

TENDER NOTICE
NO. MPPCB/PURCHASE/01/2015-16

TENDER DOCUMENT

FOR SUPPLY OF
LABORATORY INSTRUMENTS
& OTHER ARTICLES



Year: 2015 - 16

M. P. Pollution Control Board
E-5 Sector, Paryawaran Parisar,
Arera Colony, Bhopal – 462016

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M. P. POLLUTION CONTROL BOARD

PARYAWARAN PARISAR, E-5, ARERA COLONY, BHOPAL – 16

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TENDER NOTICE NO. MPPCB/PURCHASE/01/2015-16

Sealed tenders are invited from the reputed manufacturers [approved by BIS/ISO for quality & precision] and / or their authorized dealer / agent /representatives, specially authorized for this tender, for the supply of following laboratory instruments and other articles:

Sl. No.	Particulars of Items	Qty. of Phase-I	Qty. of Phase-II	Total Qty.	Earnest Money (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)
1.	Atomic Absorption Spectrophotometer [GTA /FLAME / VGA]	01	01	02	160000.00
2.	Autoclave	--	02	02	3000.00
3.	Bomb Calorimeter	01	--	01	20000.00
4.	BTEX Analyzer/Monitor	--	02	02	80000.00
5.	Bottle Top Dispenser	--	04	04	2000.00
6.	Columns for Gas Chromatograph	--	02	02	4000.00
7.	Compound Microscope [Binocular]	--	02	02	4000.00
8.	Desiccators for PM _{2.5} Sampler	--	11	11	5500.00
9.	Digital Burette	--	01	01	400.00
10.	Electronic Balance	05	--	05	10000.00
11.	Elemental [CHNS] analyzer	--	01	01	20000.00
12.	Filtration Assembly [Vacuum]	--	02	02	6000.00
13.	Flame Photometer	--	01	01	1500.00
14.	Flash Point Monitor	01	--	01	4000.00
15.	Flue Gas Analyzer	05	--	05	70000.00
16.	Fire Alarm System	01	--	01	3000.00
17.	Gas Analyzer for Petrol Vehicle	03	--	03	18000.00
18.	Gas Detection Pump & Tubes	05	--	05	15000.00
19.	Gas Chromatograph with Mass Spectrometer (GC-MS)	01	01	02	240000.00
20.	Hot Air Oven	--	01	01	2000.00
21.	Hot Plate	--	01	01	300.00
22.	Inductively Couple Plasma with Mass Spectrometer (ICP-MS)	--	01	01	200000.00
23.	Microwave Digester	--	01	01	20000.00
24.	Microprocessor based Mercury Analyzer	--	02	02	16000.00

25.	Muffle Furnace	--	01	01	1000.00
26.	Networking Facility	01	--	01	2000.00
27.	PM 2.5 Samplers	--	07	07	21000.00
28.	PC- controlled UV-VIS Spectrophotometer	01	01	02	24000.00
29.	Respirable Dust Sampler	30	--	30	42000.00
30.	Rotary Evaporator	--	01	01	4000.00
31.	Smoke Density Meter	04	--	04	12000.00
32.	Server Racks	03	--	03	240.00
33.	Surveillance System IP Camera, Fish Eye Camera	01+06	--	01+06	2500.00
34.	Storage Device	01	--	01	1000.00
35.	Stack Monitoring Kit	14	12	26	52000.00
36.	TKN Assembly	--	01	01	2000.00
37.	TOC Analyzer	01	--	01	30000.00
38.	Top Loading Balance	--	01	01	2000.00
39.	Water Bath	--	02	02	2000.00
40.	Water Purification System	--	01	01	5000.00
41.	Weather Monitoring Station	--	01	01	3500.00

The laboratory instruments/equipments for which funds are available as shown above in column (3) will be procured in first phase. The instruments shown in column (4) shall be procured only after receipt of budget from Madhya Pradesh Government. The tender document including technical specifications of equipment shall be issued up to 3.00 PM on dated 30.07.2015 on payment of Rs. 1500.00 [Rupees One Thousand Five Hundred only] by cash or demand draft [Rs. 50.00 extra for supply of documents by post] in favor of Member Secretary, M. P. Pollution Control Board, Bhopal. The application for sending tender document by post shall not be accepted after 25.07.2015. The earnest money of requisite amount shall be submitted in a separate sealed envelop mentioning the details thereof. No tender shall be considered without requisite earnest money. The last date for submission of tender is 31.07.2015 by 1.00 PM and the same shall be opened on the same day at 2.00 PM in the presence of bidders, who wish to participate. The detailed terms & conditions are available in tender document. This Tender Notification may also be downloaded from Board's Web site www.mppcb.nic.in and www.govtenders.nic.in and the cost of tender document should be submitted in the form of demand draft along with Earnest Money in Envelop "A".

[Dr. Reeta Kori]
Chief Scientific Officer

M. P. POLLUTION CONTROL BOARD

PARYAWARAN PARISAR, E-5, ARERA COLONY, BHOPAL – 16

Phone: [0755] 2466191/2464428 Fax: [0755] 2463742 E-mail: it_mppcb@rediffmail.com

To,

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Sub.: Sealed tenders for purchase of Laboratory Equipments & other articles.

Dear Sir,

M. P. Pollution Control Board desires to procure laboratory equipments and other articles for its laboratories spread over whole of the state and establishment of Air Vigilance Centre at Bhopal. The laboratory instruments/equipments shown in Part-1 will be procured in first phase. The instruments shown in Part-2 shall be procured after receipt of budget from Madhya Pradesh Government. Sealed tenders are invited from the reputed manufacturers [approved by BIS/ISO] or their authorized representatives, specially authorized for this tender, who are capable of supplying laboratory equipment and other articles, which are shown on the tender notice. The terms and conditions are as follows:

[A] **SPECIAL CONDITIONS:**

1. All prices quoted should be CIF New Delhi for imported equipment. Other charges like transportation, insurance, F.O.R. destination and installation charges should be quoted separately. For indigenous equipment prices should be F.O.R. destination.
2. Prices should be quoted for complete set of equipment including the cost of installation, minor civil works, electrical fittings and cabling etc.
3. Accessories required [if any] for maintenance for a period of three years should be given separately.
4. Annual Maintenance charges for three years should be quoted separately in Annexure – 2.
5. The technical specifications of the equipment proposed to be procured on phase wise manner are given on page no. 17 to 87. The technical specifications of the offered equipment should be furnished in annexure –1. Schedule of requirement is annexed as annexure-5(i) and 5(ii). The check list is shown as annexure -6.

5. The equipment offered should necessarily contain a guarantee for its trouble free performance for a period of one year from the date of installation, while the equipments offered at Sl. No. 1, 3, 4, 11, 19, 22, 23, 24, 28, 37 should necessarily contain a warranty / guarantee for its trouble free performance for a period of three years from the date of installation.
6. The offer should clearly mention make, name of the manufacturer, detailed specifications, detailed literature about the equipment/circuit diagram/drawing of the mechanism and any other information relevant to the equipment. For any printing error / mistake in final bid will be the responsibility of the bidder and no correspondence will be entertained by the Board in future.
7. The tenderer should furnish details of supplies made by him to important institutions, along with performance certificate, during last one year [Users' list]. The bidder must submit Client list along with the previous purchase order copies of similar item [s] supplied to any Central /State Pollution Control Boards / any CSIR Laboratory.
8. The firm / manufacturer submitting the offer shall only quote for one most suitable model of the offered equipment whose specification matches the Board's specifications. No alternate offers shall be considered and, if submitted, the offer shall be rejected.
9. Earnest money be furnished by a demand draft in favor of Member Secretary, M. P. Pollution Control Board, Bhopal in envelop "A". Offers without earnest money shall not be considered and the relevant envelopes [B & C] will not be opened and their offer shall be treated as rejected.
10. Bidders using downloaded tender forms must submit tender fee by demand draft along with Earnest Money in Envelop "A" drawn of Member Secretary, M. P. Pollution Control Board, Bhopal. The tender will not be accepted from the firm to whom the document is not issued by the Board and the bid downloaded from net without tender fee will not be accepted.
11. The bidder shall have to submit the copy of sales tax registration and Income Tax registration [PAN] along with envelop "B" otherwise the offer shall be liable for rejection.
12. An undertaking shall be submitted by the tenderer that they are not black listed in any Govt. organization / institutions along with envelop "B".
13. The bidder shall provide exclusive company profile including necessary certificates / license for manufacture the product from DGTD / SSI/SIA etc.

14. The specifications are clearly mentioned in the document and the Bidder is requested to submit Bid only if their offer strictly comply with these specifications. Please note that no deviation in the required specification will be permitted. The bidding for the instruments having different specification will be on Bidder's risk as the Board will not entertain such Bids.

15. **PROCEDURE FOR SUBMISSION OF TENDERS :**

Each bidders shall submit his offer in three sealed envelops A, B and C. Envelop "A" shall contain earnest money and tender cost, if the tender document is downloaded from the web site. The Envelop "B" should contain technical specification, terms & conditions, company profile, copy of sales tax registration number, PAN number and authorization certificate from manufacturer for submission of offer for this tender, if offer is submitted by authorized representative. In case the manufacturer of any equipment authorizes more than one firm for submitting offer, then such offers shall be treated as rejected. Envelop "C" shall contain financial offer.

[a] Envelop – "A" : Envelop "A" should contain demand draft for the requisite amount of earnest money in favor of Member Secretary, M. P. Pollution Control Board, Bhopal. If the tender document is downloaded from web site, then separate demand draft for tender cost shall be submitted with envelop" A". The name of instrument and the amount of the demand draft should be inscribed on the top of envelop. Envelop "A" shall be opened on 31.07.2015 at 2.00 pm in the presence of the bidders or their authorized representatives. Insufficient amount furnished as earnest money and tender cost shall make the offer liable for rejection.

