

Sr. No. \_\_\_\_\_

**THE DIRECTOR**  
**National Institute of Secondary Steel Technology**  
**MANDI GOBINDGARH-147 301**

**Global Tender No. NISST/1 / 2009-10**

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



**TENDER DOCUMENTS**  
**FOR**  
**SUPPLY OF LABORATORY EQUIPMENTS**  
**AT**  
**NISST COMPLEX**  
**MANDI GOBINDGARH, PUNJAB**

**PRICE : Rs.1000/-**



**National Institute of Secondary Steel Technology**  
Post Box No. 92 , G T Road , Sirhind Side, MANDI GOBINDGARH-147 301

**TENDER DOCUMENTS**

**FOR**

**SUPPLY OF LABORATORY EQUIPMENTS**  
**AT**

**NISST COMPLEX, MANDI GOBINDGARH**

SOLD TO \_\_\_\_\_

(AUTHORISED PERSON) \_\_\_\_\_

NAME OF REQUESTING AGENCY \_\_\_\_\_

\_\_\_\_\_  
DATE OF SALE \_\_\_\_\_

**LAST DATE FOR SUBMISSION: 02.06.2009 TIME: 3.00PM**

## I N D E X

**NAME OF SUPPLY : SUPPLY OF LABORATORY EQUIPMENTS TO  
NATIONAL INSTITUTE OF SECONDARY STEEL  
TECHNOLOGY (NISST) AT MANDI GOBINDGARH,  
PUNJAB**

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## **National Institute of Secondary Steel Technology**

**(Established by Ministry of Steel, Government of India)**

**Post Box No. 92, G T Road, Mandi Gobindgarh-147301, Punjab.**

### **TENDER NOTICE NO. NISST/1 / 2009-10**

Sealed tenders are invited for supply & commissioning of instruments/equipments/computers & softwares (all or any) for different laboratories such as **Energy & Pollution Control, Mechanical, Metallurgical, Electrical & CAD/CAM** from manufacturers/authorised dealers in India. List of items and tender documents are displayed at the Institute's web site **www.nisst.org**.

Tender documents can be obtained from the office on payment of Rs. 1000/- only in cash or in form of Bank draft in favour of "**National Institute of Secondary Steel Technology**" payable at **Mandi Gobindgarh** or may be downloaded from the Institute's web page **www.nisst.org** and inform through email that they have downloaded information. Request for mailing of tender documents will be entertained only on receipt of cost of tender documents plus Rs. 50/- for postal charges.

The tenders must reach this office by 3.00 PM on or before **02.06.2009** along with a tender document fee of Rs. 1000/- if downloaded from website. This office will not be responsible for delay, loss or non receipt of tender documents after dispatch.

**Dy Manager (P&A)**

**SUPPLY OF LABORATORY EQUIPMENTS**  
**INVITATION FOR TENDER**

Messrs: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Subject: **TENDER NOTICE NO. NISST/1 / 2009-10**

Ref: Your letter no. \_\_\_\_\_ dated \_\_\_\_\_

Dear Sirs:

1. Sealed tenders in prescribed proforma enclosed are invited from bonafide, resourceful and experienced persons/firms/companies for supply of Equipment as per list & specifications mentioned at 17-19 & 20-56 at Mandi Gobindgarh.
2. Financial Standing:  
The tenderer should be of sound financial standing and should provide a certificate from their Bankers, based on their transactions during the preceding three years.
3. Eligibility of Tenderers:  
The tenderer should have good market reputation.
4. Tender documents in duplicate are enclosed and one copy of the same duly filled in and signed by a duly authorised person may be put in the Tender Box kept for this purpose in the office latest by 3.00 PM on **02.06.2009** . Tenders can also be submitted by Post/Courier. Tenders must be submitted in 3 parts in 3 separate sealed covers put inside one master cover superscribing **“Tender for supply of Equipment at Mandi Gobindgarh”** and shall indicate the name and address of the tenderer.
5. By submitting a quotation the tenderer shall be deemed to have fully familiarized himself/itself with all requisite details including the quantity and specification as information contained in the enclosed instructions to Tenderer including the terms and conditions of the supply and have fully satisfied himself/itself of his/its capabilities to undertake and perform the jobs to the satisfaction of the institute. Any alteration or modification or imposition or suggestion in deviation to the terms and conditions prescribed by NISST in Tender Papers shall be ignored and such Tenders shall be considered as invalid.
6. The tender shall be kept valid for a period of 180 days from the date of opening of Part I of the tender and any modification, variation, clarification made thereto by the tenderer during the above period shall be construed as withdrawal of the tender in which event the institute (NISST) shall reject the Tender and forfeit the EMD without any reference to the tenderer.

7. Please note that by merely inviting you to submit the tender, there is absolutely no commitment, implied or otherwise, at this stage from our side as to the award of actual contract and no correspondence in this regard will be entertained by us. Nor, NISST shall be liable in any manner whatsoever, for costs and expenses etc. incurred in responding to this invitation.
8. The institute (NISST) reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.

Yours faithfully ,

Dy Manager (P&A)

## INSTRUCTIONS TO TENDERERS

1. **ELIGIBILITY FOR REQUESTING AGENCIES:**
  - a) The requesting agencies should be reputed, resourceful and bona fide having atleast 5 years experience in the line and should have supplied equipments to reputed parties including Government departments
  - b) The requesting agencies should have the financial ability to undertake the supply of this magnitude and amount, and should submit along with the application for a certificate from a Nationalised bank to prove his financial soundness.
2. Tender documents should be duly filled in and signed by the authorised signatory and addressed to Manager (P&A), NISST and sent to **NATIONAL INSTITUTE OF SECONDARY STEEL TECHNOLOGY, POST BOX NO.92, G T ROAD, SIRHIND SIDE, MANDI GOBINDGARH – 147 301.**
3. All entries should be clearly written in ink. Corrections, if any, should be clearly made and duly signed and dated by the requesting agencies.
4. The requesting agencies should sign each and every page of the tender documents.
5. The Director, NISST reserves the right to reject any or all the suppliers without assigning any reason.
6. Each requesting agency should submit a declaration to the effect that he/they is/are an experienced agency or an Associate of a firm which has successfully carried out supply of this nature and has adequate organisation machinery and experienced personnel to handle this type of work and of this magnitude.
7. Full information should also be given by the requesting agencies in respect of the following
  - a) **IN CASE OF PROPRIETORSHIP FIRMS:**
    - i) His full name, address and place of business.
    - ii) His financial status
    - iii) His previous experience
  - b) **IN CASE OF PARTNERSHIP FIRMS:**
    - i) The name of all the partners and their address
    - ii) The financial status of the firm and its partners
    - iii) Previous experience of the firms and its partners.
  - c) **IN CASE OF COMPANIES:**
    - i) Date and place of registration including date of commencement certificate in case of public companies. Certified copies of Memorandum and articles are also to be furnished.
    - ii) Nature of business carried out by the company and provisions of its memorandum of article.
    - iii) Names and particulars including addresses of all the Directors.
8. **EARNEST MONEY DEPOSIT**

Suppliers are required to give an amount as per following schedule as earnest money in the form of Demand Draft/Pay Order/Banker's cheque from any

scheduled Bank in favour of NISST towards EMD at the time of submitting tender documents.

<b>Tender value (Rs. in Lac)</b>	<b>EM (Rs.)</b>
Rs.1.00 Lac	1,000
>Rs.1.00 upto 5.00 Lac	3,000
>Rs.5.00 upto 10.00 Lac	7,500
>Rs. 10.00 upto 25.00 Lac	15,000
>Rs. 25.00 upto 50.00 Lac	35,000
>Rs. 50.00 upto 100.00 Lac	75,000
>Rs.100 upto 200 lacs	1,00,000

No interest will be payable to the tenderers for this EMD amount. Tenderers are required to give this EMD in a separate envelope without attaching it with any part of tender/quotation. No request for adjustment of earlier dues in place of EM shall be entertained.

The EM, provided by unsuccessful Tenderers, shall be refunded after 30 days of issue of purchase order to the successful tenderers. EM in respect of successful tenderers will be retained as a part of security deposit which shall be adjusted with final bill.

**9. Validity of Tender**

The tenderers shall have to keep their tenders valid for 180 days from the date of opening of tenders.

**10. Mode of Submission of the Tender**

The tenderers shall submit their tenders in 3 parts. The EMD shall be put in a sealed envelope **No. 1 superscribed with ‘Tender for supply of laboratory equipments at Mandi Gobindgarh– EMD**. The Techno- commercial Bid shall be put in a separate sealed envelope **No. 2 superscribed with Tender for supply of laboratory equipments at Mandi Gobindgarh – Techno- commercial Bid’**. The price bid shall be put in a separate sealed **No.3 superscribed with ‘Tender for supply of laboratory equipments at Mandi Gobindgarh – Financial Bid’**.

All the envelopes shall indicate the name and address of the tenderer and shall be sealed and put inside another envelope No. 4 which shall be submitted in sealed condition by the tenderer. The envelope **No. 4 shall have the superscription. ‘Tender for supply of laboratory equipments at Mandi Gobindgarh** shall indicate the name and address of the tenderer.

**11. Techno- commercial Bid**

The Techno- commercial bid shall contain the following documents-

- a) The tender papers, i.e. the application for submission of Tenders, Tender Notice, invitation to Tender, instruction to Tenderers and Term & Condition of the contract alongwith all the related documents and annexures. All the

pages shall be duly filled up as required signed by a person authorised to do so on behalf of the tenderer and stamped with the seal of the tenderer.

Copy of the power of attorney in favour of the authorised signatory submitting the tender documents on behalf of the tenderer. Authorisation certificate in case of agent of foreign manufacturer.

It shall be responsibility of the persons submitting the tender to ensure that tenders have been submitted on the formats and as per the terms and conditions prescribed and no change is made therein before submission of their tenders. In the event of any doubt regarding the terms and conditions in the formats, the person concerned may seek clarifications from the Dy. Manager (P&A), NISST, Mandi Gobindgarh. In case any tampering/unauthorized alterations is noticed in the tender submitted, from the Tender Document available, the said tender shall be summarily rejected and the institute shall have no liability whatsoever in the matter. However, deviation, if any, proposed by Tenderer may be separately indicated for acceptance or other wise by NISST. Such proposed deviation will not be treated on tampering for the purpose of applications of this clause. In case price quoted in the Techno-commercial bid tender shall be summarily rejected

## **12. Receipt of Tenders**

The following shall be the accepted modes for receipt of tenders:

- a. Tenders received by post
- b. Tenders received by courier service
- c. Tenders received through tender box

Tenders which have been sent by post or through courier shall be received at the Receipt & Despatch Section of the office. Particulars regarding receipt of such tenders shall be entered in a register kept for this specific purpose indicating the name of the tenderer alongwith the date and time of receipt of the tender.

Tenders shall also be received in the Tender Box kept for this purpose upto the closing time specified in the Tender notice. Immediately thereafter the tender box shall be sealed and removed so as to eliminate any possibility of submission of any further tenders after the stipulated closing time for receipt of tender is over. Late tender received after the scheduled time and date will not be opened/considered in any case.

## **13. Opening of Tender**

The tenders received by the institute shall be opened at the stipulated date, time and place in presence of the Tenderer(s) and/or their authorised representative(s) who is/are to be present. Tender(s) not fulfilling all the conditions shall be liable to be rejected. The tenders which are not accompanied by EMD shall also be liable to be rejected summarily.

A tender opening committee constituted for the purpose shall first open the envelope No. 4 submitted by the tenderers at the appointed time and date. Name, addresses and signature of the persons present at the time of opening of tenders alongwith the names of Firms/Companies/concerns such persons are representing shall be recorded by the Tender Opening Committee. In case any individual is

representing more than one tenderer, the fact should be noted for future reference to avoid any possibility of cartel formation. Next the envelope No. 1 shall be opened for all the tenderers to see as to whether all the tenderers have submitted the EMDs. In case any tenderer fails to submit the EMD (excepting the exempted tenderers, if any,) the tender submitted by such tenderers shall be rejected. The Techno- commercial bids of eligible tenderers whose tenders have not been rejected due to non-submission of required EMD, as contained in the envelope No.2, would be taken up next for opening and thereafter for evaluation and verification. The date & time of the opening of the financial bid shall be intimated to such tenderers who qualify technically.

#### **14. Evaluation of Bids/Proposal**

Two bids/proposal system i.e. Techno-commercial & Financial (separately) will be followed. After opening the technical bids/proposal, the same will be evaluated. The evaluation of the bids/proposal will be based on criteria as mentioned below. However, depending on the type of tender enquiry i.e whether it is for services / consultancy or purchase of goods, plant and machinery, the specified evaluation criteria out of the following will be selected for further evaluation of bids/proposals.

