supply

**Experiments:** * Measurement of unknown inductance
 | 01 No. |
| 1. **Anderson Bridge**
 | **Features**:* Audio amplifier with speaker to detect the bridge balancing conditions (optional)
* Measurement Range : 25mH - 500mH
* Sensitivity : ±2mH
* Built-in power supply

**Experiments:** * Measurement of unknown inductance
 | 01 No. |
| **2** | **LVDT characteristics trainer** | **Features**:* LVDT sensor with Micrometer (Range: 0-25mm)
* Signal Conditioner for LVDT
* Displacement calibrated Range for +10mm
* Output voltage: 0-5V
* Built in Power Supply
* digital indicator to display the Displacement

**Experiments:** * displacement-voltage characteristics of the LVDT
 | 02 No. |
| **3** | **J-type thermocouple characteristics trainer** | **Features**:* `J' type Thermocouple as a temperature sensor
* sensor for cold junction compensation
* Signal conditioner f or `J' type thermocouple output: 0-5V
* Built in Instrumentation power supply
* digital indicator to display the temperature.
* Water bath as heat source
* Thermometer provided to monitor the temperature

**Experiments:** * temperature-voltage characteristics of J-type thermocouple
 | 02 No. |
| **4** | **Strain gauge characteristics trainer** | **Features:*** Cantilever beam of maximum weight up to 1Kg
* A pan with slotted weights to vary the strain
* Built in power supply
* Digital display for displaying the strain
* Offset and gain variable provision

**Experiments:** * Strain - Voltage characteristics
 | 02 No. |
| **5** | **Thermistors characteristics trainer** | **Features**:* Negative temperature co-efficient type thermistor sensor
* Signal conditioner for Thermistor Transducer : Output 0-5V
* Built in Power supply
* Digital indicator for voltage display
* Water bath as heat source.
* Thermometer provided to monitor the actual temperature.

**Experiments:** * Resistance – voltage characteristics of Thermistor
 | 02 No. |

**COLLEGE OF ENGINEERING & TECHNOLOGY, BHUBANESWAR DEPARTMENT OF ELECTRICAL ENGINEERING**

**(A Constituent College of BPUT, Odisha)**

**Techno Campus, Ghatikia, Bhuabaneswar, Khurda, Odisha,**

**Pin-751003 www.cet.edu.in Email:principalcet@cet.edu.in**

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**TECHNICAL BID**

(To be enclosed in separate sealed cover)

Name and address of the bidder:

Note: A DD for Rs.6,500/- (EMD) and Rs.500/- (Tender document fee) should be enclosed with this bid.

1. Name of the bidder
	1. Full postal address
	2. Full address of the premises
	3. Telegraphic address
	4. Telex number
	5. Telephone number
	6. Fax number
2. Monthly supply capacity of goods quoted for
	1. Normal
	2. Maximum
3. Total annual turn-over(value in Rupees)(Previous year)

(Copy of Balance Sheet / Audit Statement / IT returns, etc. to be attached as proof)

1. Past supply details for 3 years (Attach proof)
2. Whether similar job work undertaken in the past, if so details.

(Demo of the Lab Equipments to be arranged if required)

**Customer** **Quantity supplied** **Year**

6. Sale Tax No. / TIN No.

**Signature and seal of the bidder**

**COLLEGE OF ENGINEERING & TECHNOLOGY, BHUBANESWAR**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**(A Constituent College of BPUT, Odisha.)**

**Techno Campus, Ghatikia, Bhuabaneswar, Khurda, Odisha, Pin-751003** [**www.cet.edu.in**](http://www.cet.edu.in)

**Email:principalcet@cet.edu.in**

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**FINANCIAL BID**

(To be enclosed in separate sealed cover)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.** | **Item Description** |  |  |  |  | **Make / Model** | **Qty.** | **Unit Cost** | **Total** | **Taxes** | **Any** | **Total** |
| **No.** |  |  |  |  |  |  |  |  |  | **Req.** |  |  | **applicable** | **other** |  |
| **1** | 1. **DC motor driven position control system**
2. **Lag-Lead compensator frequency response trainer**
3. **Second order process trainer with P, PI and PID control to servomotor**
4. **Relay control system Trainer**
5. **Temperature control system Trainer**
6. **Position control system using Synchro Trainer**
7. **Position control system using Synchro Trainer**
 |  | **02 No.****02 No.****02 No.****02 No.****02 No.****02 No.****02 No.** |  |  |  |  |  |
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| **2** | 1. **Bridge circuits**
	1. **Wheatstone Bridge (with resistance box)**
	2. **Maxwell Inductance Bridge (with inductance box)**
	3. **De-sauty’s Bridge (with capacitance box)**
	4. **Kelvin’s Double Bridge**
	5. **Schering Bridge**
	6. **Hay’s Bridge**
	7. **Anderson Bridge**
2. **LVDT characteristics trainer**
3. **J-type thermocouple characteristics trainer**
4. **Strain gauge characteristics trainer**
5. **Thermistor characteristics trainer**
 |  | **01 No.****01 No.****01 No.****01 No.****01 No.****01 No.****01 No.****02 No.****02 No.****02 No.****02 No.** |  |  |  |  |  |
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**Signature and seal of the bidder**

# PROFORMA FOR SUBMITTING ELIGIBILITY REQUIREMENT AND UNDERTAKING

To

The Principal,

CET

Bhubaneswar-751003

**Sub: Submission of Tender for “Supply & Installation of i) DC motor driven position control system, Lag-Lead compensator frequency response trainer, Second order process trainer with P, PI and PID control to servomotor, Relay control system Trainer, Temperature control system Trainer, Position control system using Synchro Trainer, Position control system using Synchro Trainer, ii) Bridge circuits, LVDT characteristics trainer, J-type thermocouple characteristics trainer, Strain gauge characteristics trainer, Thermistor characteristics trainer**

Sir / Madam,

Having examined the conditions of contract and specifications including addenda, I/we, the undersigned, offer to undertake Supply, Installation, Testing & Commissioning of above mentioned items at Department of Electrical Engineering, CET, Bhubaneswar, in conformity with the specifications, terms & conditions of Tender.

1. I/We agree to abide by the terms and provisions of the said conditions of the contract and provisions contained in the notice inviting tender. I/We hereby unconditionally accept(s) the tender conditions.

It is certified that I/we have not stipulated any condition(s) in our tender offer. In case any condition(s) are found in our tender offer violated after opening tender, I/We agree that the tender shall be rejected without prejudice to any other right or remedy be at liberty to forfeit the EMD absolutely.

1. I/We hereby submit the earnest money of [INR…………..……….……] for the Tender for the above mentioned work in the form of demand draft.
2. That, I/We declare that I/We have not paid and shall not pay any bribe to any officer of CET for awarding this contract at any stage during its execution or at the time of payment of bills, and further if any officer of CET asks for bribe/gratification, I/We shall immediately report it to the CET authorities.
3. That, I/We undertake that CET’s tender document shall form part of contract agreement.

I/We understand that you are not bound to accept the lowest or any bid, you shall receive.

Thanking you

Yours faithfully

Dated:

Signature of Bidder

Name: ……………………

Telephone:……………….

Witness…...................

Signature....................

Address......................

Enclosures