[b] Envelop – "B": Bidders, who have furnished the desired amount of earnest money and tender cost shall be liable for opening of the Envelop "B" of their offer. The Envelop "B" should contain detailed technical specifications in annexure -1, make & model of the equipment, functioning procedure of the equipment and other literature relevant to the equipment and company profile. If the offer is submitted by authorized representative, he should submit authorization letter in envelop "B" from the manufacturer for submitting offer for this tender, otherwise tender offer of the firm shall not be considered and liable for rejection. The tenderer should furnish users' list and details of supplies made by him to important institutions along with performance certificate. The bidder shall have to submit the copy of sales tax registration and income tax no. [PAN] along with the envelop "B", otherwise the offer shall be liable for rejection. An undertaking shall be submitted by the tenderer, regarding whether they are not black listed in any Govt. organization / institutions, along with envelop "B". The details of service station in Madhya Pradesh and India should be furnished with other details.

[c] Envelop – "C" : The envelop "C" shall contain financial offer in annexure 3 or 4 [whichever is applicable] of the tender document. Offers received in due time shall be evaluated technically by a committee constituted by the Competent

Authority, M. P. Pollution Control Board and as per the recommendation of committee , depending upon the suitability of equipment with respect to application, performance, after sale service and service centers in Madhya Pradesh or in India etc., the financial offer shall be opened. Notwithstanding anything stated above the competent authority of the Board reserves the right to assess the capability and capacity of the bidder to perform the contract, should the circumstances warrant such an assessment in the overall interest of the Board.

[B] OTHER CONDITIONS:

1. The Board reserves its rights to reject any or all the tenders without assigning any reason there for.
2. Tender found incomplete shall be rejected forthwith.
3. The indigenous equipment, for which an order has been placed, after acceptance of the tender, shall have to be delivered, installed & demonstrated to the consignee mentioned in the supply order within 60 days from the date of issue of supply order. In case of late supply of the material, 2% per month penalty shall be charged up to one month, there after supply order shall be treated as cancelled and earnest money shall be forfeited and the supply order shall be issued to the second lowest firm. The maximum penalty for late supply shall not exceed 10% of the total ordered value. In case of unavoidable delay in supply a prior permission shall be obtained for extension in delivery period.
4. The time limit for the supply of imported equipment shall be 90 days, which can be relaxed for additional 30 days by the Member Secretary. After scheduled time limit, 2% per month penalty or maximum penalty up to 10% of the total ordered value should be levied.
5. If the bidder is not a manufacturer himself, should have a facility for repairing and maintenance of the instrument. The details of service centers in Madhya Pradesh and India should be furnished along with other details.
6. It shall be the responsibility of the bidder to deliver the material to the consignee in sound condition without any damage. Any damage or loss during transit shall be on the account of the bidder.
7. The tenders shall be valid for a period of 360 days from the date of opening of envelop "A".
8. The prices should include all taxes like sales tax, excise tax or any other tax.
9. The approved firm / manufacturer shall have to submit 5% security deposit of the ordered value in the form of Bank Guarantee for a period of 12 months, other wise 5% amount shall be deducted from the bill.

10. In case the approved bidder fails to effect supply, within the specified period as per supply order, the earnest money is liable to be forfeited.
11. The consignee or any other officer authorized by the Board shall have the right to reject any or all the items of the supply, if they do not confirm to specifications mentioned in the supply order. The rejected items shall be lifted by the bidders at their own cost. The consignee will not be responsible for the custody and safety of such items.
12. The Board reserves its rights to affect any reasonable increase or decrease in the quantity or number of items at the time of issue of supply order in the interest of the Board.
13. All the clearance including the obtaining NMI [Not manufactured in India] certificate, custom clearance and custom duty will be the responsibility of the tenderer. This office will open the letter of credit [L/C] as may be required and will only sign the documents wherever required.
14. In case, if any supplier quote their rates in Indian Rupees for imported equipment and do not require custom duty exemption certificate from the Board, then the supplier has to submit import document like bill of entry, custom duty paid and NMI [Not manufactured in India] certificate from the manufacturer.
15. The bidder is expected to examine all instructions, forms, terms and conditions and specifications mentioned in the bid document. Failure to furnish all information required by the bid documents of submission of a bid not substantially irresponsive to the bid document in every respect will be at the bidder's risk and may result in the rejection of it's bid.
16. The terms of payment shall be as under:
 - [A] **Indigenous Items:** 75% of the cost of material would be paid after receipt of the material by consignee and balance 25% payment shall be released only after satisfactory installation and demonstration of the equipments / material at site.
 - [B] **Imported equipments:** The letter of credit will be opened for total ordered value, but 75% of the cost will be released on shipment of the material and balance 25% payment shall be released only after satisfactory installation & demonstration of the equipments / receipt of material at site.
17. Conditional offers will not be accepted and liable for rejection.
18. In case of human error regarding labeling of envelop, the committee constituted for the opening of envelop shall take appropriate decision.

19. In case of any dispute the decision of Chairman, M. P. Pollution Control Board shall be final & binding.

20. In order to comply the instructions of Department of Commerce & Industries, Govt. of M.P., minimum 30% of the quantity of the items shall be reserved for the manufacturers / entrepreneurs from Scheduled castes/ scheduled tribes based at Madhya Pradesh.

NOTE: The tenders shall be liable for rejection in breach of any of the special or other general conditions of the tender document and no correspondence in this regard shall be entertained in future.

**[Dr. Reeta Kori]
Chief Scientific Officer**

M. P. POLLUTION CONTROL BOARD

TENDER AND CONTRACT FOR SUPPLY OF MATERIALS GENERAL RULE AND DIRECTIONS FOR THE GUIDANCE OF SUPPLIERS

- (1.) All suppliers proposed to be obtained by contract will be notified in a form of invitation to tender posted in public places/News Paper.
- (2.) The tender form will State the supplies to be made, as well as the date for submitting and opening tenders and the time allowed for supply, also the amount of earnest money to be deposited with the tender.
- (3.) In the event of tender being submitted by a firm it must be signed separately by each member thereof or in the absence of any partner, it must be signed on its behalf by a person holding a power of attorney authorizing him to do so, such power of attorney should be produces with the tender and it must disclose that the firm is duly registered under the partnership Act.
- (4.) Any person who submits a tender shall fill up usual printed form stating at what rate he is willing to undertake supply of each items. Tender which propose any alteration in the work/supply specified in the said form of invitation to tender, or time allowed for carrying out work/supply will be liable for rejection.
- (5.) The Member Secretary or his duly authorized assistant will open tenders in the presence of any tenderer who may be present at the time and will enter the amount of several tenders in a comparative statement in a suitable form. Receipts for earnest money will be given to all tenderers except those whose tenders are rejected and whose earnest money is refunded on the day that the tenders are opened.
- (6.) The officer competent to dispose of the tenders shall have the right of rejecting all or any of the tenders.

CONDITIONS OF CONTRACT

1. The time allowed for the supply of materials as entered in the tender shall be strictly observed by the supplier and reckoned from the date of which the order to commence supply of materials shall throughout the stipulated period of the contract be proceeded with all due diligence (time being deemed to be the essence of contract) on the part of the supplier and the supplier shall pay as liquidated damage an amount equal to one percent or such smaller amount as the Member Secretary, M.P. Pollution Control Board, may decide on the amount of estimated cost of the whole of the materials as shown in the estimated cost of the tender that the supply remains uncommenced or unfinished after the proper dates. In the event of the contractor failing to comply with this condition shall be liable to pay as liquidated damage an amount equal to one percent or such smaller amount as the Member Secretary may decide on the said estimated cost of the whole of the materials for every day that the due quantity of supply remains incomplete to, provided that the due quantity of liquidated damage to be paid under the provisions of this clause shall not exceed ten percent on the estimated cost of the supply of materials as shown in the tender.
2. If the Tenderer shall be hindered in the supply of the materials so as to necessitate an extension of the time allowed in this tender he shall apply in writing well in advance or immediately after the cause occurs to the Member Secretary, M.P. Pollution Control Board who shall if in his opinion (which shall be final) reasonable grounds be shown therefore authorize such extension for a period not exceeding 15 days. Any further extension shall be subject to the previous sanction of the Chairman.
3. The supplier shall give notice to the consignee officer of his intention of making delivery of materials and on the materials being approved a receipt shall be granted by him to the Consignee Officer or his assistant, and no material will be considered for payment until so approved.
4. On the completion of the delivery of the materials the supplier shall be furnished with a certificate by the Consignee Officer of M.P. Pollution Control Board.
5. The material shall be of the best description and in strict accordance with the specification and the supplier shall receive payments for such materials only as are approved and passed by the Member Secretary/Consignee Officer.
6. In the event of materials being considered by the Consignee Officer to be inferior to that described in the specification the supplier shall on demand in writing forth with remove the same at his own charge and cost and in the event of his neglecting to do so within such period as may be named by the Consignee officer that officer may have such rejected material removed at the contractor's risk and expense incurred being liable to be deducted from any sum due or which may become due to the supplier.