- Stipulation as mentioned under technical part of the tender enquiry every time when the request for proposal/quotation/bid is sought.
- Conformity to specification
- Delivery period
- Technical capacity of the supplier
- Spare parts availability for atleast 5 years
- After sale and service facilities
- Each evaluation criteria will be allotted definite marks and overall technical rating will be developed
- The suppliers/service providers should be considered technically qualified and responsive if they score atleast 80% marks. Those who do not meet these requirements must be rejected as non-responsive.
- Submission of EMD as per para 8 (page No.7-8) shall be mandatory for procurements. In absence of EMD, bid will be summarily rejected.
- If taxes and duties are not included in the techno-commercial bid, the price will be taken as inclusive of taxes and duties.
- If the delivery date is an important factor in the bid, and has been so stated in the invitation, the bids not meeting the required delivery schedule shall be rejected. If all bids are disqualified and re-advertising is not feasible, it may be necessary to enter into a negotiated contract.
- Terms of payment.
- Warranty/guarantee conditions.

#### **15. Financial Bid**

The financial bids will be opened only for those suppliers/consultants who have qualified on the technical evaluation. The following criteria will be considered for price evaluation.

- ☞ Landed price (instruments/equipments) CIF/FOR, freight, insurance, handling charges, taxes and duties shall be taken into account.
- ☞ Price of spares for 2 years of operation
- ☞ Price of consumables for 3 months (commissioning consumables will be treated a part of equipment supply).
- ☞ Cost of transportation to the site (in case of imported item).

## **16. Termination of Contract**

NISST, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

- a) If the Supplier fails to deliver any or all of the Goods within any extension thereof granted by the Purchaser.
- b) If the supplier fails to perform any other obligation (s) under the contract.

## **17. Force Majeure**

In the event of and as soon as possible after the occurrence of any cause constituting Force Majeure the supplier shall give notice and full particulars in writing to NISST of such occurrence or change if the supplier is rendered unable wholly or in part to perform its obligations and meet its responsibility under this contract. However NISST shall have the right to suspend or terminate the contract giving a notice of seven days on receipt of such information.

Force majeure shall mean fires, floods, natural disasters or other acts such as war, turmoil, strikes, sabotage, explosions, quarantine restriction beyond the control of either party.

## **18. Settlement of disputes**

### **Amicable settlement**

The Parties shall use their best effort to settle amicably any dispute, controversy or claim arising out of, or relating to this Contract or the breach, termination or invalidity thereof. Where the parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the procedure as may be agreed between the parties.

### **Arbitration**

If at any time, any question, dispute of difference whatsoever shall arise between the purchaser / owner and the supplier upon or in relation to, or in connection with the contract ( except as to any matter the decision on which is specifically provided for) the same may be referred to the sole arbitration of the Chairman, NISST or a person appointed by him.

**19.** All disputes will be subject to the territorial jurisdiction of Fatehgarh Sahib, Punjab.

## TERMS & CONDITIONS

1. The tender documents can be obtained from the office during working hours on any working day on payment of Rs. 1000/- at Institute cash counter or by sending an A/c payee demand draft in favour of the Institute for Rs. 1050/- payable at Mandi Gobindgarh.
2. The institute does not take any responsibility of postal delay in receipt of tender documents at tender's end.
3. Only valid tender which conform to the following will be considered:
  - (a) Must have been received by Institute in time
  - (b) Earnest money required as per tender must have been furnished along with the tender in the prescribed form of remittance
  - (c) It must have been securely packed and closed so that the cover is not opened or torn during transit.
  - (d) The firm must not have been black listed by the Institute.
  - (e) It must have been addressed correctly.
  - (f) The reference to Tender inquiry No and Date, the last date for receipt of tender and the date of opening tender must have been superscribed on the cover containing the tender.
4. Tender will be opened on the due date in the office in the presence of those tenderers or their representatives who may like to be present.
5. The rates quoted should be inclusive of all packing forwarding, freight, incidental and insurance charges and F.O.R. Mandi Gobindgarh if stores are delivered by road.
6. Rates quoted should be valid for a period of 180 days from the due date of tender opening.
7. Payment to supplier will be made by crossed A/c payee cheque normally within 15 days from the date of receipt of the stores in good order and acceptable condition. 50% of the payment will be released after delivery within 15 days and rest 50% after successful installation and operation of equipment. In case of imported equipments where payment is to be made in foreign currency L/C shall be established.
8. Institute accepts no liability what so ever for any breakage, pilferage or damage to the materials in transit & payment will be made strictly on the basis of stores received in good and acceptable condition by the Institute.
9. The supplies will have to be completed as per the delivery period indicated against each item in the list of equipments of tender document (refer page 17-19) from the date of placement of the purchase order, failing which the tender shall liable to be rejected.
10. Manufacturers name and country of origin of the materials offered must be clearly specified and illustrated literature or drawing must accompany all quotation whenever possible.
11. In case of proprietary article, manufacturer's standard price list/proforma invoice must be furnished with the quotation for price verification.
12. Institute reserves its right to reject outright any tender/to make or not to make any purchases against a tender/to increase or to decrease the quantity without assigning any reason therefore.
13. Sales tax / Vat where leviable and intended to be charged from Institute should be distinctly shown along with the price quoted. Failing this no claim on A/c of Sales Tax / Vat will be entertained by the Institute. Institute does not issue any C or D form for tax relief. In case of excisable items on which **CENVAT credit** shall be available to the Institute, the suppliers will have to furnish the necessary documents and indicate the excise element even though the same might not have been shown separately in the bill/quotation.

14. All the materials supplied shall be subject to inspection by Institute's representative at the registered office of the Institute only and must strictly conform to the specification and quality as per purchase order. The Institute reserves the right to reject such stores as are not found to be acceptable on these grounds and impose liquidated damage at the rate applicable in case of failure to execute the order.
15. If a firm accepts an order but fails to execute the same in full or part, as per the terms and conditions stipulated therein, it will be open to this Institute to recover liquidated damages from that firm at the rate of 0.5% of the contract price of the delayed/undelivered store/services for every week of delay or part of a week, subject to a maximum of 5% of the value of the delayed stores. It will also be open to this Institute, alternatively, to arrange procurement of the required stores from any other source, at the risk and expenses of firm which accepted and then failed to execute the order according to stipulations agreed upon.
16. Where it is necessary, inspection of the equipment may be carried out before delivery if required by the Institute.
17. The facilities of the Annual Maintenance Service contract and the terms & conditions thereof may also be indicated.
18. Installation, commissioning and training where necessary has to be made free at the site by the supplier after delivery of the material.
19. Equipment shall be opened in presence of supplier or its authorised representative and commissioning shall be done within 15 days of receipt of equipment. The convenient date shall be decided mutually.
20. Supplier shall intimate the requirement if any in advance for commissioning and or demonstration of the equipment to avoid wastage of time.

**NATIONAL INSTITUTE OF SECONDARY STEEL TECHNOLOGY (NISST)**

**(QUESTIONNAIRE FOR THE REQUESTING AGENCY)**

1. NAME OF REQUESTING AGENCY :
  
2. POSTAL ADDRESS :
  
3. TELEPHONE NOs. :
4. E-MAIL ADDRESS :
  
5. HAVE YOU ENCLOSED THE FOLLOWING :
  - a) CERTIFIED COPY OF REGISTRATION :  
AS SUPPLIER WITH GOVT/SEMI-GOVT  
PUBLIC UNDERTAKING/ANY OTHER  
AGENCY IF ANY
  
  - b) CERTIFIED COPY OF LATEST INCOME:  
TAX CLEARANCE CERTIFICATE
  
  - c) BANK REFERENCE FROM YOUR :  
BANKERS
  
  - d) i) LIST OF CLIENTELE TO WHOM  
EQUIPMENT (WORTH Rs.10.00  
LACS) SOLD
  
  - ii) LIST OF GOVT. PARTIES :  
TO WHOM EQUIPMENTS SOLD
  
  - e) YOUR ANNUAL TURNOVER
  
  - f) WHETHER YOU HAVE ANY FOREIGN :  
COLLABORATION
  
  - g) WHETHER YOU ARE AN AGENT OF :  
FOREIGN MANUFACTURER. IF YES,  
SUBMIT THE AUTHORIZATION  
CERTIFICATE
  
  - h) PHOTO COPY OF THE RECEIPT FOR :  
PURCHASE OF TENDER DOCUMENT

**LETTER OF SUBMISSION OF TENDERS**

DATED :

FROM:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

To

The Director,  
National Institute of Secondary Steel Technology,  
G.T. Road, Sirhind Side,  
Mandi Gobindgarh – 147 301

**Sub : QUOTATION FOR SUPPLY OF LABORATORY EQUIPMENTS**

Dear Sir,

Subject to the instructions & conditions given in the tender document and terms & conditions of supply, I/we hereby submit quotations duly completed with other related documents / annexures as required in the tender documents for your kind consideration. I/we hereby certify that I/we have examined and am/are familiar with all the provisions of the tender document and agree to abide by all the terms and conditions laid down therein.

2. The following documents are enclosed:

- a. Detailed list indicating documents/statements submitted as part of Technical bid.
- b. Evidence of the authority of person signing this document and the requisite Powers of Attorney (if required).
- c. Certificate from \_\_\_\_\_ (Name of the Bank) who are my bankers and are a schedule bank about my sound financial standing.
- d. This tender document with all pages intact and dully signed by the tenderer.

3. A sum of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_) only is forwarded herewith as Earnest Money in the form of demand draft/ Banker's Cheque/BG No. \_\_\_\_\_ drawn on \_\_\_\_\_ in favour of "**National Institute of Secondary Steel Technology**" payable at Mandi Gobindgarh.

4. I/We agree to keep this tender open for a period of 180 (One hundred eighty) days from the date fixed for opening and the same cannot be withdrawn from the said period of 180 (One hundred eighty)days or until the purchase order is issued, whichever is earlier.
  
5. I/We do hereby declare that the entries made in the tender document and the Annexures/appendices attached are true and every page of the tender documents is dully signed.

Yours Faithfully,

(SIGNATURE OF AUTHORISED SIGNATORY)

SEAL OF FIRM

PLACE: \_\_\_\_\_

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

**LIST OF LABORATORY EQUIPMENTS AND  
SCHEDULE FOR SUPPLY /INSTALLATION**

<b>Item No.</b>	<b>Instruments / Equipments</b>	<b>Quantity</b>	<b>Schedule for supply/installation</b>
<b><u>Energy &amp; Pollution Control Laboratory</u></b>			
1.	Auto Clave	One	3-6 months
2.	Bottom sampler	One	3-6 months
3.	Centrifuge	One	3-6 months
4.	COD Digester with aluminium heating block system	One	3-6 months
5.	Colont Counter (Electronic)	One	3-6 months
6.	Current Meter	One	3-6 months
7.	Digesters with condensers	Two	3-6 months
8.	Flame photometer	One	3-6 months
9.	Filtration Assembly with vacuum pump	One	3-6 months
10.	Hot Air Oven	One	2-3 months
11.	Incubators for Bacteriological tests	Two	3-6 months
12.	Laminar flow (Inoculation chamber)	One	3-6 months
13.	Liquid handling systems (Dispensers)	Four set each	3-6 months
14.	Mercury Analyzer Digital	One	3-6 months
15.	Portable pH meter with combined glass electrode	One	2-3 months
16.	Portable Analyzer kit (DO, pH, Temp. Cond.)	One s	3-6 months
17.	Rotary Evaporator	One	3-6 months
18.	Stereo Microscope	One	3-6 months
19.	TKN Analyzer semi automatic with aluminum block digester	One	3-6 months
20.	Ultrasonic water bath	One	3-6 months
21.	Vacuum pump	One	2-3months
22.	Water distillation assembly (Glass)	One	2-3 months
23.	Water purification system (RO based)	One	3-6 months

24.	Water bath (Thermostatic Control)	One	2-46 months
25.	Flue Gas Analyzer	One	3-6 months
26.	Handy sampler for gaseous monitoring	Two	3-6 months
27.	High temperature probe for stack monitoring	Two	3-6 months
28.	Meteorological sensors with mast WS, WD, Temp., humidity	One	4-8 months
29.	RSPM sampler with flow control/brush less motor + calibration kit	Four	3-6 months
30.	Automatic Burette Digital	One	6-8 months
31.	Gas Chromatograph with ECD, FID, NPD, FPD	One	6-8 months
32.	Microwave Digester	One	6-8 months
33.	Detector tubes of different pollutants with pump	One	6-8 months
34.	Noise level meter	One	6-8 months
35.	Soap bubble meter	One	6-8 months
36.	Stack monitoring kit with High temp. probe	Two	6-8 months
37.	Exhaust CO/HC Analyzer	One	6-8 months
38.	Smoke Density Meter	One	6-8 months
39.	Portable Combustion analyzer	One	3-6 months
40.	Thermocouple probe with meter	Two	3-6 months
41.	Pressure Gauge (Capsule model)	Two	3-6 months
42.	Thermo chalk	Two set each	3-4 months
43.	Electric Balance (0-3 Kg)	One	3-4 months
44.	Infrared pyrometer	One	3-4 months
<b><u>Mechanical Laboratory</u></b>			
45.	Brinell-cum-Vicker Hardness Tester	One	3-4 months
46.	UTM of 100 Ton Capacity	One	3-4 months
47.	Ultrasonic Flaw Detector	One	3-4 months