7. Receipts for payment made on account of a supply when executed by a firm must also be signed by several partners except where the contractors are described in their as a firm in which case the receipt must be signed in the name of firm by one of the partners or by some other person having authority to give effectual for the firm.
8. Under no circumstances whatever shall the contractor be entitled to any compensation from Board on any account.
9. The supplier shall supply at its own expense all tools, plant & implements required for the due fulfillment of his contract and the materials shall remain at his risk till the date for final delivery, unless it shall have been in the mean time removed for use by the Consignee Officer.
10. No materials shall be brought to site or delivered on Sunday/holiday without the written permission of the Consignee Officer.
11. The supplier shall not sublet this contract without the written permission of the Member Secretary, M.P. Pollution Control Board. In the event of the contractor subletting his contract without such permission, he shall be considered to have thereby committed a breach of the contract, and shall forfeit his earnest money and shall have no claim, for any compensation for any loss that may occur from the materials he may have collected or engagements entered into.
12. The decision of the Chairman, M.P. Pollution Control Board, Bhopal shall be final, conclusive & binding on all parties to the contract upon all questions relating to the meaning of specification and instructions herein before mentioned and as to quality of materials or as to any way arising out of, or relating to the contract specifications, instruction orders of these conditions or otherwise concerning the supplies whether arising the progress of after the completion or abatement thereof.
13. On the breach of any term of condition of this contract by the supplier, the said Chairman shall be entitled to forfeit the earnest money, security deposit and the balance thereof that may at that time be remaining and to realize and retain the same as damages and compensation for the said breach but without prejudice to the right of the said Board to recover any further sums as damages from any sums due or which may be come due to the contractor by M.P. Pollution Control Board, or otherwise howsoever.

TENDER SPECIFICATIONS VS OFFERED SPECIFICATIONS

Sl. No.	Tender Specifications	Offered Specifications	Documentary evidence/ leaflet enclosed

Signature of Bidder

Name

Business Address

Place:

Date :

PRICE SCHEDULE FOR ANNUAL MAINTENANCE AND REPAIR CHARGES AFTER WARRANTY PERIOD

Sl. No.	Item Description	Qty.	Annual Maintenance & Repair charges for each unit including supply of spares [Price to be quoted either in Indian Rupees or in Foreign currency] Excluding guarantee period	Maintenance and Repair charges for 3 years, including supply of spares.

Note: In case of any discrepancy between unit price and total price, the unit price shall prevail.

Signature of the Bidder -----
 Name -----
 Business Address -----

Place -----
 Date -----

PRICE SCHEDULE FOR GOODS IMPORTED

1	2	3	4	5	6	7
Sl. No.	Description	Country of origin	Quantity	Unit Price CIF New Delhi	Total CIF price per item	Unit price pf Inland delivery to final destination and unit price of other incidental services.

Note: In case of discrepancy between unit and total price, the unit price shall prevail.

Signature of the Bidder.....
Name
Business Address

Place:
Date:

Annexure – 4

PRICE SCHEDULE FOR GOODS INDIGENOUS

Sl. No.	Name of equipment with make & model	Unit Price in Rupees	VAT/CST or any other Tax/duty	Unit price including all taxes up to final destination

Note: In case of discrepancy between unit and total price, the unit price shall prevail.

Signature of the Bidder
Name
Business Address
.....

Place:

Date:

TECHNICAL SPECIFICATIONS

Atomic Absorption Spectrophotometer [GTA /FLAME / VGA]

S. No.	Specification	Requirement
1.0	INSTRUMENT COMPOSITION	Atomic Absorption Spectrophotometer (GTA/FLAME/VGA), Unit for Flame (Air Acetylene and nitrous oxide- acetylene), Graphite Tube Atomizer (GTA), Chiller / Water circulating unit, Auto samplers for GTA and flame.
2.0	TECHNICAL SPECIFICATION	
	Atomic Absorption Spectrophotometer	Computer Controlled with built-in flame emission mode
	Wave length range	190 – 800 nm wave length
	Sensitivity	Sensitivity at least 0.35 abs for 5µg/ml aqueous copper standard solution with air – acetylene flame.
2.1	Optics	Double Beam dual blazed / holographic Mono chromator
	Focal length	At least 250 mm focal length
	Resolution	1800 lines / mm
	Width	Automatic bandwidth of 0.2 to 2.0 nm
2.2	Flame Atomizer	All titanium or equivalent burner with impact bead / Flow spoiler, premix Design
	Movement	Automatic movement into the sample compartment
	Affect from Acids /Organic solvent	Unaffected from attacks by acid solution or organic solvents (e.g. Methyl isobutyl Ketone i.e. MIBK
	Flame Alignment in liquid beam	Fully automatic, optimized with motorized burner mount for vertical and horizontal burner adjustment
	Nebulizer	High precision able to provide manually adjustable uptake rates material of the nebulizer and related Venturi should be inert to acid solutions and organic solvents such as MIBK
2.3	Flame Control	Computer controlled ignition
2.4	Gas Control	Computer controlled with oxidant and fuel gases monitoring to monitor constant fuel / oxidant ration ignition.
2.5	Safety Function	Interlocking system to prevent ignition
2.6	Essential Interlock Monitor	Burner type as well as its presence in position, air selector, flame sensor, liquid trap level, gas supply pressure and air supply anywhere in the network of gas tubings in the system
2.7	Automatic Lamp Selection Function	Computer controlled Hollow Cathode Lamp selection and alignment
	Lamp Holder	At least 8 lamp holder with built in power supplies for hollow cathode lamps and electrode – less discharge lamps or equivalent
	Operating Parameter	Automatic Setting

	setting	
2.8	Read Out /Display	Display facility for absorbance as well as concentration, Display of errors or error codes, absorbance range at least up to 2.0 Abs.
	Scale Expansion	Scale expansion at least up to 100x
	Integration time	Integration time should cover at least 0.2 to 50 seconds range
	Measurement	Measurements of mean, RSD and CV, Background only mode, Integration of peak height and peak areas.
2.9	Accessories / Spares with Flame AA System	
2.9.1	Vapor Generation Assembly	Should be continuous flow based hydride / mercury vapor generator with option of using with or without a programmable auto sampler
	Precision	Precision of better than or at least 1% at ppb levels of mercury, arsenic etc.
	Absorption Cell	The absorption cell's material should have no effect of the high heat of the flame and the cell for the analysis of mercury should be of a closed absorption design
	Flame Arrestor	Flame arrestor should be provided in the tube which connects the assembly to the absorption cell
	Cell Design holder	The design of the cell holder should give a firm and easily adjustable (for alignment) mounting on the burner head.
	System accessories	Complete with necessary reagent bottles, connectors etc.
2.9.2	Hollow Cathode lamps	16 hollow cathode lamps. One lamp each for the elements: Arsenic, Antimony, Boron, Calcium, Chromium, Cobalt, Copper, Iron, Nickel, Lead, Manganese, Mercury, Selenium, Tin, Vanadium and Zinc. Equivalent coded lamps will also be acceptable.
2.9.3	Air Compressor with Air Filter or equivalent Air Service Unit	Complete with pressure regulator quite in operation, necessary tubing and connectors and should meet the air supply requirements of AAS operation.
	Oil Free Pump	Oil- free pump and moisture trap
	Corrosion Resistant	Resistant to acidic vapour and the drain valve (if any) should be made of stainless steel of equivalent corrosion resistant material
2.9.4	Gas Regulators	
	Nitrous – oxide gas regulator	Nitrous Oxide Gas regulator (two stage) with heater, with necessary tubings and connectors. Necessary transformer should be provided to transform this supply to the requirements of the heater. The heater should work on 230±10volts 50 Hz AC power

		supply.
	Acetylene Gas regulator	Acetylene gas regulator (two stage) with necessary tubing and connectors.
	Nitrogen Gas regulator	Nitrogen regulator (two stage) with necessary tunings and connectors.
2.10	Graphite Furnace System	
	(a) Graphite Tube Atomizer	Should be computer controlled fully enclosed graphite tube system consisting of stabilized temperature / total pyrolytic graphite plate form.
	Gas Supplies	Provision of two gas supplies (programme selectable) with independent control over the gas supply through the furnace.
	Heating Rate	Heating rate of at least 2000°C per second
	Cooling Time	Cooling time 20 seconds
	Temperature Range	Temperature range ambient to 2600°C or more in 1°C increments
	Feed back system	Feed back system for furnace temperature control, interlocks for water, gas, temperature, furnace door, graphite tube damage and mains power.
	Temp. Programming	At least eight steps temperature programming facility with flexibility of programme selection, ramp time, gases, gas flow and read trigger for each temperature step.
	Control	Computer controlled with appropriate provision for print out of the furnace and sample parameters
	Display	Calibration data / graphs, temperature profiles, signal graphics and the instrument status.
	Memory	Memory should be able to store at least ten non volatile programmes
	(b) Chiller / Cooling Water Re-circulation Unit	Refrigerating water circulation unit of appropriate capacity. No discharge of water from this water circulation unit.
3.0	DATA WORK STATION	
3.1	Application Software	Programme facility with multitasking software
		Should provide complete control of instrument with instrument status display and its various accessories.
		Provide accurate and reproducible time averaged, integration, non – averaged integration, multi level calibration.
		Software should handle instrument linear absorbance reading, concentration, or emission intensity, integration time, built-in statistics, calibration equation control, slope of analytical

		curve using operator selective calibration standard Built-in interface for computer connection and use of optional accessories. Comprehensive quality control protocols facility including blank, multiple quality control standards, QA/QC audit trail and calibration failure.
3.2	Computer System	
	Make	Reputed brand such as HP/Compaq/IBM/ Dell
	Processor	Intel core 2 duo processor 3.00 GHz or above
	RAM	4 GB (upgradable up to 8 GB)
	HDD	500 GB ultra DMA or higher HDD (7200 RMP)
	Monitor	21” TFT – LCD Flat Colour
	CD ROM	52X CD- ROM
	DVD-CDRW	32X DVD-ROM and CDRW – combo Drive Max speed 48x24x48
	Ports	2 serial, 1 parallel and 2 USB front 6 rear USB2 PS/2 Port, 1 VGA integrated Port 1line in/out port
	Key Board	104 keys IBM Compatible
	Mouse	Optical mouse with pad
	Ethernet	32 bit auto selectable 10/100 MBPS
	Graphics	Internet ready with integrated graphics
	Sound	Integrated sound card and inbuilt stereo speakers
	Printer	HP Laserjet Printer 1200 x 1200 dpi 12 PPM black
3.3	Operation Software	Preloaded Windows XP Professional operating system with Licensed CD MS Office 2000 Standard with media, manual and Licensed CD or better Preloaded Antivirus with latest version along with Licensed CD
4.0	ADDITIONAL ITEMS	Following items to be supplied
	Operation Kit	Manufacturers Standard Operation Kit including all required items, tubings, fittings for start up / regular operation of instrument.
	Operation / maintenance Manual	Operation / maintenance Manual for each unit
	Analytical manual	Analytical manual including applications for flame, VGA and graphite system
	Service Manual	Service manual with one set of required tools for each system / unit
	Trouble Shooting Charts	Trouble Shooting Charts
	Spare parts Catalogue	Spare parts Catalogue
	Application Notes	Application Notes for trace metal analysis in environmental, biological, geological, metallurgical and industrial samples
	Dust Cover	One for each unit

	Consumables	For three years operation for each of the following units: <ul style="list-style-type: none"> • Flame AAS (basic unit, burner system) • Vapour generation assembly • Graphite Furnace Atomizer • Auto sampler
5.0	Operation and Maintenance Training	Two weeks training to be provided to two scientist on software training, operation, maintenance and trouble shooting aspects of instrument as its application laboratory in India
6.0	General Conditions of Supply	<ul style="list-style-type: none"> • The instrument and all its units should operate on 230 ±10 volts 50Hz power supply • All the operation and maintenance manuals, circuit diagrams, application notes and application software to be supplied should be in English Language. • The supplier / manufacturer should have Indian Agent to provide after sales service. • The main unit and all the sub units of the instrument should be serviced by the Indian representative of supplier. • The Bidder should be a manufacturer / authorized representative of a manufacturer, who must have designed, manufactured, tested and supplied two numbers of such equipment similar to the type specified in the past five years, which shall be in successful operation for at least 2 years as on the date of bid opening. • The bidder should furnish the information on past supplies and their satisfactory performance. • Bidders shall invariably furnish documentary evidence (client's certificate – at least two) in support of the satisfactory operation of the equipment as specified above. • Notwithstanding anything stated above the purchaser reserves the right to assess the capability of the bidder to perform the contract, should the circumstances warrant such an assessment in the overall interest of the purchaser. • Comprehensive warranty with spares for three years from the date of installation of the instrument should be covered.

AUTOCLAVE**Specifications:**

Chamber Dimension	:	350 D X 500 H [mm]
Jacket Dimension	:	425 D X 525 H [mm]
Material of Construction	:	
Chamber	:	Hospital Grade Stainless steel SS 304, 2.5 mm thick polished interior.
Jacket	:	Polished Stainless steel to provide aesthetic appearance long lasting and to be rust proof .
Lid Head Plate	:	Made out of heavy stainless steel plate with 10mm Flange to hold the swing clamping bolts. Thermally insulated nuts for the bolts.
Foot Pedal Lift Mechanism	:	For the Head Plate
Insulation	:	High quality glass wool of 1.5 " thickness to conserve heat Energy and to be energy efficient.
Gasket	:	Seamless Neoprene, Silicone gasket
Safety Valves	:	3 safety valves, 2 spring loaded and 1 perforated dead weight safety valves.
Exhaust Valves	:	Provided on the Head Plate to release the steam after the sterilization is completed.
Water drain	:	A drain cock is provided
Operating Pressure	:	5 to 20 psi.
Hydraulic Test Pressure	:	40psi
Pressure Gauge	:	0 to 4 kg/cm ²
Timer	:	Digital Electronic Timer adjustable from 0 - 120 mins. in one minute increments for sterilization control. The system will be automatically shut down after the lapse of the said time.
Water level indicator	:	Glass gauge visual level indicator will be provided as standard.

Automatic Power Cut off during low water level: A SS float switch will be provided as standard without additional cost to cut off power supply in case water level fails below the heater level and give visual indication on the control panel.

Electrical Service: 230V, 50Hz, 2 KW, 15 amps, single Phase.

Provided with 2 spare gaskets, power cable and plug, Mains On/Off, Timer On/Off etc.

Essential Requirement: Overload test pressure should be demonstrated at the time of Installation.

BOMB CALORIMETER

Sl. No.	Specifications	Requirement
1.0	Instrument Composition	1 set
	Oxygen Bomb with permanent fuse wire	1 set
	O ₂ gas cylinder with regulator	2 nos.
	Electronic Balance	1 no.
	Pallet press	1 no.
	Laser Printer	1 no.
	Sample Crucible	3 nos.
	Accessories	As mentioned
2.0	Technical Specification	
	Type /Method	Compensated Isoperibol /Isothermal
	Instrument	Microprocessor controlled Bomb Calorimeter for determination of heat of Combustion, Gross calorific Values & Sulphur contents solids & liquid fuels as per Indian and International standards.
	Measurement Range	Upto 12000 Kcal / Kg for one gram of sample with a provision to extend the measurement range without reducing the sample size. Calorimeter software should identify different bombs automatically and maintain the history of the ignitions performed with each bomb.
		Bomb and bucket should be removable type to increase the number of samples per hours.
	Precision	0.1 % RSD or better on analysis of 1 gram sample
	Resolution	0.0001 Cal/gm
	Analysis Mode	Equilibrium mode / Dynamic mode or any other mode
	Temperature measuring Resolution	0.0001 deg C
	Temperature Measurement	With in-built high precision electronic thermometer
	Repeatability / Reproducibility	As per BIS 1350 (Part – 2), 1970, ASTM D-5865/04 & DIN 51900 Methods
	Display	Colour Touch screen with graphical user interface
	Correction	Spiking, Ash / Nitrogen or Acid, Fuse wire, Sulphur and Hydrogen
	Laser printer	HP or other equivalent make Laser Printer 1200

		X 1200 dpi, 12ppm black compatible to the instrument along with connector.
	Sample Crucible Capacity	0.5 gm to 1.5 gm Metal crucible with Ni-Cr Alloy 3 Nos.
	Power requirement	230 ± 10 V AC, 50 Hz
	Processing Capacity	5 to 7 minute or better
	Number of Tests per hour	6 samples or more in an hour
	Oxygen Bomb	Combustion vessel made up of Special stabilized stainless steel to resist the mixed nitric acid and sulphuric acid produced in combustion with heavy duty screw cap.
	Memory Capacity	Inbuilt data storage for minimum 1,000 tests and data transfer to PC via Ethernet without using any additional software.
	Interface	In built USB interface for Balance, Printer and Computer without any additional accessories / software. Required extra software details should be mentioned separately.
	Up gradation	Calorimeter should have a facility to upgrade with different types of bombs by simply plug in without changing the main calorimeter configuration.
	Sample Volume	Approx 1 g
	Electronic Balance	Weighing Capacity : 120 g or more Readability : 0.0001 gram readability Connectivity: should be supplied with connecting cable to connect to the main instrument.
3.0	Accessories	<ul style="list-style-type: none"> • Bucket & water measuring Flask: 1 set • Benzoic Acid with certificate: 1 set • Spares / consumables : 1 set

BTEX MONITOR / ANALYZER**GENERAL**

GENERAL	A complete monitor / analyzer system including automatic sampling (pump etc), detector, calibrator, computer hard ware and software for data display, acquisition (in excel format), data processing and instrument control for selective determination of volatile compounds in ambient air optimized for Benzene, Toluene, Ethyl benzene and o,m,p – Xylenes. Compatible to power supply (voltage 230 volts ± 10 volts AC and 50 Hz $\pm 3\%$). Continuous un attended measurement of individual BTX samples. Software should have inbuilt facility for customized averaging period (1hr/4 hr/8 hr/ 12hr/ 24 hr/ monthly/annual mean values). System should work without cryogenic cooling. System should have protocol compatible to communicate & transfer data to main computer / website through modem. Raw data storage capacity without erase minimum for three months or more.
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2.0 TECHNICAL SPECIFICATIONS

2.1 Automatic Sampling (Monitor)	Analytical instrument / pump (single stage membrane) monitoring or automatic sampling, concentration of the organic compounds on an adsorption trap. Subsequent sample injections by thermal desorption and separation by wide bore capillary gas chromatography. Sample volume controlled by thermal mass flow controller (dust protected). The sampled volumes of air should be controlled by a calibrated sampling loop. Sample flow range may be 20 -100 ml / min or more (adjustable). Sample volume should be between 400 ml – one litre or more of ambient air over a 10 -15 min sampling cycle and about equal time for analysis. All sample transfer tubing's should be in stainless steel. The flow / pressure sensor to be preferred with digital display.
2.2 Sampling Trap	Light weight stainless steel mini trap containing selective adsorbents (active charcoal or carbotrap or tenax G.R. or chromosorb 106), integrated heating element and temperature sensing by thermocouple, operating temperature range 40 – 200 °C or so.
2.3 Heating Oven	Metal oven having space for installation of wide bore capillary column, precolumn and temperature sensor. Operating temperature 40 – 100 °C or so that high resolution, stability and reproducibility is obtained for analyte of interest (BTEX)
2.4 Columns	Approx. 5 m pre column (for back flushing) followed by an approx. 10m – 50m length analytical column (higher length to be preferred). Both columns capillary (0.22 mm – 0.32 mm i.d. or / and wide bore i.e. 0.53 mm i.d.) coated with suitable