48.	Charpy & Izod Notch Machine, V-notch cutter, U-notch cutter (Machine/tooling for making of impact sample)	One	3-4 months
49.	Chillers/Cryostat/Cooling Chamber for sub impact test (Facilities for creating sub zero impact testing of samples)	One	3-4 months
50.	Ultrasonic Flow Meter	One	3-4 months
<b><u>Metallurgical Laboratory</u></b>			
51.	Image Analyser with micro hardness	One	3 months
52.	Muffle furnace 0-1100°C(upgradation)	One	6 months
53.	Vacuum sample cutting machine	One	3 months
<b><u>Electrical Laboratory</u></b>			
54.	Electrical Power analyzer with accessories(Clamp on Type)	One	4-5 months
55.	Compact Power meter (Clamp on Type)	one	4-5 months
56.	Current transformers (Clamp on type)	Three	3-4 months
57.	Thermal printer	One	4-5 months
58.	Tong tester 1000 Amp (Digital clamp meter)	One	4-5 months
59.	Digital and Analog Pressure gauges	Four	3-4 months
60.	Digital Temperature meter	Two	4-5 months
61.	Digital Industrial Multi-meter	One	3-4 months
62.	Diesel Generator set of capacity 75 KVA	one	5-6 months
<b><u>Computers &amp; Softwares</u></b>			
63.	Laptop	Four	3 months
64.	Softwares a) For calculating Thermal Heat Balance from a re-heating Furnace and Boilers b) Upgradation of Auto Cad/MDT S/W	One each Two each	3 months

## Specification of the Instruments/equipments

### Energy & Pollution Control Laboratory

<u>Item No.</u>	<u>Detailed Specification of the Instruments/equipments</u>
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<b>1.</b>	<b><u>Autoclave:(Vertical model)-(For sterilization of bacteriological samples)</u></b>	<b>(One No.)</b>
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Internal height	: 450 mm
Internal diameter	: 250 mm

It should be fabricated from thick Stain less Steel sheet 304 from inside. The outer jacket should be made of thick gauge stainless steel and finished with hammer tone grey stove enamel. The lid should be made of thick stainless steel faced to form a steam tight joint (with the molded neoprene rubber gasket fixed in the groove ensuring leak proof), with Radial locking system. Should be fitted with regulating valve for pressure adjustment up to at least 20 PSI, pressure gauge, safety valve, steam release valve, water level indicator, water drain valve, and timer for at least 2 hrs operation and adjustable in 15 minutes or less for auto cut off. To be supplied complete with power cable, mains on/off switch and electric line indicator ( $220 \pm 10$  volts /  $50 \pm 5$  % HZ AC) and perforated stainless steel baskets.

The Instrument pressure gauge should be calibrated from a NABL accredited calibration laboratory, which must be within the range of  $1.02 \pm 0.03$  Kg/cm<sup>2</sup> gauge pressure and temperature 120<sup>0</sup> C. The calibration certificate should be provided.

<b>2.</b>	<b>Bottom Sampler (Ekman Dredge)</b>	<b>(One No.)</b>
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The bottom sampler (Ekman) shall be used for collection of benthic animals in the water bodies having bottom sediments.

The device shall have two or more curved metal plate (Stainless steel) designed to converge when the sampler hits bottom and grab a specified volume of bottom sediments. The size shall be 20cm x 20cm x 40cm and the specific grasping area shall be 225cm

<b>3.</b>	<b>Centrifuge (Cooling Type)</b>	<b>(One No.)</b>
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The centrifuge will be used for the extraction of chlorophyll from environmental samples involving monitoring of lakes, rivers etc., using low boiling solvents such as acetone, Ethanol etc. The unit should, therefore, have facilities for operation at  $220 \pm 10$  volts/50 HZ AC power supply.

Unit	: Steel body, table top, compact and corrosion resistant, with a see through acrylic lid.
Timer	: Up to at least 60 minutes and adjustable
Temperature	: Digital display and controlled
Maximum Speed	: At least 7000 RPM
Maximum Centrifugal	

Force 'G'	: At least 7000
Mains	: 220 ± 10 volts / 50 ± 5 % HZ AC
Speed Regulation	: Step less with zero-start switch
Speed Meter	: Continuous reading type
Protection	: Protection fuse, operation possibility with lid closed only, unbalance cut off
Head	: 4 Place swing out suitable for 200ml and 100ml carriers.
Carrier	: A set of 4 metal carriers suitable for the above head, with reduction adaptors and a set of 4 polypropylene tubes for each of the above two volumes i.e. 100 ml and 200 ml..
Rotor	: 12 x 50ml angle rotor with set of 12 (twelve) polypropylene tubes of 50 ml capacity.
Spares	: 12 no of 50 ml capacity polypropylene tubes.

The unit should be complete with operation manual, power cable with plug, dust cover and with power safety cut off.

#### **4. Chemical Oxygen Demand (COD) Digesters (One No.)**

The digester will be used for potassium dichromate - sulphuric acid digestion of water/waste water samples for COD estimation. Should consist of an electrically heated (220 ± 10 volts / 50 ± 5 % Hz AC power) metal block thermostat having at least 15 holes to take the borosil glass reaction vessels. The digester should be supplied with 15 no. of borosil glass reaction vessels, a cooling tray, and an air cooler stand for 15 air coolers. The capacity of these reaction vessels should be at least 100 ml each. The heating with thermostatic control should provide a temperature range of upto at least 400 °C, and built-in timer with signal.

The COD should be supplied complete with 30 extra reaction vessels and 30 air coolers, power cord and plug, and adjustable automatic Dispensers 4 each of 1-10 ml, 2-20 ml, and 5-30 ml capacities for reagents additions.

The Instrument temperature device should be calibrated from a NABL accredited calibration laboratory. The calibration certificate should be provided with system.

#### **5. Digital Colony Counter (Electronic) (One No.)**

Should have a glare-free illumination and a 100 mm diameter-magnifying lens the position of which should be adjustable. The counting plate should have standard wolf haggel ruling. Should provide automatic digital display (minimum 3 digits), with facility to manually reset. Should be complete with ON/OFF switch, probe for counting, power cable with plug suitable to work on 220 ± 10 volts / 50 ± 5% HZ AC power supply.

#### **6. Current Meter (One No.)**

Should be suitable for direct measurement of flow in rivers, canals etc. by suspending the probe from a boat / platform. It should be watertight, impact and corrosion resistant. Should provide a direct digital display with recorder output and cover a current velocity range of up to at least 300cm/second. Should be rechargeable battery operated.

**7. Digester with condensers (Two Nos.)**

The digester should be supplied with all accessories such as heating mantle glass apparatus etc (two set – one 250 ml capacity and one set 500 ml capacity).

Capacity	: 250 ml flask one set
	: 500 ml flask one set
Temperature range	Ambient to 250 °C
Accuracy	: ± 2° C
Condenser	: Double walled spiral

**8. Flame Photometer (One No.)**

For measurement of concentration of Alkali and Alkali earth metals (**Sodium, Potassium, Calcium and Lithium**). The equipment should be microprocessor based with **printer** along with Calibration curve programmable (using different standards) and saving facility. The equipment should be supplied with all standard accessories such as filters, buffer tanks, gas igniter and beakers etc. The system shall have following specification:

Nebulizer	: Concentric suction type with SS capillary
Flame system	: Burner - Stainless Steel
	: Fuel - LPG Gas
	: Oxidant - Dry oil free air
	: Regulator - SS Needle type
Detection	: Photo conductive cell
Linearity	: ± 1 %
Repeatability	: ± 1 count /1%

Range		
<b>In ppm</b>	<b>In mEq (with dilution)</b>	
Na	: 1-100	0-200
K	: 1-100	0-100
Ca	: 1-100	0-10
Li	: 15-100	0-05

One LPG gas cylinder along with gas has also to be supplied.

The system should be supplied with calibration standard solution of sodium, potassium calcium and lithium and spares to be used for at least 2 years.

**9. Filtration Assembly for filtration of samples. (One No.)**

***Filter Holder***

Material	: Stainless steel lid, funnel, base, clamp and filter support
Filter diameter	: 47mm
Filtration Area	: 12.5cm <sup>2</sup>
Funnel Capacity	: 500 ml
Connections	: Outer diameter of base outlet 10mm
Operating pressure	: Vacuum only

### ***Vacuum Pump***

Type	: Single phase motor with IP 44 type of protection, with carrying handle and sturdy rubber feet
Vacuum pump	: The pump should be an oil free diaphragm Pump. Should be adequate for smooth filtration of surface water samples for Chlorophyll, Biomass etc., and suspended solids estimations.
Rating	: At least 0.12 KW
Mains Voltage	: $220 \pm 10$ volts / $50 \pm 5\%$ HZ AC

The assembly should be complete with stopper, suction flask of at least 2-liter capacity vacuum hose, stainless steel forceps, power cord with plug, and toggle switch etc.,

### **10. Hot Air Oven (One No.)**

a) Size	: 605 x 605 x 605 mm, temperature ranges from room temperature to $250^{\circ}\text{C}$ , digital temperature indicator cum controller.
b) Specification	Double walled inside stainless steel sheet and out side wall made up of mild steel furnished in double white enamel paint, temperature range $50^{\circ}\text{C}$ to $300^{\circ}\text{C} \pm 3^{\circ}\text{C}$ . Thermostatic control built in L shaped thermometer-heating elements placed on both sides. Complete with 3 nos. of perforated stainless steel shelves adjustable at any level. One no. air circulating fan thermostat indicators and on/off switch, to work on $220 \pm 10$ volts / $50 \pm 5\%$ HZ AC.

The equipment for its temperature measurement should be calibrated from NABL accredited calibration laboratory. The calibration certificate should also be provided.

### **11. Bacteriological Incubator: (Doubled walled) (Two no.)**

The chamber size of the equipment shall be 300mm X 300 mm X 300mm. It should be double walled, inside wall made up of stainless steel and outside wall mild steel furnished with epoxy powder coating with perforated adjustable shelves. Spacing between walls should be 75mm packed with white glass wool. Double glass door for viewing inside.

The heating elements should be provided on all three sides (up to  $70^{\circ}\text{C}$ ), thermostatically controlled with a sensitivity of  $\pm 0.5^{\circ}\text{C}$ . This should have L shaped thermometer and adjustable ventilators located at two sides. To work on 220/230 volts AC/ $50 \pm 5\%$  Hz

The temperature measurement device should be calibrated from NABL accredited calibration laboratory. The calibration certificate should also be provided.

### **12. Laminar Flow Bench (One No.)**

Type	: Horizontal laminar flow conforming to class 100 conditions of the U.S. Federal standard 290 B
Work Area	: 120cms x 60cms x 60cms
Principle	: Double filtration of Air

Filters	Pre- filter and HEPA filters with at least 99.97% efficiency for particulates of 0.3 micron or large size on all the sides. DOP tested for leaks and certified.
Air Flow	: 90 ± 20 FPM (feet per minute)
Noise	: less than 65 db on 'A' scale at work area
Light level	: Normal working fluorescent light. The intensity should exceed 100 feet candles at work area
Vibration	: 0.0001- inch average displacement of work table
Blower	: Dynamically balanced and with at least 0.25 HP electric motor operating on 220 ± 10 volts / 50 ± 5% HZ AC power supply.
Housing	: Wood-melamine or equivalent
Work Top	: Stainless Steel (SS 304)
Accessories	: Ultra Violet light, static, pressure inclined manometer, Air / Vacuum petcock and burner.

The HEPA filter and manometer should be calibrated from NABL accredited calibration laboratory. The calibration certificate should also be provided.

**13. Liquid Handling System (Dispenser) (Four Set each)**

Conformity, certified with safety prime venting valve in digital adjustable volume type.

Volume range	Graduation
0 - 1 ml	0.1 ml
1 – 10 ml	0.2 ml
10 – 100 ml	1.0 ml

Thousand no's of disposable tips for each volume range.

To be supplied with calibration certificate.

**14. Digital Mercury Analyzer (to be used for analysis of Mercury concentration in environmental samples) (One No.)**

It is consisting of Main Unit, Vapor generating system, Suction pump and optical Parts

***Specifications:***

Measuring range in solutions 20 to 200 ng absolute (with small reaction vessel), 20 to 600 ng (with BOD bottle as reaction vessel)

Readout	Digital display of absorbance % transmittance on DPM
Sensitivity	:3 ng absolute for 1% transmittance Change
Detection limit	:10 ng absolute or 0.0001 ppm (0.1 micro gram/ltr)
Stability	:±1 % of full scale
Vapor generating system	:All glass reaction assembly including BOD bottle (one set with magnetic stirrer and stand).
Radiation source	:Mercury lamp
Detector	:Silicon Photo Detector

Power requirements 230 ± 10 Volts / 50 ± 5% Hz

Mercury standard solution for Calibration of different concentration range should also be supplied. Spare glassware set (one set) should also be supplied with system.