	column packing capable of separating all analyte of interest (i.e. 94-95% dimethylpolysiloxane & 5-6% cyanopropylphenyl or CP WAX 52 /DB5/624 or equivalent), film thickness between 1 and 2 μm . Should guarantee high resolution, stability and reproducibility.
2.5 Detector	Type : Photo Ionization Detector [PID] PID Lamp eV : 10.6 eV Lowest detector limit : 0.1 $\mu\text{g}/\text{m}^3$ (0.03 ppb) for Benzene Detector Diagnostics : PID sensitivity sensor / check facility
2.6 Operating Conditions	Temperature range : 5 – 35 $^{\circ}\text{C}$ or ore Concentration Range : 1 – 1000 $\mu\text{g}/\text{m}^3$ (0.3 ppb to 270 ppb) Repeatability : Retention time - < 0.1 % RSD Amount - < 1.0 % RSD Typical Cycle Time : Total Cycle time – 15/30 min. Approx Sample collection Time - 15 min. approx. Analytical Time – 15 min. approx.
2.7 Calibration Unit with Span Gas / Permeation Tubes and gas mixing / Dilution Facility	The certified permeation tubes, span or calibration gas mixture (low conc. range) with S.S. container / cylinder, regulators & filters. With calibration unit having gas flow (approx): 10 ml / min (calibration gas) ; 1.4 – 2.0 lit/min (dilution gas). Auto gas selection option for automatic calibration for ppb level calibration gas (10 – 30 ppb of individual compound of interest). Dilution device for calibration gases. Manual and software selectable valves for sample, calibration span and blank zero air gases. Dilution factor between 1:50 to 150.
2.8 Gas Supply & Control	Mass Flow controller and pressure regulators with pressure gauge for carrier gas. Inlet pressure regulator with pressure limit switches for all necessary gases. Needle valve with quick shut off valves for zero air.
2.9 Memory and Control Facilities	Method auto load and system restart after power failure. Methods storage capacity with timed events programmes for control of system parameters and valves in permanent memory. Busy (operational) status; calibration / sample gas selection. Fault status: gas supply (low press). Detector signal (low) and communication errors. Status indicated on monitor by LED's & controlled from computer. Output signals: Analog 0 – 1 mV, Serial RS 232 for data intermission and CP – BUS for monitor control from remote. Both digital & analog outputs should be available.
3.0 SOFTWARE	Window based latest software's (English version) consisting instrumental control features as well as data acquisition, processing and handling in desired format including sorting of data (1/4/8/12/24 hourly, days wise / date wise reporting as micro gram / m^3) or ppb (selectable) & averaging etc.). Software should have following features:

	<p>In-built facility for customized averaging period (1hr/4hr/8hr/12hr/24hr/monthly/annual mean values), Data presentation / graphical & statistical processing & data transfer & storage facility to Excel / access. Communication software with protocol compatible to communicate & transfer data from BTX monitor to central computer / website through modem (preferably including sample chromatogram). System should have remote access to BTX monitor. Resident program as well BTX control / monitor user programme with monitor start up / off/status, blank / calibration and sample gas measured, fault status, carrier gas and communication errors indication. Updation of response factors automatically after calibration run. Updation of retention times after every sample analysis. Auto tune facility. Raw data storage capacity without erase minimum for three months or more.</p>
4.0 Spares for 3 years	<p>One set of each including columns, filters / traps for removal of dust & unwanted impurities (moisture / hydrocarbon); spare parts / electronic cards and sufficient septas, ferrules, dust filters, Teflon tubing etc & other consumables usually get exhausted during first 3 years of operation apart from one set as essential part with main instrument.</p>
5.0 Installation & training	<p>Free of cost installation & one week Training to concerned staff at MPPCB Laboratory.</p>

BOTTLE TOP DISPENSER

Digital Dispenser for Continuous, pulse free dispensing techniques for liquid dispensing continuous titration without volume restrictions. Cylinder refilling no longer necessary, no pulsing or accidental excess titration. Autoclavable up to 121 deg.C. Can be calibrated by the user by Gravimetric Methods.

Fits on bottles directly by means of adapter's safety valve for Dearing without loss of reagent (Refluxing type output valve). Voltage supply with long life primary cells and charging display.

Digital display prevents reading errors Simple calibration, calibration certificate for each instrument, Telescopic aspiration tube for automatically setting the length from 210 mm to 370mm (Refluxing Tube).

Non jamming sliding piston with cleaning ring adjustable dispensing angle, adjustable discharge tube, Dispensing range from 0.01 ml to 999.9 ml. Removable electronics unit. PTFE coated piston, Attachment of drying tube with Silica. Modular service friendly construction. Simple calibration program. Discharge tube should be rotatable by 360 degree. Horizontal : 142 – 220 mm, Vertical : 10 -200 mm, connection for dry tube.

For bottle threads with an outer diameter of 45 mm, complete with telescopic aspiration tube, 2 X 1.5 V micro batteries and adapters for outer diameter (mm): A-25, 28, 32, 38

COLUMNS FOR GAS CHROMATOGRAPH

MS-5

Phase: MS-5 (DB/ELIT/BP/RESTEK)

Dimensions: L 30 meters
ID 0.25 mm
Film 0.25 mm

Temperature Range: -60°C – 330°C/350°C
608

Phase: 608 (DB/ELIT/BP/RESTEK)

Dimensions: L 30 meters
ID 0.32 mm
Film 0.5 mm

Temperature Range: 40°C – 280°C/300°C

COMPOUND MICROSCOPE

Specifications	Requirements
Description	Binocular Microscope with electrical illumination for magnification and observation of bacteria, viruses, slides, biological material etc. with built-in attached facility of display of magnified objects.
Objectives	Parfocalled, parcentered, achromatic
Functions	Count, capture, measure, record, amalgamate, Internal meeting
Illuminator	20W halogen with rheostat
Stage Dimensions	145 mm x 135 mm x 76 mm x 50 mm movement range
Pixel	640 x 480 with PCI card
Resolution	320 x 240, 480 TV lines
Shutter Speed	30 fps
Output	Digital
Cable(s)	USB, RCA – Video, S – Video
Data Transfer	7.5 MB/sec
Data Formats	BMP, JPG, MIG
Magnification	4x / 10x / 40x / 100x
Power Supply	230 ± 10 Volts AC, 50 Hz
Accessories	Spare Halogen Lamp – One, Spare Eyepiece, Cable & Plug
Warranty	Comprehensive warranty for at least three years

DESICATOR FOR PM_{2.5} SAMPLER

Desicator Cabinets for protecting humidity sensitive items specifically for filter papers of PM_{2.5} Sampler. The cabinets are moulded of co-polyester plastic, resistant to staining, crazing and chemical attack. All the contents kept inside should be easily viewed through a large clear door that seals with positive latches and can be securely closed with seals. A dial hygrometer in the door allows for easy monitoring of relative humidity. Should work on 230±10VAC, 50Hz power supply.

Height	:	Approx 51cm
Width	:	Approx. 34 cm
Depth	:	Approx. 41cm
Internal Volume	:	Approx. 1.9 cu.ft

DIGITAL BURETTE

The Digital Burettes are capable of titrating with most common titrants such as NaOH, KOH (aqueous and non aqueous), EDTA, H₂SO₄, Na₂S₂O₃, AgNO₃, HCl, KMnO₄, and many other common titrants up to 2N. Large digital display with push-button zeroing shows volumes up to 99.99mL without meniscus reading errors or volume calculations. Provision of recirculation valve eliminates reagent waste and reduces spurting during priming. Calibration should be easy and allows calibration adjustments in seconds—without retesting for simple ISO/GLP/GMP compliance. Capacity: 25 ml & 50 ml, Accuracy of $\leq \pm 0.2\%$ of nominal volume with a coefficient of variation of $\leq 0.1\%$. Reliable single-piston design and lithium battery with hardened electronics and capable to provide up to 60,000 titrations without recharge.

ELECTRONIC ANALYTICAL BALANCE

- Capacity : 220 g [± 10 g acceptable]
- Tare Range : Full scale display
- Sensitivity : 0.0001 g [0.1mg]
- Std. Deviation : 0.1 mg
- Linearity : ± 0.2 mg
- Pan diameter / size : Minimum 80 mm
- Temp. Coefficient of sensitivity : ± 2 ppm/Deg. C
- Ambient Temperature : 5 ~ 40 Deg.C
-

Perfect self calibration, Motor cal-built in weight for internal calibration, External calibration, Built-in RS-232 Interface, Printer connectivity supported with standard weighing chamber, Power source- 230V 50 Hz. Over weight protection.

Glass draft shield with sliding doors. As soon as the mains connected and switched ON, the unit will perform all function self test with all display segments for half second and then normal display will be displayed.

ELEMENTAL (CHNS) ANALYZER

S. No.	Specifications	Requirement
1.0	Macro Elemental Analyzer System	Fully automated PC Controlled simultaneous CHNS and O analyzer with high sensitivity detector and capable for multiple operating mode with sample (solids & liquids) size of 0.02 to 1000 mg.
1.1	Application	The Instrument should accept 50 – 80 mg of solid sample such as solid waste, hazardous waste, coal, coke, biomass, liquid waste etc. System should be real multi matrix analyzer, capable to analyze solids, liquid, liquid volatile samples and gases.
1.2	Selectable Operation mode	Measurement of CHNS, CHN, CNS, Total carbon, Total N, Total S, Traces sulphur and O-TCD, O-IR,
1.3	Sample Combustion System	Should have at least two furnaces for working in both vertical and horizontal operation with same system with independent temperature control up to 1200 °C for each furnace to ensure complete oxidation of sample.
		Should have ash finger to hold ash and prevent ash from affecting catalyst and quartz combustion tube.
		Should have mass flow controller for constant flow of carrier gas.
		System should have auto protection due to fully integrated safety features for increased operational safety and minimized maintenance expenditure.
1.4	Analytical range	PPB to prevent weight for all elements with the capability of measuring following absolute weight.
		Total Carbon [C]: 0 to 20 mg
		Hydrogen [H]: 0 to 3 mg or better
		Total Nitrogen [N]: 0 to 2 mg
		Total Sulphur [S]: 0 to 6 mg or better
Oxygen [O] : 0 to 2 mg or better		
1.5	Minimum Detection Limits	< 40 ppm with TCD 2 ppm with IR detection for sulphur
1.6	Standard Deviation	< 0.1% of absolute
1.7	Analysis Time	Self optimizing depending on element content and weight, but less than 8 minutes in any case.
1.8	Separation system	Adsorption desorption principle for separation of gases using multiple columns with independent temperature control for each column.
1.9	Analytical gases	Nitrogen, Argon, and Oxygen, Microprocessor control for gas flow control