**15. Portable pH Meter (One No.)**

A portable battery operated (rechargeable) pocket model pH meter (digital display) with built-in double junction combined electrode along with buffer solutions and plastic bottle etc.

Display	:4 Digit Display with Decimal point
Measuring Range	:0.00 – 14.00 Temp. 0-99.0
Resolution	:0.01 pH; Temp. 0.1 °C
Accuracy	:± 0.01 pH; Temp. 0.1 °C
Temp. Compensation	:Automatic / manual
Repeatability	:± 0.01
Operating Temp.	: 0 to 50°C
Stability	:± 0.05 in 8 hrs

To be supplied with case, instruction manual.

**16. Water Analysis Kit (Dissolved Oxygen, Conductivity, pH, Temperature, Turbidity and Colorimeter) (One No.)**

A microprocessor based water analysis kit in a sturdy brief case capable of measuring pH/mV/ORP, Conductivity/TDS, Salinity, DO, Temperature, Turbidity and Colorimeter. The equipment should have LCD display and it could be operated on battery and mains at 220 ± 10 volts 50 Hz. The equipments shall have following specification:

	<i>pH</i>	<i>mV/ORP</i>
Range	: 0 to 14.00 pH	: ± 1999 mV
Resolution	: 0.01 pH	: 1 mV
Accuracy	: ± 0.01 pH ± 1 digit	: ± 1 mV ± 1 digit
Sensor	: Combination Electrodes	: Combination Electrodes
Temp Compensation	: Auto & Manual	

***Conductivity / TDS***

Range	: 0 to 100 mS, 5 ranges, 0 ppm to 100 ppt 5 ranges at TDS factor 0.5 (approx)
Accuracy	: ± 1% of FS ± 1 digit
Sensor	: PVC cond Cell
Temp Compensation	: Auto & Manual

***Salinity***

Range	: 0 to 40 ppt
Resolution	: 0.1 ppt
Accuracy	: ± 2% of FS ± 1 digit

Sensor : PVC cond Cell  
Temp Compensation : Auto & Manual

### ***Dissolved Oxygen***

Range : 0 to 20 ppm  
Resolution : 0.1 ppm  
Accuracy :  $\pm 1\%$  of FS /  $\pm 0.1$   
Sensor : Amperometric Gold – Silver dlectrode  
Temp Compensation : Auto & Manual

### ***Temperature***

Range :  $\pm 0$  to 100<sup>0</sup>C  
Resolution : 0.1<sup>0</sup>C  
Accuracy :  $\pm 0.5^0\text{C} \pm 1$  digit  
Sensor : PT 100

### ***Colorimeter***

Range :  $\pm 2.00$  Abs / 0 to 100 % T / Conc. 0-1999  
Accuracy :  $\pm 0.05$  Abs  
Resolution : 0.001 Abs, 0.1% T  
Sensor : Photo Diode  
Filters : Blue (440nm), Green (540 nm) and Red (660 nm)

### ***Turbidity***

Range : 0 to 1 NTU  
: 1 to 10 NTU  
: 10 to 100 NTU  
Accuracy :  $\pm 2\%$  of FS  
Sensor : Photo Diode  
Source : Tungsten Lamp

## **17. Rotary Evaporator with Pump (One No.)**

Rotary Evaporator complete in all aspect such as of Rota vapor, microprocessor controlled heating bath vacuum controller, glass assembly with vacuum pump and recirculation chiller.

### ***Rota vapor***

Rotation Speed : Controlled and digital display  
Vapor Temperature : Sensor and digital display  
Glass Assembly : Vertical glass assembly  
Jack : For elevation and submersion of evaporating flask, (Jack operation – electrical as well as manual)

### ***Heating Bath***

Display : Digital display, microprocessor temp. control  
Material : Corrosion resistant coated with PTFE

Capacity	: 4.0 lt
Heating Element	: Under Pan heating for ease of bath Cleaning; 1000 w or above.
Temperature Range	: 20 to 180 <sup>0</sup> C ( Provision for setting temperature by user, digital display)
Temperature Accuracy	: $\pm 1^{\circ}\text{C}$
Flask Accommodation	: 50 to 3000 ml on source joint
Power	: 220 $\pm$ 10 volts; 50 $\pm$ 5% Hz

#### ***Vacuum Controller***

Vacuum display and control	: Digital, capable of controlling vacuum set by user for unattended operator
Programming facility with storage	: Programming for evaporating mixture and facility to store user customized programmes
Power	: 220 $\pm$ 10 volts; 50 $\pm$ 5% Hz

#### ***Glass Assembly***

Condenser & Joint Adopter	: Vertical, compatible for vacuum pump water jet pump Press fit type adapter for evaporating flask to condenser
Flask volume and adopter	: Preferably conical shape, 25 ml, 50 ml, 100 ml, 250 ml, 500 ml with adapter joints for smaller volumes
Clips	: preferably stainless steel

#### ***Vacuum pump***

Type	: Mono-block, PTFE Diaphragm type, self cleaning features
Suction and Final volume	: 1.5 m <sup>3</sup> /hr or more and about 10 mBar
Glass heads	: Inert glass heads
Control of solvent vapor	: Secondary condenser for minimizing Laboratory Pollution
Communication with vacuum controller	: Vacuum level communication with vacuum controller

#### ***Recirculation Chiller***

Display	: Digital display
Water-cooling	: up to -20 <sup>0</sup> C (using CFC free gas)
Temperature stability	: $\pm 0.05^{\circ}\text{C}$
Readout accuracy	: $\pm 0.05^{\circ}\text{C}$
Water recirculation	: leak proof to and from condenser
Operation	: 220 $\pm$ 10 volts/50 $\pm$ 5 % Hz, AC operated.

### **18. Stereoscopic Binocular Microscope (One No.)**

Standard set with mounted 2X and 4X Achromatic objective with diaphragic adjustment and glass paired eye piece 10 x and 16 x and stand in wooden cabinet, built-in electrical light source.

To be supplied with operation maintenance manual, lens cleaning solution, felt cloth and one extra bulb.

**19 Total Kjeldahl Nitrogen (TKN) Analyzer (One No.)**

The analyzer should be a semi-automatic system consisting of a digestion unit, a scrubber unit, and a distillation unit.

***Digestion unit***

Should have electrically heated ( $220 \pm 10$  Volts,  $50 \pm 5$  % Hz AC) metal blocks. It should be capable of providing a temperature range from Ambient -  $450^{\circ}\text{C}$  with 1% repeatability. Should have inbuilt temperature controller with digital display along with manual temperature adjustment.

Should have the capacity to accommodate at least six numbers of digestion tubes each of at least 200ml capacity

Should have leak-proof integrated condensers (fumes carriers) made up of glass, fixed on a movable panel along with adaptor for outlet to the scrubber unit.

***Scrubber unit***

Should be an oil free centrifugal suction type, with manual vacuum adjustment facility. Corrosion and impact resistant provided with condensate and acid fumes collection vessels. Should operate on  $220 \pm 10$  Volts,  $50 \pm 5$  % Hz AC power supply

***Distillation unit***

Should be made-up of standard quality borosilicate glass and possess a steam generator made-up of borosilicate glass along with heater and should have 3- step manual control facility i.e. standby, water inlet and distillation. The distillation unit should have inbuilt diaphragm pump along with push button for alkali dispensing with manual volume adjustment, ventilation valve, timer for 5 - 15 minutes with audio signal. Steam inlet tube should be of PTFE. Unit should have quick clamping device for digestion tube with adaptor.

Should operate on  $220 \pm 10$  Volts,  $50 \pm 5$  % Hz AC power supply.

Complete unit should provided with one set of digestion tubes along with the servicing, operating and maintenance manuals.

***Accessories***

Two set of additional digestion tubes, digestion tube stand, spillage tray for the condensers and tube-removing device spares and accessories for two years of continuous use.

**20. Ultrasonic Water Bath (One No.)**

Type : Plug in type with Lid and Timer  
Tank dimensions (interior) : 50 cm L x 28 cm W x 15 cm H  
Sound frequency : 42 kHz

Timer	: Digital adjustable up to 99 minutes
Temperature control	: Digital adjustable from 20 to 70 °C
Power supply	: 220 ± 10 VAC / 50 ± 5 % Hz AC

**21. Vacuum Pump (Diaphragm) (One No.)**

Two stage diaphragm vacuum Pumps

Suction capacity	: Not less than 1.6 m <sup>3</sup> /h
Pressure	: < 100 mbar (<75 Torr) to 0.6 mbar (0.45 Torr).
Volume throughputs	: 1.9m <sup>3</sup> /hr (1.3 cfm) to 11.2 m <sup>3</sup> .hr (7.6 cfm)
Power supply	: 220 ± 10 VAC/50 ± 5% AC

**22. Water Distillation Assembly (Glass) (One No.)**

**Boiling Flask capacity – 5 ltrs or more**

All glass double water distillation assembly of borosilicate glass, with quartz condenser with standard ground glass joints and heater tube, horizontal type, 2.5 ltrs /hr, with automatic cut off switch. Wastage of water should be minimum and condenser water to be used as make up water. To be supplied complete with glass fitting, metallic stand, rings, clamps, electrical fittings and automatic water level cut off device in case water supply is stripped.

**23 Water Purification System – (RO Based) (One No.)**

It should be microprocessor based compact, single unit to deliver ultra pure water taking tap water bearing conductivity upto 2000 µs/cm as feed. The RO based Water Purification System should remove any fine particles, weakly bonded ions, 100% Bacteria, Total Organic Carbon, Particles etc. The System should give Chlorine free water and remove 95% of mono-valent and polyvalent ions. The System should have Built-in Softener, Micro -Filtration, Activated Carbon, Reverse Osmosis technology.

The system should have backlit alpha numeric display auto diagnostic features with clear indication of error/alarm for easy maintenance.

The System should have a temperature control Feed back loop for constant flow rate in any seasons. The System should have a provision for either wall mounting or bench top. The system should have an in-built tank of min. 10 liter capacity.

The Water system should have built-in Pre-filtration Cartridge, Application Specific Cartridges & Validated Final 0.22 µm Reverse Osmosis Membrane to ensure 100% bacteria retention.

The Product water of the system should be of the following specifications and complies with ASTM, NCCLS, CAP etc.

Resistibility	: At least 18 Mega-Ohm with accuracy of 0.01/cm Cell Constant
Conductivity	: Less than 0.05 micro-Semens with accuracy of 0.01/cm Cell Constant

T.O.C	: Less than 10 ppb
Micro-organisms	: Less than 1 cfu/ml
Particles	: Less than 1 / ml of 0.22 pore size
Flow rate	: 0.5 Liter / Minute

This system should also have provision for auto-sanitization, auto-rinsing, auto-recirculation, temperature control and feed back loop for constant flow rate in any seasons.

One set of Cartridges, one no of RO membrane and any other accessories/spares and consumable required to use for at least 2 years

The Operation and detailed maintenance manual should also be supplied.

**24. Water Bath (Thermostatic Controlled) (One No.)**

Size inside chamber :300 x 250 x 1150 mm

The equipment should be rectangular double walled inside stainless steel and outside mild steel sheet painted in epoxy powder coating. The lid of water bath shall be made of stainless steel (SS 304 quality) have temperature range ambient to 100<sup>0</sup>C, thermostatic control with an accuracy of  $\pm 0.5^0$ C. Water Bath shall consists of two pilot lamp, temperature control knob and ON/OFF switch to work on 220  $\pm$  10 volts A.C, 50 Hz  $\pm$ .5 % AC.

The equipment for its temperature measurement should be calibrated from NABL accredited calibration laboratory. The calibration certificate should also Be provided.

**25. Flue Gas Analyzer (One No.)**

The equipment shall be portable in nature, equipped with re-chargeable battery and printing facility as well as interface RS232 connector. It should be capable to measure following parameters in specified range and accuracy.

Parameter	Range	Resolution	Accuracy
Oxygen	: 0 to 25%	0.1%	$\pm$ 0.1%
Carbon dioxide ( NDIR sensor)	: 0 to 40 % (measured value)	0.1%	1 ppm
Carbon monoxide	:0 to 20,000 ppm with H <sub>2</sub> compensation	1ppm	$\pm$ 5 to10%
Hydrocarbon ( NDIR sensor)	: 0 to 10000 ppm	1ppm	$\pm$ 5 %
Nitrogen oxide	: 0 to 5000 ppm	1ppm	$\pm$ 5 %
Nitrogen dioxide	: 0 to 1000ppm	1ppm	$\pm$ 5 %

Sulphur dioxide	: 0 to 5000 ppm	1ppm	± 5 %
Draft	: 0 to 150 mbar	0.01 mbar	±0.5 %
Temperature	: Ambient to 1300 <sup>0</sup> C		

The equipment shall give calculated value for Excess air, Combustion efficiency, CO/CO<sub>2</sub> ratio, inlet temperature, losses etc. The equipment should be capable of measuring these parameters on different type of fuels such as solid, liquid and gas. The supplier shall clearly state guarantee for different sensors supplied along with equipment and also the life and guarantee for next supply.

The AMC cost with and without spares shall also be indicated.

**26. Handy Sampler for Gaseous Monitoring (Two)**

The equipment should be made of stainless steel and should be capable of monitoring dust as well as gaseous sample at shop floor. Battery operated (rechargeable maintenance free batteries to be operated for more than 10 hrs on full charge), along with built in type/rotary vane type suction pump. The sampler shall have provision for dust sampling system (filter paper holder), flow adjustable Rota meter / flow meter (0.5 to 1.5 lpm), battery operated adjustable timer with 3 digits display in minutes running time upto 999 min, glass impinger, sampling head and silicon tubing etc.

The equipment should be supplied with Battery Charger (220 V ± 10 VAC; 50 Hz ± 5%), operation manual, cord/plug sampling train consisting of 2 nos. 35 ml glass impingers kept in ice tray connected with inert silicon tubing and rechargeable battery.

**27. High Temperature Probe for Stack Monitoring (Dual display) (Imported) (Two No.)**

Measuring sensor	:Laser based system
Measuring range	:0 <sup>0</sup> C to 1300 <sup>0</sup> C in one or two range
Accuracy	:Lower than 200 <sup>0</sup> C ± 1K <sup>0</sup> ± digit Higher than 200 <sup>0</sup> C ± 1% of measure vale
Resolution	:1.0 K <sup>0</sup>
Repeatability	:1 K <sup>0</sup>
Response time	:1 Sec.
Measuring Distance	:0.02 m to 20m
Optical system	:Cassegrain focusable type
Display	:LCD in view finder
Operating Temperature	:0 <sup>0</sup> C to 55 <sup>0</sup> C
Storage temperature	:10 <sup>0</sup> C to 70 <sup>0</sup> C
Weight	:Stainless steel Hand held light weight
Power Supply	:Rechargeable battery life >50 hrs along with battery charger of 220 V±10 VAC, 50 Hz± 5%

Measuring Capability	: Within 6 mm dia and 0.5 m depth, i.e. blind holes or thermo well of the incinerator
Calibration	: Certificate of calibration to be provided from NABL accredited calibration laboratory.

**28. Meteorological sensors with Mast, WS, WD, Wind direction, Humidity and Temperature. (One No.)**

**Meteorological Sensors**

Microprocessor based reliable measuring stations for recording and storage of meteorological and environmental data along with sensors for wind speed, wind direction, air temperature and relative humidity. The supplier has to provide mast structure, solar panel, statistical interpreting software / hardware for minimum, maximum average values, wind rose diagram / pollution rose diagrams.

***Data logger***

a) Input channel	: 12
b) Digital Channel	: 5
Data Transfer	: Instantaneous data Transmission through 256 KB Smart card and RS 232 to any IBM compatible PC
Capacity	: 256 K
Memory Readout	: To transfer the data from memory module to PC for further processing along with Memory Card.
Software	: Windows XP compatible, menu driven user friendly software which can be run on IBM compatible PC for retrieving the data from memory and archives averages, maximum, minimum values, wind roses, pollution rose etc.
Operating Temperature	: -5 °C to 50°C
Power Supply	: 12 V DC solar powered with battery and charger. The system should be capable to run on 220 V± 10 VAC. 50 Hz; 5%, solar power and battery alternatively without any power interruption. Solar panel should also be capable to charge the battery.
Data Logger Housing	: Stainless steel housing as per IP-65. It should be all weather proof. Battery and charger should be enclosed in this housing as an integral part of the system.

***Wind Speed Sensor***

a) Sensor	: Up to Electronic Board
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b) Operation Principle	: Frequency proportional to wind speed
c) Range	: 0 to 60 m/sec
d) Accuracy	: 0.3 m/s
e) Threshold	: 0.3 m/sec
f) Operating Temperature	: -5 °C to 50°C

### ***Wind Direction Sensor***

a) Sensor	: Up to Electronic Board
b) Operation Principle	: Resistance proportional to wind direction
c) Range	: 0 to 360 Degree
d) Accuracy	: 1.5 °
e) Threshold	: 0.5m/s at 10 ° amplitude
f) Operating Temperature	: -5 °C to 50°C

### ***Air Temperature Sensor***

a) Sensor	: RTD (Platinum)
b) Operation Principle	: Resistance proportional to temperature
c) Range	: -5°C to 60°C
d) Accuracy	: 0.2 °C
e) Resolution	: 0.1° C
f) Operating Temperature	: -5 °C to 50°C
g) Radiation Shield	: Non aspirated radiation shield

### ***Relative Humidity Sensor***

a) Sensor	: Thin Film Capacitance Type
b) Range	: 0 to 100 RH
c) Accuracy	: ± 2% of humidity range 5% to 95%
d) Sensitivity	: 0.2% RH
e) Response Time	: 1 sec for 80% Humidity change without dust filter
f) Operating Temperature	: -5 °C to 50°C
g) Radiation Shield	: Non aspirated radiation shield

### ***Mast Structure***

: 10 meter high adjustable hydraulic mast structure self supported along with all accessories rugged enough to withstand open climate conditions, should be provided with the system.

### ***Installation***

:The system has to be installed at roof top and commissioned by the supplier for which no additional cost will be paid. Details of software should be provided. The software should be capable to prepare wind roses, pollution roses and other related data processing.

The operation and maintenance of the system to be provided by the supplier for at least two years at no additional cost.

***Accessories and Spares***

:The consumable accessories, cables and adequate spare parts to be provided with the system for at least two years trouble free operation. Spare parts supply should be guaranteed for at least next ten years

***Calibration***

:Calibration certificate should be provided from NABL accredited laboratory.

**29. RSPM sampler with flow control and brush less motor (FOUR NOs.) + calibration kit (one)**

The high volume sampler used for monitoring respirable dust along with gaseous sample in the ambient air and also at shop floor or work area. The equipment shall work on 220 V ± 10 VAC, single phase, 50Hz ± 5% AC power supply with built in voltage stabilizer (auto cut off type). The equipment shall have provision for gaseous sampling along with dust sampling. The equipment should have the following specification:

Flow rate	: 0.9 to 1.4 m <sup>3</sup> /min. (free air flow)
Particulate size	: 10 to 0.5 micron (collected on filter paper); 5 PM bigger than 10 µm collected in separate sample bottle
Timer and Time	: Programmable timer, 0 to 9999.99 hrs (shall
Automatic sampling	: 24 Hrs programmable timer to automatically shut off the system after pre-set time interval indicate blower stoppage time also).
Totaliser	
Motor	: Brush less
Calibration Kit	: One set
Filter Paper	: GF/A – Two Box and EPM 2000- One Box.

**30. Automatic Burette (Digital) (Imported) (One No.)**

Bottle top, piston type digital burette having digital volume display with easy calibration facilities and safety prime venting valve.

Capacity	: 25 ml and 50 ml (One each)
Accuracy	: ± 0.1ml
Temperature	: Ambient

**31. Gas Chromatographs with ECD,FID, NPD and FPD (Imported) (One No.)**

Gas chromatograph complete in all respect comprising of followings

***Instrument Composition***

Gas Chromatograph	:One set
Capillary column with accessories	:One set each of specified columns
ECD Detector	:One set
FID Detector	:One Set
NPD Detector	:One Set
FPD Detector	:One set
GC Data station	:One set
Auto sampler	:One set

## ***Technical Specification***

GC System	:Computer controlled data workstation based computer compatible (GC). Built in diagnostics and comprehensive self-testing facilities.
Temperature programming	:At least six ramps temperature programming
Heated zones	At least six including oven, two injectors, two detectors and one auxiliary
Display	:Functional keyboard with four line alphanumeric display Display include temperature and pressure / low parameters, type of carrier gas, carrier gas column pressure, flow rates, split flow, detector gas flow rates and all detector parameters.
Memory protection	:Power fail memory protection
Storage facility	:8 methods and automated sequences.
Networking and data	:RS-232 interface with LAN communication
Method editing facility	:Non-active methods should have editing facility
System leak check	:Unattended and automated system leak simultaneous check
Injector / detector mounting	:2 injector and 2 detectors simultaneous mounting and capable to hold 100 $\mu\text{m}$ to 530 $\mu\text{m}$ different diameter capillary to mega bore columns
Purge system	:Effective Gas saver and septum purge system
Injector facility	:Automatic / manual injection.

## ***Column Oven***

High performance, large capacity oven accommodating capillary column and mega bore column

Volume	:More than 10 liters
Operating temperature	:Maximum 4 <sup>0</sup> C above ambient to 400 <sup>0</sup> C
Temperature set point	: $\pm 1^{\circ}\text{C}$
Temperature stability	: $\pm 0.01^{\circ}\text{C}$ for 1 <sup>0</sup> C ambient change
Ramp rate	:Up to 120 <sup>0</sup> C / minute
Heating time	:Maximum 8 minutes (50-400 <sup>0</sup> C)
Cooling time	: Maximum 5 minutes (400-50 <sup>0</sup> C)
Vent temperature control	:Microprocessor control in automatic sequence and fast.
Facility for Column bleed compensation	

## ***Flow / pressure controller***

Electronic pneumatics control (EPC) channel	:Inlets, detectors, or auxiliary gasses through data processor with screen display of pressure / flow.
Pressure adjustment	:0.01-PSI increment
Compensation (press./temp)	:Atmospheric pressure compensation for altitude and ambient temperature variations
Pressure / flow	:Two or more programming ramps
EPC setting facility	:Computer workstation system

EPC Sensor	:Inlets and detectors for all gasses (carrier gas, make up gas and support gas in detectors, and carrier and split vent gas in inlets)
Flow / pressure set points	:On each inlet on detector parameter screen
Flow sensor for control	:Split ration in split / split less and PTV injector

### ***Injector***

Injector	:Two injectors mounting, one split / split-less injector one PTV (Programmable Temperature Vaporizer)
Protection	:Heater, temperature sensor and protection from over heating
Capacity	:To hold all types and all sizes of capillary columns and mega bore columns as well
Purge adjustment	:Efficient septum purge system, purge times adjustable
Compatibility	Solid Phase Micro Extraction (SPME) system

### ***Split / Split-less Injector***

Forward inlet pressure programming with and optimized modular, uniform thermal profile for split / split-less injections

Injections volume	:Large volume split-less injections
Flow control	:Electronic pressure / flow control
Temperature control	:Up to 400 <sup>0</sup> C for split / spit-less injector with 1 <sup>0</sup> C increment
Solvent / back flush facility	:Solvent rejection and black flush

### ***PTV Injector***

Pressure / Flow control	:Electronic pressure / flow control
Operating temperature	:Up to 400 <sup>0</sup> C
Programmed ramps	:At east 3-temperature programmed Ramps

### ***Detectors (Detector combination would be ECD, FID, NPD and FPD)***

Temperature range	:Up to 400 <sup>0</sup> C
Detector mounting	:At least two detectors should be simultaneously mounted
Pressure control	:EPC and electronic on/off facility for all gasses
Auto zero & protection	:Detector with make up gas and automatic facility and overheat protection

### ***ECD Detector***

E C D Detector	:Coaxial design based on Ni <sup>63</sup> source)
Linear Dynamic Range	:Better than 10 <sup>4</sup>

Departure from linearity	:Less than $\pm 1\%$ for the entire range
Operating temp. (maximum)	:400 <sup>0</sup> C
Pressure / flow control	:Electronic pressure /flow control
Minimum detection limit	:less than 10 fg/sec of lindane
Makeup Gas	:Argon / 5% Methane or Nitrogen

### ***FID Detector***

FID Detector	: Mass flow type
Linear Dynamic Range	:10 <sup>7</sup> with Nitrogen
Departure from linearity	:Less than $\pm 1\%$ for the entire range
Operating temp. (maximum)	:400 <sup>0</sup> C
Pressure / flow control	:Electronic pressure /flow control
Minimum detection limit	:less than 100 pg/sec of lindane
Support Gas	:Hydrogen and air
Ignition	:Auto ignition facility through computer Auto Flame re-ignition
Flame Detection	:Flame out detection facility

### ***NPD Detector***

N P D Detector	: <i>Mass</i> flow type
Dynamic Range	:10 <sup>6</sup>
Departure from linearity	:Less than $\pm 1\%$ for the entire range
Operating temp. (maximum)	:400 <sup>0</sup> C
Pressure / flow control	:Electronic pressure /flow control
Minimum detection limit	:less than 10 pg/sec of lindane
Support Gas	:Hydrogen and air

### ***FPD Detector***

F P D Detector	:Electronic pressure control, Dual wavelength version)
Temperature operating limit	:Up to 400 <sup>0</sup> C
Minimum detection limit	:less than 100 pg/sec of lindane
Dynamic range	:Better than 10 <sup>3</sup>
Support Gas	:Hydrogen, air and oxygen