1.10	Detector System	Temperature stabilized TCD detector for measurement of C-H-N-S-O
		IR Detector for trace measurement of sulphur as low as 2 ppm
		Simultaneously CHN –Trace S detector and automatic switching from normal S to Trace S.
		NDIR detector for Chlorine and Trace oxygen determination
2.0	Auto Sampler	Electro Mechanical auto sampler system with 80 positions or more for solid and liquid samples with possibility of direct syringe injection of liquid and gas.
3.0	Consumables	Consumables to be supplied should be sufficient for 3000 sample analysis.
4.0	Reference Standards	Pure chemical reference standard (one set for each element) must be supplied with the system.
5.0	Computer System	
	Make	Reputed brand such as HP / Compaq/Dell
	Processor	Intel core i7 (3 rd generation) processor
	RAM	4 GB DDR RAM (upgradable to 8 GB)
	HDD	500 GB SATA
	Monitor	21” TFT – LCD Flat colour (digital)
	DVD Writer	DVD – Multi drive
	Ports	2 serial, 1 parallel and 2 USB front 3 rear USB 2 Port, 1 VGA 4 bays(2external & internal) with LAN 1 PS, 2 mouse port
	Key Board	Latest multimedia (HP/Microsoft)
	Mouse	Optical mouse with pad
	Ethernet	32 bit auto selectable 10/100 MBPS
	Graphics	Internet ready with integrated Graphics
	Sound	Integrated sound card and inbuilt stereo speakers
	Printer	HP laser jet color printer 1200 x 1200 dpi 12 ppm
5.1	Software	Pre – loaded Windows 7 professional or latest operating system with Licensed CD compatible with application software
		MS Office 2010 Professional with media manual and licensed CD compatible with application software
		Pre loaded Norton Antivirus with latest version of 3 years life time along with licensed CD compatible with application software
5.2	Application Software	Programme facility with multitasking windows base software displaying method sample and analysis status.
		Display of set and actual pressure, flow rate, temperature no. of sample analyzed.
		Provision for setting maintenance interval with warning

		regarding maintenance needed.
		Online display of graphics and text data
		Should have segmented leak check through software.
		Auto leak failure or electronic failure detection
		Instrument control reintegration / report calibration, automatic data acquisition and processing.
		Calculation of data and report formatting
6.0	Sample Packing	Should be supplied with required accessories for solid sample packing
		Should be supplied with liquid sample sealing press for packing and analysis of liquid samples. The sealing press should allow for sealing of samples under inert gas flow to ensure air free packing.
7.0	Optional Items	
7.1	Balance	Semi micro balance capable of direct transferring the data to the analyzer
	Operation	Balance operation through bright touch screen
	Control	Hands free Infra Red controlled opening and closing of draft should
	Weighing Range	Weighing Range: up to 6100 mg
	Control	Resolution : 0.001 mg
	Weighing Range	Repeatability : 0.8 to 0.9 micro gram
		Linearity : ± 2 to 4 μg
		System should have provision for auto sampler to handle both solid and liquid samples. Auto sampler should have provision to accommodate 120/80 samples as per selected sample tray.
8.0	Additional Items	Oxygen analysis kit
		Kit for trace sulphur analysis using IR detector
9.0	Operation and Maintenance Training	On site comprehensive training for scientific officials operating the system and support services till customer satisfaction with the system followed by complementary (all expenditure including) one week training for two scientists on operation and maintenance aspects of the instrument at manufacturers application laboratory in the country / abroad.
10.0	Warranty	Comprehensive warranty with spares for three years from the date of installation of the instrument should be covered. The AMC charges to be mentioned for next two years after warranty is over.

FILTRATION ASSEMBLY (VACCUM)

Specifications	Requirements
A. Filter Holder	
1. Material	Stainless Steel Lid, Funnel, base, clamp and filter support of SS perforated filter mesh with 6 place Manifold.
2. Filter Diameter	47 mm
3. Filtration Area	12.5 cm ²
4. Funnel Capacity	Autoclable SS body, 47 mm dia with 650 ml (Minimum) Capacity
5. Suction Flask Cap	1.0 / 2.0 litre
6. Connections	Outer diameter of base outlet 10 mm
7. Operating pressure	Vacuum only
B. Vacuum Pump	
8. Type	Single Phase motor with IP 44 type of protection, with carrying handle and sturdy rubber feet
9. Vacuum	Should be adequate for smooth filtration of water / waste water. The pump should be an oil free pump / diaphragm with continuous heavy duty type.
10. Flow Rate /Rating	15 LPM (maximum) / 0.12 KW or 1/16 HP
11. Supply Voltage	230 ± 10 Volts, 50 Hz, Single Phase AC
12. Ambient Temperature	45°C (Maximum)
13. Warranty	Comprehensive warranty / Guarantee should be valid for three years.
The Filtration Assembly should be complete with perforated Neoprene stopper, Vacuum hose pipes, stainless steel forceps, power cord with plug and toggle switch and operating manual with standard tool kit.	

FLAME PHOTOMETER

Range of operation (without dilution):

Elements	Lower range	Higher range
Na	0-10 ppm	10-100 ppm
K	0-10 ppm	10-100ppm
Li	0-2 ppm	2-50 ppm
Ca	0-100 ppm	100-300 ppm

- i. Curve fit software to be provided for high concentration mode
- ii. Curve fit accuracy: $\pm 2\%$ f.s.

Full Scale Sensitivity:

Na: 2 ppm K: 1 ppm Li: 1 ppm Ca: 30 ppm

Minimum Detection Limit:

Na: 0.2 ppm K: 0.1 ppm Li: 0.1 ppm Ca: 3 ppm

- Filters [10nm typical] : Na , K, Li and Ca .
- Reproducibility : Low Conc.: $\pm 1\%$ f.s., High conc.: $\pm 2\%$ f.s.
- Minimum Sample : Appx. 3 ml per element
- Averaging : 2 to 15 seconds, selectable
- Aspiration Time : [5 sec + Avg. time] per element + 4 sec.
- Operating Air Pressure : 0.45 kg/cm² [typical]
- Air Compressor : With built-in air regulator and air filter to deliver stable moisture / oil free air supply
- Fuel Gas : LPG
- Power supply : 230 V AC, 50 Hz.

Accessories: All necessary accessories to make the equipment functional such as Power cord, Operation and service Manual [2 copies each], Electrode stand [preferentially flexible], Beakers for calibration.

FLASH POINT APPARATUS

SPECIFICATIONS	REQUIREMENT
Description	Portable, Electrically heated equipment to measure flash point of waste, oils, lubricating oils, waste fuels, petroleum products, water liquid, paints as per latest flash point ASTM Standards method ASTM D 5450 & D 7094
Controller	Microprocessor based process controller – cum- indicator. Flash Point measurement by continuously Closed Cup with RTD sensor.
Sample Volume	Small, 1 to 10 ml
Ignition	Electric arc ignition inside closed measuring chamber, Ignition transformer having O/P of 10.6 KV DC from 230 ± 10 V AC i/p.
Temperature Range	Upto 400 deg. C
Temp. Readout & Control	Digital, Built – in temperature control
Heater	800 watt Electronic heater with energy regulator
Flash Detector	Automatic Ionization principle based flame detector sensor with audible signals and on screen prompt
Stirrer	At least two speed or more
Measuring Time	5 – 10 min per sample
Pressure correction	Automatic
Cooling	Force cooling facility
Interface	<ul style="list-style-type: none"> • Computer & Printer • Connection for external keyboard or bar code reader
Calibration	Simple, factory calibrated with calibration certificate from NABL accredited calibration laboratory. Should be supplied with calibration Liquid - 2 bottles
Power Supply	230 ± 10 V AC 50 Hz single phase
Safety Features	Fire safe with fire sensor over temperature cut off facility
Accessories	Syringes, ignitor, electrical cable, instruction manual (2 nos.), calibrated thermometer from NABL accredited calibration laboratory
Other Accessories	<ul style="list-style-type: none"> • Sample Cup 4 ml for ASTM D 6540 – 01 No. • Sample Cup 7 ml for ASTM D 7094 – 01 No. • Sample Cup carrier – 01 no. • Stirring magnet – 06 Nos. • Brass eraser - 02 nos. • Power supply cable • RS 232 printer cable • Other accessories necessary of operation of equipment [if any]

FLUE GAS ANALYZER

1.	Gases to be measured	CO, O ₂ , CO ₂ , SO ₂ , NO, NO ₂ , HC, H ₂ S, NO _x and combustion efficiency
2.	Sensors	IR or Electro – chemical Sensors with high accuracy and life span of 3 to 5 years
3.	Gas Flow	At least 1 Liter / min.
4.	Temperature Measurable	Up to 600°C
5.	Operating Temperature	0 to 45 °C
6.	Power Supply	Battery operated along with built-in charger on Mains 230 V ± 10 VAC, 50 Hz ± 3%
7.	Flue Gas Probe	Stainless steel Shaft, Sintered Filter with Silicon hose and handle.
8.	Pre Programming	For Natural Gas, Light Oil, Heavy Oil, LPGs, Propane, Butane, Coke, Coal etc.
9.	Parameter wise specifications	Please see annexure- “A”
10.	Software/ operator	Easy to handle Key Board operated and user friendly, Data Format transferable to user software.
11.	Weight	Light weight /Portable housed in sturdy Carrying Case
12.	Calibration Certificate	Calibration and certificate of approval from recognized agency like EPA, TUV
15.	Documents	Instruction manual for operation