### ***Auto sampler***

Syringe Capacity	:Up to six different syringe capacity
Injection volume	:Between 1 and 200 micro liter or more should be available for accurate sample dosing
Washing solvent	:Up to four different washing solvent 10 ml bottles to be provided
Injection Port access	:Access two injection ports without requiring an additional tower
Internal standard calibration	:Automated internal standard calibration and sandwich" technique
Programming	:Completely programmed by a dedicated controller or GC keyboard

### ***Columns***

Columns	:Bonded phase, fused silica capacity column with (one each) -DB-1701 or equivalent 30 m x 0.25 mm ID having x 0.25 $\mu$ m film thickness. Film– 14% cyanopropyl phenyl and 86% dimethyl polysiloxane co-polymer column
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- Ultra – 125 m x 0.2 mm ID having 0.33  $\mu$ m film thickness Film – 100% di-methyl polysiloxane
- HP-5- MS 60 m x 0.25 mm ID with 0.25  $\mu$ m film thickness, Ultra low bleed column Film – 5% di-phenyl & 95% dimethyl polysiloxane copolymer column
- Ultra -225 m x 0.2 mm ID having 0.33  $\mu$ m film thickness,
- Ultra low bleed column Film - 5% di-& 95% dimethyl polysiloxane copolymer column

### ***Data Station***

***Application Software*** (With basic programming facility, Accurate and reproducible integration)

Data acquisition	:At least two simultaneous chromatograms and data acquisitions reintegration report multilevel calibration baseline correction area calculation background subtraction and custom/tailored report format facility should be in-built
Memory Protection	Battery Back up for protection
Data export / import	:Data export / transformation to database software i.e., Excel and Access should be supplied with the system.
Quality control	:Software for quality control protocols
Data display / handling	:Software for data display, handling, data export/ import and reporting

### ***Computer System***

Make	:Reputed brand such as HP/Compaq/IBM/Lanovo/Wipro
Processor	:Duo Core-2, 2.8 GHz
RAM	:1GB (Upgradeable to 4 GB)
FDD	:1.44 MB
HDD	:320 GB (7200 RPM)
Monitor	:19" SVGA Flat Colour (Digital)
VRAM	:16 MB
CD ROM	:52 x CD ROM
DVD/CD-RW	:DVD-ROM and CDRW-combo drive max speed 48x24x48
Ports	:2 serial, 1 parallel and 2 USB front 6 rear USB2 PS/2 Port, 1VGA integrated port 1 line in / out port
Key board	:Cordless 104 key IBM compatible
Mouse	:Cordless Optical mouse with pad
Ethernet	:32 bit auto selectable 10/100 MBPS
Graphics	:Internal ready with integrated graphics
Sound	:Integrated Sound Card and inbuilt stereo speakers
Printer	:HP Laser jet printer 1200 x 1200 dpi 12 PPM black.
• Software	: - Preloaded Windows XP Professional operating system with Licensed CD (Latest version)

- MS Office 2000 Standard with Media, Manual and License CD
- Preloaded Antivirus with latest version alongwith Licensed CD

### ***Accessories***

Start up kit / soap bubble /gas flow meter	:Manufactures standard accessories start up kit including tools, Digital gas flow meter 0.1 ml/min to 1000 ml/min
Operation / maintenance Application notes	:Operation and maintenance manual :Application notes in (CD) for pesticides, PAHs, PCBs, PCPs, VOCs, THMs, Dioxins & Furnas in environmental samples
Service manual Gas Cylinders	:Service manual :Nitrogen, hydrogen, helium and Zero air gas High-pressure stainless steel cylinder filled with high purity 99.99% (above mentioned gases) having gas capacity 7M <sup>3</sup> (water capacity 47 ltrs). Cylinders should be ISI marked, confirming to IS: 7285, flat bottom, fitted with valve as per IS: 3224, complete with neck ring and cap, painted as specified as gas cylinder rules, 1981. Gas cylinder should be supplied along with “cylinder tying belt” and with hydraulic test certificate, ISI inspection/test certificate and explosive certificate from Chief controller of Explosives, Nagpur as per BIS standards.
N <sub>2</sub> Gas regulator	:N <sub>2</sub> gas regulator (2 stage) with necessary tubing & connectors 1no.)
Hydrogen gas regulator	:H <sub>2</sub> gas regulator (2 stage) with necessary tubing & connectors
Zero air regulator	:Zero air regulator (2 stage) with necessary tubing and connectors
Carrier gas purifier	:High capacity carrier gas purifier (2 Nos.)
H <sub>2</sub> gas purifier	:High Capacity H <sub>2</sub> gas purifier (2 Nos.)
Air compressor	:Air compressor (GT free) with air filter and regulator unit
Air Purifier	High capacity air purifier (2 Nos.)
Moisture Trap	:Moisture trap (Silica Gel – Molecular Sieve 50:50; length 10” – Two
Hydrocarbon trap	:Activated Charcoal filter for hydrocarbon length 10” – Two
Oxygen trap	:High Capacity Oxy trap capacity more than 125 cc – two

All the required cylinders shall have to be supplied with filled gas.

### ***Spares & Consumables***

Spares and consumables as mentioned below, sufficient for two years trouble free operation should be included in the offer and supplied with each system.

Column nut	:2 Nos.
Washer	:2 Nos.
Graphite / vespel ferrules	:20 Nos.
Inlet Spta (self sealing for injectors)	:200 Nos.
O-ring	:20 Nos.
Copper tubing with connectors	:50Mtrs.
Micro syringes for manual injection	:(5 µl, 4 Nos.)
Micro syringes for manual injection	:(10 µl) 4 Nos.
Copper tube cutter	:1 No.
Column cutter	:1 No.
Installation	: Satisfactory installation at Laboratory and hands on training to users.

### **Training**

**The supplier has to impart on-site operation training to at least two operators, at the time of installation followed by complimentary (all expenditure inclusive) one week training to two scientist on application, routine maintenance and software training at the application laboratory in India.**

## **32. Micro Wave Digester (Bench top model) (Imported) (One No.)**

The microwave digestion system completely microprocessor controlled programmable for use in laboratory for digestion, dissolution, extraction and drying of environmental samples, comprising of a microwave power system, corrosion resistant microwave cavity with exhaust fan, built-in microprocessor, and rotating turn table with provision to hold 12 digestion vessels and fool proof safety system.

Microwave power	:1000 watt, with programmable un-pulsed power control.
Vessel system	:At least 17 position rotor of acid resistant material with 12 PFA / PTFE digestion vessels each of at least 100 ml capacity or more capable of with standing pressure of atleast $760 \pm 70$ kPa Provision for controlled pressure relief
System programming	:Adequate programmes for at least following parameters (1) Microwave power (2) Pressure control system (3) Time at control pressure and (4) Total run time
Turn table speed	:Minimum speed should be 3 rpm to ensure homogeneous distribution of microwave radiation.
Oven interior/Cavity	:Fluoropolymer or plastic coated stainless steel
Display	:High resolution LCD display screen with alphanumeric keyboard for entry of operating parameters & sample information.
Internal self diagnose	:Should have test system to perform and monitors <ul style="list-style-type: none"> <li>• turntable operation, status/operation, exhaust system, door safety Interlock etc.,</li> <li>• digestion vessel pressure, run time</li> </ul>

Power supply	• door opening. : 220 ± 10 volts/50 ± 5 % Hz, AC operated.
Corrosion protection	:All electronic devices should be protected against corrosion

Operation manual, programming chart, Additional 12 nos. of PTFE digestion vessels and washers for pressure lid for two years operation should also be supplied.

### 33. **Detector Tubes of different pollutants with Pump (Imported) (One No.)**

Specially designed, imported, glass detector tubes, with solid specific reacting chemical for specific gaseous analysis properly calibrated to be used for detection of specified gases and vapours in ambient air/work place environment and also from wide ranges of sources viz. stacks, ambient air, hazardous gases etc. The detailed technical specification of detector tubes, pump and accessories are given below:

#### A **Detector Tubes:**

Measurements	:Various gases/vapours in ambient air, Work place environment, source emission, automobile exhaust emission, hazardous vapors/gases.
Shelf Life	:Minimum One Year ranging up to 2-3 years
Detector Tubes	:Detector tubes made of sealed glass tube and filled with chemical reagent substances which will undergo colorimetric reaction in the presence of specified gas or vapor
Temperature and climatic conditions and climatic Conditions	: Within specified optimum temperature

#### B **Manually Operated Light Weight Pump**

Application	:For short term measurements with detector tubes which requires small sample volume.
Operation Strokes	: Manually Operated : Allow the user to provide multiple strokes and stroke counter for ease in reading.
Stroke Volume	: 100 CC

#### C **Accessories**

a) Hot Air Probe	: Hot air probe with cooling unit designed for measurement of high temperature gases from furnaces and automobile exhaust. The is cooled to ambient temperature for accurate concentration measurement utilizing detector tubes.
b) Carrying Case	: Should accommodate various detector tubes, pump and accessories.

## LIST OF DETECTOR TUBES WITH QUANTITY REQUIRED

<i>i)</i>	<b><i>Acid test</i></b>	
	Range	:Qualitative
	Quantity Required	:2 Pkts.
<i>ii)</i>	<b><i>Ammonia</i></b>	
	Range	:0.5 – 60 PPM
	Quantity Required	:4 Pkts.
<i>iii)</i>	<b><i>Benzene</i></b>	
	Range	:2.5 – 120 PPM
	Quantity Required	:4 Pkts.
<i>iv)</i>	<b><i>Carbon Dioxide</i></b>	
	Range	:100 – 11,500 PPM
	Quantity Required	:1 Pkt
<i>v)</i>	<b><i>Carbon Dioxide</i></b>	
	Range	:0.13 – 6 Vol. %
	Quantity Required	:1 Pkt.
<i>vi)</i>	<b><i>Carbon Disulphide</i></b>	
	Range	:0.63 – 100 PPM
	Quantity Required	:3 Pkts.
<i>vii)</i>	<b><i>Carbon Monoxide</i></b>	
	Range	:5 – 300 PPM
	Quantity Required	:4 Pkts.
<i>viii)</i>	<b><i>Carbon Monoxide</i></b>	
	Range	:8 – 1000 PPM
	Quantity Required	:4 Pkts.
<i>ix)</i>	<b><i>Carbon Monoxide</i></b>	
	Range	:2.5 – 2000 PPM
	Quantity Required	:2 Pkts.
<i>x)</i>	<b><i>Carbon Monoxide</i></b>	
	Range	:0.1 – 10 Vol. %
	Quantity Required	:2 Pkts.
<i>xi)</i>	<b><i>Carbon Tetrachloride</i></b>	
	Range	:0.5 – 60 PPM
	Quantity Required	:1 Pkt
<i>xii)</i>	<b><i>Chlorine</i></b>	
	Range	:0.05 – 16 PPM
	Quantity Required	:4 Pkts.
<i>xiii)</i>	<b><i>Chlorine</i></b>	
	Range	:25 – 1000 PPM
	Quantity Required	:2 Pkts.
<i>xvi)</i>	<b><i>Fluorine</i></b>	
	Range	:2.5 – 100 PPM
	Quantity Required	:1 Pkt

<i>xiv)</i>	<b><i>Formaldehyde</i></b>	
	Range	:0.1 – 32.5 PPM
	Quantity Required	:2 Pkts.
<i>xv)</i>	<b><i>Formaldehyde</i></b>	
	Range	:2 – 100 PPM
	Quantity Required	:2 Pkts.
<i>xvi)</i>	<b><i>Hydrocarbon</i></b>	
	Range	:0.5 – 20 mg/l
	Quantity Required	:3 Pkts.
<i>xvii)</i>	<b><i>Hydrocarbon</i></b>	
	Range	:0.05 – 2.4 %
	Quantity Required	:3 Pkts.
<i>xviii)</i>	<b><i>Hydrogen Chloride</i></b>	
	Range	:0.2 – 40 PPM
	Quantity Required	:2 Pkts.
	Quantity Required	:2 Pkts.
<i>xix)</i>	<b><i>Hydrogen Fluoride</i></b>	
	Range	:0.25 – 100 PPM
	Quantity Required	:2 Pkts.
<i>xx)</i>	<b><i>Hydrogen Sulphide</i></b>	
	Range	:10 - 4000 PPM
	Quantity Required	:1 Pkt
<i>xxi)</i>	<b><i>Hydrogen peroxide</i></b>	
	Range	:0.5 – 10 PPM
	Quantity Required	:1 Pkt
<i>xxii)</i>	<b><i>Nitrogen Oxides</i></b>	
	Range	:0.5 – 125 PPM
	Quantity Required	:2 Pkts.
<i>xxiii)</i>	<b><i>Nitrogen Oxides</i></b>	
	Range	:5 - 625 PPM
	Quantity Required	:2 Pkts.
<i>xxiv)</i>	<b><i>Petroleum Hydrocarbons</i></b>	
	Range	:0.05 – 2.4 %
	Quantity Required	:2 Pkts.
<i>xxv)</i>	<b><i>Petroleum Hydrocarbons</i></b>	
	Range	:100 - 3000 PPM
	Quantity Required	:2 Pkts.
<i>xxvi)</i>	<b><i>Sulphur Dioxide</i></b>	
	Range	:0.05 – 10 PPM
	Quantity Required	:2 Pkts.
<i>xxvii)</i>	<b><i>Sulphur Dioxide</i></b>	
	Range	:0.05 – 60 PPM
	Quantity Required	:2 Pkts.
<i>xxviii)</i>	<b><i>Sulphur Dioxide</i></b>	

Range : 1.25 – 200 PPM  
Quantity Required : 2 Pkts.