Annexure-“A”

Parameter	Range	Resolution	Accuracy
TEMPERATURE MEASUREMENT			
Flue Temperature	0.1°C use high temperature probe for gases > 600°C / 1112 °F	0.1° (C/F)	0.1° C ± 0.3% of reading
Inlet temperature	0°- 600°C	0.1°(C/F)	0.1° (C) ± 0.3% of reading
GAS MEASUREMENT			
Oxygen (O ₂)	0 to 25%	0.1%	± 0. 2%
Carbon Monoxide (CO)	0 to 10000 ppm	1 ppm	± 5% of mv (200 to 20000ppm CO) ±10% of mv (2001 to 10000ppm CO) ± 10ppm CO (0 to 199 ppm CO)
Pressure	0 – 150 mbar	0.01 mbar / kpa	± 0.05% full scale
Carbon Dioxide (CO ₂)	0 to 50 Vol. %	0.01 vol. %	± 0.3 Vol. % CO ₂ + 1% of mv (0 to 25 Vol. % CO ₂) ±0.5 vol % CO ₂ + 1.5% of mv (>25 to 50vol % CO ₂)

Efficiency	0 – 100%	0.1%	--
Flow Velocity	0 to 40 m/s	0.1 m/s	--
Pressure	- 200 to + 200 hPa	0.01 mbar	±1.5% of mv (-200 to -50 hPa) ±1.5% of mv (+50 to 200 hPa) ± 0.5 hPa (- 49.9 to + 49.9 hPa)
Hydrocarbon (HC)	100 – 40000 ppm	10 ppm	< 400 ppm (100 to 4000ppm) < 10% of mv (> 4000ppm)
Nitric Oxide (NO)	0 to 4000ppm	1 ppm	±5% of mv (100 to 1999.9 ppm NO) ±10% of mv (2000 to 4000 ppmNO) ± 5 ppm (0 to 99 ppm NO)
Nitrogen Di Oxide (NO ₂)	0 to 500 ppm	0. 1ppm	± 5% of mv (100 to 500 ppm NO ₂) ± 5 ppm (0 to 99.9 ppm NO ₂)
Sulphur Dioxide (SO ₂)	0 to 5000 ppm	1 ppm	±5% of mv (100 to 2000 ppm SO ₂) ±10% of mv (2001 to 5000 ppm SO ₂), ± 5 ppm (0 to 99 ppm SO ₂)
Hydrogen Sulphide (H ₂ S)	0 – 300 ppm	0. 1 ppm	±5% of mv (40 to 300 ppm H ₂ S) ± 2 ppm (0 to 39.9 ppm H ₂ S)

FIRE ALARM SYSTEM

Fire Alarm System	Approx. Qty.
Supply, Installation, Testing and Commissioning of Microprocessor based intelligent and electronically addressable, modular, with networking card & printer port- loops Panel (expandable) with each loop capacity of 250 detectors. Fire alarm control panel with coloured touch screen LCD display, multiple access levels, 10,000 event history logs in the non volatile memory (EEPROM). The panel should be modular microprocessor based in nature With provision for CPU & loop redundancy. The panel shall have 240V AC power supply, Automatic battery charger, 24V , ceiled lead acid maintenance free batteries sufficient for 24 hours normal working and then be capable of operating the system for 30 minutes during emergency condition. The panel shall be EN54 / Vds / OEM certification.	01
Supply, Installation, Testing and Commissioning of addressable– Automatic Dual LED smoke detector with two integrated light-scattering smoke sensors using LEDs with different colors/wavelengths (blue/infrared) to avoid False alarm & should comply to Test Fire 1, including mounting base with LED etc. complete as required, Each Detector should have 2 Isolators (one for incoming and one for outgoing line) integrated in detector for maintaining operational availability of all elements in the loop, even in the event of a short circuit & Drift Compensation feature & Automatic addressing. High resistance to electromagnetic effects in accordance with EFSG agreement EFSG/F/97/005 Shall be EN54/ VDs/OEM certificate	22
Supply, Installation, Testing and Commissioning of addressable manual break glass unit (Double action) with inbuilt isolators, with flexible network structures & necessary fixing arrangements with key complete for outdoor application as required. Shall be EN 54 / Vds Certification.	03
Supply, Installation, Testing and Commissioning of Stand alone Loop Powered Addressable sounder with inbuilt isolators & with 32 different tone variants selection options & adjustable sound pressure by 5 levels, the sound pressure 100.0 dB , it should be programmed from the panel. Shall be EN54 / Vds Certification. for outdoor application	03
Providing and Laying of 2 Core 1.5 sq mm Armored Cable	500 mtrs.

GAS ANALYZER FOR PETROL VEHICLES

Measuring Method : Non Dispersive Infrared
Measurable Components : Carbon Monoxide (CO) and Hydrocarbon (HC) Carbon dioxide (Co2) and Oxygen (O2) automobile exhaust gases

	Measurement	Resolution
CO	: 0 ... 10 % Vol.	0.01 % Vol.
HC	: 0 ... 20 000 ppm vol.	1 ppm (0 – 2000 ppm)
CO₂	: 0 ... 20 % Vol.	0.1 % Vol.
O₂	: 0 ... 22% Vol.	0.01 % Vol.
Lambda (λ)	: 0 ... 9.999	0.001
Reproducibility	Within 1% of full scale	
Stability	Within 1% of full scale/hour at constant temperature	
Instrument deviation	within 1% of full scale	
Accuracy	Within 2% of scale at Constant temperature	
Response Time	90% response within 10 second with 5 meters amp	
Drift	Zero & Span drift ± 3% FS (3 Hr) or less	
Calibration	By span gas	
Accuracy of span	within ± 1-2% of the concentration state	
Warming up time	within 5 minutes	
Interference	effect from other gas Ambient Condition Less than 0.2 units	
a) Temperature	0 to 50 Deg. C	
b) Humidity	Less than 95% R.H.	
Display	Bright LCD	
Printer Built	– separate	
Power supply	220 ± 10 V AC; 50 Hz ± 3%	

Approval certificate from ARAI, Pune should be attached.

Equipment should be light-weight to carry with external printer.

Accessories For two years: Filter Paper for fine and coarse Part two packets of each)

Equipment (4 Gas Analyzer) 2. Power Supply Adaptor

3. Probe and Hoses 4. Mains Cord 5. RS 232 Cable

OPTIONAL ACCESSORIES

1. Engine Speed (magnetic type (two Wheelers) and Pickup (Four Wheelers) Type
2. Oil Temperature
3. Computerization Software CD

GAS DETECTION PUMPS & TUBES

Gas Detection Pump: Portable, handy piston type pump. The Pump should have built in tip breaker for breaking of gas detector tubes. The flow Indicator should be available to not down a fixed volume 50 ml to 100 ml. The pump should be of good quality, plastic preferable ABS resin material of better, so as to avoid reaction with the gases collected.

Description & Ranges of Gas Detection Tubes		
1.	Ammonia	0.5 to 1 ppm
		2.5 to 5 ppm
2.	Benzene	0.5 to 10 ppm
		1 to 20 ppm
3.	Carbon Monoxide	1 to 30 ppm
		25 to 1000 ppm
4.	Chlorine	0.05 to 0.5 ppm
5.	Chloride	0.05 to 1 ppm
6.	Hydrogen Chloride	0.2 to 1 ppm
7.	Hydrogen Sulphide	0.2 to 2 ppm
8.	Mercaptans	0.1 to 0.2 ppm
9.	Methyl Mercaptans	0.25 to 2.5 ppm
10.	Ethyl Mercaptans	0.2 to 0.5 ppm
11.	Nitrogen Oxides	0.04 to 0.08 ppm
		0.2 to 0.1 ppm
12.	Sulphur Dioxide	0.2 to 5 ppm

GAS CHROMATOGRAPH WITH MASS SPECTROMETER (GC-MS)

Sr. No.	Technical Specifications	Requirements
01	Instrument Composition	
	Gas Chromatograph with accessories	One Set
	Mass Spectrometer with accessories	One Set
	Capillary columns with accessories	One set each specified columns
	Software for Automatic control of the system, Data Acquisition and processing	One set
	Vacuum Pump for MS with accessories	One Set
	Auto Sampler	One Set
2.0	Technical Specification	
2.1	Gas Chromatograph	Fully Computer controlled with Injectors, Oven, Detector, EPC and related electronics
2.2	Make	Basic unit as well as other major components of the same manufacturer
2.3	Display	Alphanumeric digital display in at least four lines.
2.4	Parameters setting & control	Through application software as well as through key board of the instrument
2.5	Injector / Detector mounting	2 Injectors and Electron Capture Detector (ECD)
2.6	Capillary Column Mounting	Capable to hold two capillary columns of different diameter (100 μm to 530 μm)
2.7	Heated Zones	At least five Heated Zones including two injectors, Oven, Detector and Auxiliary.
2.8	Purge System	Gas Saver and Septum Purge System
2.9	Memory Protection	Memory Protection during power Failure
2.10	Diagnostics & Self Testing	Built in Diagnostics and comprehensive Self Testing.
2.11	Data Acquisition	Simultaneous from two signal channels i.e. Mass Spectrometer and ECD.
3.0	Injector - 1	Split / split less Injector (for Manual Injection)
3.1	Constituents	Modular Injector with Heater, temperature and Pressure Sensors.
3.2	Modes of Injections	Split less and split injections
3.3	Column Compatibility	100 to 530 mm ID Capillary Columns
3.4	Provision for	Over heat protection, septum Purge and Gas Saver
3.5	User Setting	User adjustable setting of split ration, Purge Flow and Purge Time
3.6	Temperature Range	50 ⁰ C to 450 ⁰ C
3.7	Temperature Increments	Minimum 1 ⁰ C in the entire operating range
3.8	Temperature Program Ramps	At Least 3
3.10	Temperature Ramp Rate Range	From 0.1 to 120 ⁰ C / min