**34. Noise/Sound Level Meter with Calibrator (Imported) (One No.)**

For measuring the noise/sound level at shop floor and other area's having features to perform following functions

Type 1, type2, dB (A), dB (B), dB (C), dB (Z), fast, slow, Impulse, SPL, Lmax, Leq, LEP,d , Peak(C)

Measurement Range : 35-140 dBA  
Frequency Weighing : Switchable to A, B, C, Z Linear and Octave  
Accuracy : Min. IEC 804 (BS 6698) Grade 1 or ANSI Type 1  
Resolution : 0.1 dB over Full Range  
Display : Digital, Leq, SPL Lmax and Lmin over a programmable range  
Power Supply : Battery System  
Time Weighting : Switchable to different time intervals i.e. 1/8 Sec., 1 Sec., 10 Sec., etc. or slow, fast and maximum.  
Operating Temperature : -10 °C to 55 °C  
Calibration : Automatic calibration  
Memory : Sufficient memory to store at least. 8 Hrs data for all parameters given in modes and 0 classic band anslyais.

It should have automatic calibration system and data logging system with RS 232 interface.

**Specification for Calibrator**

a) Level (dB) : At least two one each in lower and higher range  
b) Frequency : At least two within 1 khz range  
c) Accuracy : ± 0.3 dB at 25°C  
d) Adaptors : 25 mm, 12.5 m, 6.25 mm

**Accessories Required**

a) Calibrator  
b) Tripod Stand  
c) Wind Screen  
d) Batteries  
e) Carrying Case or Kit  
f) Extension cable  
g) Thermal printer

**Specifications for Thermal Printer**

Type : Mobile compact and battery panel  
Size : Light weight and ultra smart size  
Interface : Serial RS – 232 C

Battery	: Lithium battery
Compliant	: ROHS IP 54 Compliant
Drop test	: 1:5 meter
Paper loading	: Easy operated/changeable

**35 Soap Bubble Meter (Automatic)(Imported) (One No.)**

Measuring range	:0.1 to 5.0 lpm
Display System	:4 digit LED
Flow rate	:Measured flow rate in ml/min or ml/min with automatic unit section
Temperature	:To show the temperature inside the volumetric tube in °C
Time	:To display the rise time in seconds
Atmospheric pressure	:To display atmospheric pressure in mm Hg
Select switch	:for on/off of instruments
Connector	:RS 232 C interface to printer
Power supply connector	:To work on 6V DC from AC/DC (230V)
Sensors	:For starting and stopping measuring time.

**Soap bubble meter should be calibrated using a standard volume traceable to NIST, USA**

**36. Stack Monitoring Kit With High Temperature Probe (Two No.)**

The equipment should be rapid, accurate and reliable measurements of temperature, pressure, velocity and measurement of particulate and gaseous pollutants like SO<sub>x</sub>, NO<sub>x</sub>, NO, H<sub>2</sub>S, temperature display. 3-digit LCD readout for stack gas with a range 0 - 600°C. A resolution of 1°C. Digital stop watch:

Inclined manometer for a range of 0.2 inch of water with a resolution 0.01 inch, spirit level for leveling, spill proof arrangement for water and oil, vacuum gauge, 0.30 inches mercury.

Flow Totaliser having capacity to measure total flow with resolution of 1 liter LH Rota meter 100 lpm with coarse control valve for particulate sampling. RH Rota meter 3 lpm with fine control wall for gaseous sampling.

Sampling accessories with include S.S. braided Teflon hoses with SS end fitting in a standard length of 2 meter, S –type pitot tube of standard length of 1 meter, S.S. thimble holder for leak proof collection, thimble pipe One 10 standard length 1 meter set of 3 nozzles size- 1/4, 3/8 inch and 1/2 bore S.S. thermocouple with standard length of 1 mtr. , impinger tube box- set of 4 glass impinger tubes with 300 ml capacity in double wall container and thermocole insulation . Ball and cup joints for leak proof sample collection. Additional accessories like – mounting flange, Heated lines, nozzles, velocity vs. pressure charts, harness for transportation,. All necessary accessories should also be provided.

**Heating Probe**

Heating probe should be provided for monitoring / sampling the pollutants to keep them in vapor form by using a heating probe.

Measuring range	:0°C to 1000°C in one or two range
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Accuracy : ± 1%  
 Resolution : 1<sup>0</sup> C

**37. Exhaust CO/HC/NO Analyzer (Imported) (One No.)**

The Equipment shall be used for analyzing the exhaust flue gas from petrol driven vehicle. The equipment should be sturdy in nature and shall be operated with 230V, single phase, 50Hz AC power supply/ on battery operated. The instrument should have auto calibration system and RS 232 interface connector along with printer also. The equipment shall have the following specification:

Specification	CO	HC	NO
Range	0-10%	0-20000 ppm	0-5000ppm
Resolution	0.01%	≤2000:1-ppm 20000:10-ppm	1ppm
Accuracy	<0.6%: ±0.03%, ≥0.6% : ±5%	<200ppm:±10%,, ≥200ppm: ±5%,	<500ppm:±50ppm ≥500ppm:±10%

Response Time :  $T_d \leq 100$  m sec or less  
 With 500 mm sample line  $T_{90} \leq 30$  m sec

Repeatability : ± 1 % of FS

Drift : Zero and span: ± 1% FS/1hr

Linearity : ± 1% of FS

Ambient conditions : 5-45<sup>0</sup> C

Warm up time : Less than 10 min.

Analyzer Unit : 0 to 45<sup>0</sup>C, 80% R H Maximum  
 Control Unit : 0 to 50<sup>0</sup>C, 80% R H Maximum

**38. Smoke Density Meter (Imported) (One No.)**

The Equipment shall be used for analyzing the exhaust gas from diesel driven vehicle. The equipment should be sturdy in nature and shall be operated with 220 V ± 10 VAC, single phase, 50 Hz ±5% AC power supply or battery operated. The equipment shall be supplied with CTV and it should have printing facility. The equipment shall have the following specification:

Opacity : 0 to 100%  
 Resolution : 0.1%  
 Absorption coefficient : 0 to 99.99 m<sup>-1</sup>  
 Resolution : 0.01 m<sup>-1</sup>  
 Linearity : within ± 0.1 m<sup>-1</sup>  
 Warm up time : Not more than 30 min.

It shall have other features, if any fixed up by CPCB.

**39. Portable Combustion Analyzer****(One No.)**

The equipment shall be portable in nature, equipped with chargeable battery and printing facility as well as interface RS232 connector. It should be capable to measure following parameter in specified range and accuracy.

Parameter	Range	Resolution	Accuracy
Oxygen:	0 to 25%	0.1%	±0.1%
Carbon dioxide: (NDIR sensor) (measured value)	0 to 40 %	0.1%	1ppm
Carbon monoxide: with H <sub>2</sub> compensation	0 to 20,000 ppm	1ppm	± 5 to10%
Hydrocarbon: (NDIR sensor)	0 to 10000 ppm	1ppm	± 5 %
Draft:	0 to 150 mbar	0.01 mbar	±0.5 %
Temperature:	Ambient to 1300 <sup>0</sup> C		

A part from this parameter the equipment shall give calculated value for Excess air, Combustion efficiency, CO/CO<sub>2</sub> ratio, inlet temperature losses etc. The equipment should be capable of measuring these parameters on different type of fuels such as solid, liquid and gas. The supplier shall give the guarantee for different sensors also. The life of different sensors (supplied along with equipment) should be clearly stated. Also the life for different sensors as after sales service otherwise the quotation shall not be considered

**40. Thermocouple probe with meter****(Two Nos. ,One each)**

One thermocouple probe along with temperature meter

**Probe**

Sensor Type:	K Type
Temperature range:	0 to 1250 <sup>0</sup> C
Standard (Limit of error):	±2.0 <sup>0</sup> C or ± 0.75%
Operating Temperature:	1100 – 1150 <sup>0</sup> C
Probe length:	1 meter

**Meter:**

Operating Temperature:	4 digit LCD display -200 to 1350
Operating Parameter:	Single thermocouple input Timer function Temperature reading, <sup>0</sup> C or <sup>0</sup> F and hold function Max, avg and min. function Auto power off Auto low battery indicator Last eight data memory RS- 232 interface compatible

The equipment should be calibrated from a NABL accredited Laboratory. Equipment has to be supplied with the above mentioned certificate.

One thermocouple probe along with temperature meter

Sensor Type: S Type  
Temperature range: 0 to 1450<sup>0</sup>C  
Standard (Limit of error):  $\pm 1.5^0\text{C}$  or  $\pm 0.25\%$   
Operating Temperature: 1300 – 1450<sup>0</sup>C  
Probe length: 1 meter  
Sheath: Refractory

**Meter:** 4 digit LCD display

Operating Temperature: -200 to 1650  
Operating Parameter: Single thermocouple input  
Timer function  
Temperature reading,<sup>0</sup> C or <sup>0</sup> F and hold function  
Max, avg and min. function  
Auto power off  
Auto low battery indicator  
Last eight data memory  
RS- 232 interface compatible

The equipment should be calibrated from a NABL accredited Laboratory. Equipment has to be supplied with the above mentioned certificate.

**41. Pressure gauge (Two Nos.)**

Model: Capsule  
Dial Size: 4” (100mm)  
Operating Range: 0 – 1600 mm water gauge

The equipment should be calibrated from a NABL accredited Laboratory. Equipment has to be supplied with the above mentioned certificate.

**42. Thermo Chalk (Two Set Each)**

The good quality thermo Chalk/thermo crayons required for measuring the surface temperature of any body.

Dimension: Length - 120mm  
Temperature Range: 80<sup>0</sup> C, 100<sup>0</sup> C, 120<sup>0</sup> C, 150<sup>0</sup> C, 180<sup>0</sup> C 200<sup>0</sup> C, 250<sup>0</sup> C, 280<sup>0</sup> C, 300<sup>0</sup> C, 350<sup>0</sup> C  
Accuracy of Thermo-chalk: + / - 2% of their rating.

Protected by an adjustable Plastic Holder .Packed in 6 (six) Nos. in a plastic box

**43. Electric Balance (One No.)**

Model and type:	Electronic Digital weighing scale
Range:	0-3 kg
Accuracy:	$\pm 1.0$ grams
Display:	Bright up to 3 decimal points
Unit:	in grams/kg
Memory:	Up to 10 readings
Baby pan/platform:	Of adequate size (at least 50 cm x 30 cm)
Power supply:	220/240V 50/60 Hz with DC adaptor Capable of running on battery

The equipment should be calibrated from a NABL accredited Laboratory. Equipment has to be supplied with the above mentioned certificate.

Easily cleaned and disinfected, Should be able to stabilize the readings. Operating and Service manual should be provided.

**44. Infra red Pyrometer (One No.)**

Model:	Infra Red Pyrometer/thermometer
Measuring Range:	-60 to 600°C
Display:	°C or °F
Ambient operating range:	0 - 60°C
Resolution:	0.1°C
Response Time:	1 Second
Accuracy:	$\pm 2^\circ\text{C} \%$ or $\pm 4^\circ\text{F}\%$ ( $2^\circ\text{C}$ ) which ever is higher
D:S	12:1
Emissivity:	Adjustable
Wave Length response:	8 – 14 micron
Battery Operated:	Battery life should be at least 140 hours

The equipment should show LCD error diagnostic messages, thermal Shock, exceeds temperature range and low battery Icon. The equipment should have auto calibration mode.

**Mechanical Laboratory**

**45. Brinell cum Vickers Hardness Tester: (One No.)**

Function:	To measure hardness of ferrous & non ferrous castings, forgings such as hard alloy steels, carbon steels, cast irons and other soft metals having flat, round or irregular shape samples.
Test load:	10 Kgf to 3000 kgf
Test height:	Minimum 250mm
Loading/unloading:	load stages to be adjustable through easy control mechanism (motorized control to be preferred)
Indentors:	At least two sets as required in brinell and Vickers test to be provided along with

Display:	Digital display of hardness values on screen
Operation:	Automatic computerized machine
PC:	A Pentium (P-4) computer with 512 MB RAM, window XP operating system and TFT monitor, UPS
Accessories:	All standard accessories like flat table, Vee table, vicker's diamond indenter, ball indentors 2.5mm, 5mm,10mm, Vickers and brinnel hardness test blocks, device for clamping of specimens to be supplied
Conforming to :	BIS standards
Main supply:	220/440 volts
Optical magnification :	Up to 70X

**46. Universal Testing Machine: (One No.)**

Test/Measuring range : 100 Ton

Tests to be conducted : Tensile test, bend test, shear testing, compression test etc. to be done on steel specimens as per BIS standards.

Operation : Computerized

Load measurement: Digital

Elongation measurement: Digital

Test Load accuracy :  $\pm 1\%$

Least count : 0.1 KN

Crosshead travel: Up to 1000mm or more

Effective stroke: Up to 800mm or more

Load measurement: With load cell to be preferred, machine to have load rate control

Accessories: All standard accessories like a comprehensive range of grips, clamping jaws suitable for round and flat samples, attachments & fixtures to control various types of tests on different sizes of samples to be provided

Computer hardware: A Pentium (P-4) computer with 512 MB RAM, window XP operating system and TFT monitor, UPS

Software: A window based software having user interface with real time display of test parameters like load Vs elongation with facilities for recording, storage and retrieval of results, tare load & reset elongation facility, fully automatic on screen calculation of UTS, YS, proof stress and unit change facility.

Printer : A printer interface with a laser jet printer to be provided

Calibration: Machine should be calibrated as per BIS standards

Safety : Overload and over travel safety to be provided

Extensometer : Electronic extensometer for proof stress calculation to be provided

Power supply : 220/440 volts, AC drive

**47. Ultrasonic Portable Flaw Detector:****(One No.)**

Requirement/Use:	Should be able to detect internal defects/imperfections like discontinuities, cracks, inclusions in metals especially ferrous material.
Type :	Portable for on site inspection
Test range :	5mm to 10 meter
Velocity :	1000-9999 m/s
Delay (Pulse Shift):	0-10 meter
Frequency :	0.5 MHz to 15 MHz
Gain :	0-100 db, adjustable in smallest possible steps like 0.5 db or 1 db
Linear reject :	Minimum up to 50%
Test modes :	Pulse echo & transmit-receive
Operating modes:	Single probe, double probe, T-R probe
Monitor :	Gate start and width adjustable over full range. Gate threshold variable between 0-100%. Visual & audible alarms. Gate search and off facility. Two independent gates
Linearity :	Vertical & vertical- up to 1% of full screen height & width respectively
Measurement modes:	5 common measurement modes should be available
Display :	Colour TFT display with variable brightness and sunlight viewable
Data recording:	Facility to be provided for data recording and documentation of test results
Power :	220/440 volt, maintenance free battery with at least 3 hour backup
Memory :	For at least 20 settings
Temperature :	Up to 50 °C
Software :	Software and PC interface to be available
Data logger :	Data logger facility to be provided

**48. Charpy & Izod Notch Machine, V-notch cotter, U-notch curter (Machine/tooling for making of impact sample ( One No.)**

Charpy & Izod Notch Broaching machine : Motorised notch cutting machine to be supplied

V- notch cutter :	To make V-notch for Izod/ charpy samples
U-notch cutter :	To make U-notch Izod/ charpy samples

**49. Chillers/Cryostat/Cooling Chamber for sub impact test (Facilities for creating sub zero impact testing of samples) (One No.)**

Function :	To chill steel samples for impact testing to temperature up to -50 °C
Type :	Bench top
Temperature range:	From -50 °C to 30 °C
Internal dimension:	Minimum depth-150mm, hight-75mm, width-150mm
Shelves :	At least 2 shelves to be provided

Display : Digital temperature display  
Temperature control: Automatic, recording and alarm facility, accuracy-  $\pm 1$   
 $^{\circ}\text{C}$

**50. Ultrasonic Flow Meter (One No.)**

TYPE : PORTABLE  
Range : 0 - 10000 LPM  
Velocity : 0.1 – 15 meter/sec.  
Pipe Dia Range : 10 – 1000mm  
Process Temperature : up to  $200^{\circ}\text{C}$   
Media : All sonically conductive liquids  
Pipe Materials : All commonly used pipe materials  
Repeatability :  $\pm .01$ meter/sec. or .01% of reading  
Accuracy :  $\pm 1$  % of flow rate reading  
Power Supply : 220V input, battery backup of at least 3 hrs.  
Data Logger : Internal or supplied along with the instrument  
Printer : Facility for printer to be provided by using  
integral Printer with roll paper  
Wall Thickness : Should be able to measure the wall thickness  
of the Pipe  
Display : LCD screen

**Metallurgical Laboratory**

**51. Micro Vickers Hardness Tester (One No.)**

Equipped with auto turret for anti-palpation.  
New high-tech product integrating mechanical and photoelectrical technologies.  
Equipped with digital microscope, direct display of the measuring method, test force, indentation length, hardness value, dwell time of test force  
Camera device can be connected via RS232 interface.  
Especially suitable for testing the hardness of micro and thin specimen, fragile material.  
By means of a 10 X objective and a 40 X objective, the tester has wide measurement and high accuracy.  
Optional knops indenter can be used to measure Knops hardness value.

Test Forces	(0.098, 0.246, 0.49, 0.98, 1.96, 2.94, 4.90, 9.80) N (10,25,50,100,200,300,500,1000) gf
Carriage Control: automatic	Loading/dwell/loading
Amplification of the Microscope	100 x to 1500 x
Dwell Time of the Test Force	(5-60)s
Min. Graduation value of the Testing Drum Wheel	0.0625um
Testing Field	1HV – 2967HV
Dimension of the XY Table	100 x 100 mm
Movement Field of the XY Table	25 x 25 mm
Max. height of the specimen	70 mm
Max. width of the specimen	95 mm
Light source	Cold light source
Power supply	110V/220V, 60/50Hz
Dimension	425 x 245 x 490 mm

**52. Upgradation of Muffle Furnace (high temperature furnace)(One No.)**

Upgradation of Therlack Make Muffle Furnace from SiC. Rods to coil heating system and enlargement of heating chamber size to 6”x 6”x 15” from present 4” x 4”x 12”

Existing setup: Max. temp. 1100 degree C, working Temp. 1050 degree C, fitted with digital temp. indicator-cum-Controller industrial grooved type. Size : 300x300x450 mm (9.0 KW)

**53. Abrasive Cut-off Machine with vacuum (One No.)**

Compact machine for cutting specimens for metallurgical examination. Unique job clamping vice may slide against the cutting wheel by a counter weight. Inbuilt coolant pump. Entire cutting operation should be carried out in an enclosed chamber that could be put under vacuum.

Specification:

Cuts sections : upto 100 mm  
Wheel size : 200 mm x 1.5 mm thick  
Cutting speed : 2800 & 3000 RPM  
Motor : 3HP three phase 220V A/C

Application of vacuum for dust control continuous flow of coolant / cutting fluid. Stationary model with rigid base.

**Electrical Laboratory**

**54. Electrical Power analyzer with accessories (Clamp on Type)**

Clamp on Type POWER ANALYSER Capable of Measurement of up to Two systems of 3-phase/ 3-wires or Four Systems of 1-phase/2-wires, Main electrical parameters to be measured -- Voltage, Current, KW, KVA, P.F., KWH, KVAH, KVARH, Frequency, Harmonics (THD). Having good accuracy and facilities of PC Card Data Storage, PC connectivity, Power Recording for individual wave form, Simultaneous recording of Demand Values and Harmonics. (Voltage range 0-600 V, Current range 0-500/5000A) With Standard and optional accessories viz.	01
Clamp on sensor, 500A AC	03
Clamp on sensor, 5000A AC	03
Thermal Printer	01
Recording paper set	01
Voltage cords	04
AC Adapter	01
PC Card/ Flash card up to 512 MB	02
Software for analysis on PC	01
Carrying case	01
Battery pack	01

**55. Compact Power meter (Clamp on Type)**

Clamp on Type Compact Power meter (Capable of Measurement of 3-phase, 3 & 4 wires systems) Main electrical parameters to be measured -- Voltage, Current, KW, KVA, P.F, KWH, KVAH, KVARH, Frequency. Having good accuracy, Data Storage and PC connectivity facility (Voltage range 0-600 V, Current range 0-500/3000A) With standard and optional accessories viz.	01
Clamp on sensor, 500A AC	03
Clamp on sensor, 3000A AC	03
Voltage cords	04
AC Adapter	01
PC card/ Flash card up to 512 MB	02
Software for analysis on PC	01
Carrying case	01
Battery pack.	01

**56. Current transformers (Three Nos.)**

Clamp on type flexible C.T s suitable for bus-bars and large size cables having current capacity up to 5000 Amp. To be used with compact power meter for measurement of current.

- 57. Thermal printer (One No.)**
- Thermal printer to be used with power analyzer for on the spot readings print outs.
- 58. Tong tester 1000 Amp (Digital clamp meter) (One No.)**
- Digital clamp meter/ Tong tester capable of measuring electrical parameters viz. Voltage, Current, Frequency, etc. having different voltage ranges up to 600 V and different current ranges up to 1000 A. With standard accessories viz. voltage cords, Battery, carrying case etc.
- 59. Digital and Analog Pressure gauges (One each)**
- Digital Pressure gauge (0-20 Kg/cm<sup>2</sup>)  
 Digital Pressure gauge (0-50 Kg/cm<sup>2</sup>)  
 Analog Pressure gauge (0-20 Kg/cm<sup>2</sup>)  
 Analog Pressure gauge (0-50 Kg/cm<sup>2</sup>)
- 60 Digital temperature meters (One each)**
- Digital Temperature indicator (-30°C to 300°C)  
 Digital Temperature indicator (Infrared) (0-2000 °C) suitable for the measurement of molten steel / metal & hot steel / metal
- 61. Digital Industrial Multi-meter (One No.)**
- Digital Industrial Multi-meter capable of measuring AC/DC Current, AC/DC Voltage, Frequency, Resistance, etc. with cords, clamp and carrying case.
- 62. Diesel Generator set of capacity 75 KVA (One No.)**
- Silent type, D.G SET 75 KVA, Three phase, 415 V, 50 Hz with canopy, control panel having volt meter , frequency meter, ampere meter & KWH meter. The DG set should be fuel efficient having reputed make Engine , generator and other accessories. To be commissioned at site including all civil works related to foundations etc. and connection to the existing power system
- 63. LapTop (Four Nos.)**
- Processor: Intel, Core 2 Duo  
 Processor Speed: 2000 (MHz)  
 Processor Cache memory: 3072 (KB)  
 Standard RAM: 3072 (MB) (Could be upgraded)  
 Inbuilt Hard Disk Drive: 250 (GB)

Operating System & : Softwares	Genuine Windows Vista business, M S Office -2007, Anti Virus (Licensed)
DVD Writer:	Yes
Display Screen size:	15.4 (inches)
Screen:	Bright view
Video Display card:	Integrated
Web Camera:	Inbuilt in (1.3 mega pixel)
Internal Modem:	Yes, speed- 56 (Kbps), Wi-fi system
Multimedia:	Yes, with sound card, microphone and speaker
Computer Interface:	With express card, S-video, blue tooth, digital media reader, TV tuner and at- least 4 nos. of USB port, supporting Flash memory cards (Card Reader) and wireless LAN Supported network adapter (Wifi)
Mouse Type:	Touch pad, along-with small mice
Battery Life:	At least 3 hours
Warranty:	Maximum

The laptop should be provided with leather carrying bag and other accessory along with operating manual and warranty certificate.

#### 64. Softwares

##### **a) Software for calculating Thermal Heat Balance from a Re-heating Furnace and boilers. (One Set)**

The software should give detailed calculation of heat input from different fuels such as Furnace Oil, Heavy Petroleum Stock, Natural Gas, Producer Gas, Coal and bio-fuel etc.,(from fuel, from oxidation of metal, from heat recovery system etc.), heat out put to the material/water etc., and different losses (such as loss due to insulation (surface loss), loss due to radiation and convection through openings, loss due to heat in flue gas, loss due to moisture (inherent and surface moisture), loss due to incomplete combustion, loss due to shift operation, loss due to pipe leakage etc.

Also it should calculate different losses in case of boilers.

The software supplier should ensure proper data base and up-gradation in future if needed.

##### **b) Upgradation of existing AUTOCAD 2000i / MDT Release 5 Softwares (education version) to AUTO CAD (Mechanical/Electrical) and Inventor Latest version (2008 or above) (Two each)**

FORMAT FOR FINANCIAL BID

ITEM NO.	ITEM	MAKE /MODEL & SPECIFICATIONS	PRICE QUOTED	TAXES	TRANSPOR-TATION, INSURANCE IF ANY	ACCESSORIES/ COMMISSIONING, CONSUMABLES IF ANY.	TOTAL AMOUNT

(SIGNATURE OF AUTHORISED SIGNATORY)

SEAL OF FIRM

PLACE: \_\_\_\_\_

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