3.12	Number of Pressure Programme Ramps	At Least 3
3.13	EPC Pressure Range	0 to 100 psi
3.14	Operation Modes	Constant pressure, Ramped Pressure, Constant Flow and Ramped Flow
3.15	Total Flow Setting Range	N ₂ : 0.1 to 100 ml/ min, He : 0.1 to 100 ml/min H ₂ : 0.1 to 1000 ml/min
3.16	Maintenance	Quick and easy maintenance provisions.
4.0	Injector - 2	Multimode Injector (For use with auto sampler located at back position
4.1	Constituents	Modular Injector with Heater, Temperature and pressure sensors
4.2	Inlet Options	Split / split less, temperature programmable, Large Volume Injection and cool on column injections
4.3	Modes of Injections	Hot or cold split / split less, Pulsed split /split less, Solvent vent and Direct.
4.4	Column compatibility	50 to 320 mm ID Capillary Columns
4.5	Provision for	Overheat Protection, Septum Purge and Gas Saver
4.6	User Setting	User adjustable setting of Split Ration, Purge Flow and Purge time
4.7	Temperature Range	50 ⁰ C to 450 ⁰ C
4.8	Temperature Increments	Minimum 1 ⁰ C in the entire operating range
4.9	Temperature Programming capability	Up to 7 ramps at up to 450 ⁰ C/ min or above
4.10	Temperature Program Ramps	At Least 3
4.11	Temperature Ramp Rate Range	From 0.1 to 120 ⁰ C/min
4.12	Pressure Programming Capability	Yes
4.13	EPC Pressure Range	0 to 100 psi
4.14	Operation Modes	Constant Pressure, Ramped Pressure, Constant Flow and Ramped Flow
4.15	Total Flow Setting Range	N ₂ : 0.1 to 100 ml/ min, He : 0.1 to 100 ml/min H ₂ : 0.1 to 1000 ml/min
4.16	Maintenance	Quick and easy maintenance provisions

5.0	OVEN	
5.1	Volume	More than 13 litres, should have provision to accommodate minimum two nos. Capillary columns or more at a time.
5.2	Column Compatibility	Capillary (0.10/0.20/0.32/0.53mm ID)
5.3	Temperature Range	50 ⁰ C to 450 ⁰ C or more
5.4	Temperature Increments	Minimum 1 ⁰ C
5.5	Temperature Accuracy	±1% for the entire Range
5.6	Temperature Stability	±0.1 ⁰ C
5.7	Column Overheat Protection	User defined setting
5.8	Oven Safety Features	Oven power must turn off automatically when the lid / door is opened automatic carrier gas shut off if inlet pressure drops significantly.
5.9	Temperature	Minimum six ramps and seven Plateaus
5.10	Programming Rate Range	0.1 ⁰ C to 120 ⁰ C / min

5.11	Heat up time	Less than 2.0 min(50 ⁰ C or Lower to 250 ⁰ C)
5.12	Cool Down Time	Less than 4.0 min(450 ⁰ C or Lower to 50 ⁰ C)
5.13	Resetting of Programme	Automatic by user defined sequence
5.14	Maximum Run Time	Minimum 650 minutes
5.15	Injector Compatibility	Split Split less Injector Multimode Injector.
5.16	Detector Compatibility	Mass Spectrometer (MS) and ECD
6.0	Electronic Pneumatic Control (EPC) System	
6.1	Type	Dual Column Dual Flow
6.2	Control of Inlet Pressure, flow rate of the carrier gas and Split ratio	Through the application software
6.3	Parameters Display	On-Screen digital display
6.4	Pressure & Flow programming	Time Programmable between the run.
6.5	Dean's Pressure Switch	For bifurcating the column eluents to two different columns
7.0	Capillary Columns	Low Bled Capillary Columns with following dimensions
7.1	HP-5MS or equivalent	60Mx0.25mmx0.25 μMM
7.2	Uncoated deactivated Silica Column (Guard Column)	5 m x 0.25 mm

8.0	Mass Spectrometer (detector)	
8.1	Control	Provisions for automatic start and shut down through application software parameters should be set and controlled through the software.
8.2	GC Interface	Short heated Interface
8.3	Interface Temperature Range	100°C to 350°C
8.4	Mass Source	Should have EI, CI, Positive CI, Negative CI facility with automatic tuning and acquire both SIM and scan data from single injection.
8.5	Electron Source	Easy access heated inert Filament
8.6	EI/CI Source Changeover	Easy and Quick Changeover by user
8.7	Source Temperature Range	125°C to 300°C
8.8	Analyser Type	Transmission Quadrupole with pre - filter
8.9	Noise Reduction	Heated Quadrupole Pre-filter / entrance lens/any other proven means for noise reduction
8.10	Analyser Temperature Range	150 ⁰ C to 200 ⁰ C
8.11	Mass Range	10 to 1000 amu or more
8.12	Mass Stability	Less than ± 0.1 amu accuracy over 48 hours
8.13	Ionization modes	Electron Ionization, Positive /Negative Chemical Ionization
8.14	Electron Ionization Voltage	10 to 100eV
8.15	Vacuum Pump	210L/Sec or better for He highly efficient Turbo-molecular Pump.
8.16	Pump Down time	For Air / Water < 3 minutes
		For Qualitative Stability < 15 minutes
		For Quantitative Stability < 90 minutes
8.17	Detector	Electron Multiplier or Photo Multiplier

8.18	Mass Tuning Standard	PFTBA (FC-43) BFB, DFTPP
8.19	Resolution	1 amu or better
8.20	Scan Rate	Fully variable 10000 amu / sec or more
8.21	Scan Step Sie	0.1 amu or less
8.22	Acquisition Rate	50 Full Scans or better / sec depending on mass range
8.23	Linear Dynamic Range	Concentration 10^5
		Electronic $10^6 - 10^7$ dependent on acquisition rate
8.24	Number of SIM Group	Minimum 30 groups
8.25	Number of Ions / Group	Minimum 30 Ions
9.0	Sensitivity (detection Limits)	
9.1	EI Scan	1pg of OFN at S/N of 600 : 1 RMS
9.2	EI SIM Scan	100 fg of OFN at S/N of 25:1 RMS
10.0	Mass Spectral Libraries	
10.1	NIST Mass Spectral	Version Year 2011 or latest pre loaded on data station and licensed backup licensed CD compatible with operation software.
10.2	NIST Chemical Structures database	Latest version available on date of quotation preloaded on Data station and back up Licensed CD compatible with operation software.
11.0	Additional Capabilities	
11.1	Acquisition	Simultaneous Full Scan as well as SIM Acquisition.
11.2	Ability to Split Column Effluent	To ECD in addition to MS with dual signal capability
11.3	Applying constant flow rate	To the MS regardless of column flow rate (use of any column at any flow rate)
11.4	Column Replacement	Without cooling and venting the MS
11.5	Injector Maintenance	Without cooling and venting the MS / Back Flushing.
12.0	Electron capture Detector(ECD)	Coaxial Design based on Ni ⁶³ source
12.1	Linear Dynamic Range Should be	10^4 or higher
12.2	Departure from Linearity should be	Less than $\pm 1\%$ for the entire range
12.3	Operating temperature (Maximum)	400°C
12.4	Pressure / Flow Control	Electronic pressure / flow control
12.5	Sensitivity	Less than 10 fg / sec of Linden
12.6	Makeup gas	Argon / 5 % methane or Nitrogen
13.0	Auto Sampler	
13.1	Number of Sample Vials	Capable pf accommodating 100 Vials or more
13.2	Syringe Capacity	Capable of Accommodating up to six Different Syringe capacity.
13.3	Injection Volume	Selectable between 1 and 10 micro litre or more
13.4	Washing Solvent	Up to four different washing solvents in 4 ml vials
13.5	Programming	Sequence and repetition programmable from work station software.
14.0	Operating Conditions	
14.1	Power Supply	230 \pm 10Volts, 50 \pm 1 Hz AC Power supply

14.2	Operating Temperature	15 ⁰ C to 30 ⁰ C
14.3	Relative Humidity	40 to 80% non condensing
15.0	Data Station	
	Application Software Capabilities	
	Application software	Multitasking software with programming facility
	Capabilities	Accurate and reproducible integration
		Reintegration / replot
		Baseline Correction
		Multi Level Calibration
		Background Subtraction
		Library Search
		Quantitative Analysis
		Customizable Report Formats
	Software Control	The Whole system including GC –MSD, Injectors and additional detector (ECD)
	Parameters Control	Flow, Temperature, Pressure and Vacuum System
	System Auto Tuning	Through Tuning Standards
	Analytical Quality Control	Calibration Check Samples
	Spike recoveries	
	Calibration verifications and	
	QC Limits	
16.0	Computer System	
	Make	Reputed brand such as HP/Compaq/Dell
	Processor	Intel Core i7 (3 rd Generation) processor
	RAM	4GB DDR RAM (Upgradable to 8 GB)
	HDD	500 GB SATA
	DVD Writer	DVD – Multi drive
	Ports	2 Serial, 1 parallel and 2 USB front 3 rear USB 2 Port, 1VGA 4 bays (2 external & internal) with LAN 1 PS2 mouse port
	Key Board	Latest multimedia (HP/Microsoft or equivalent)
	Mouse	Optical mouse with pad
	Ethernet	32 bit auto selectable 10/100 MBPS
	Graphics	Internet ready with integrated Graphics
	Sound	Integrated sound card and inbuilt stereo speaker
	Printer	HP or equivalent Laser Jet colour printer 1200 x 1200 dpi 12 ppm color
	Software	Pre loaded Windows 7 professional or latest operating system with licensed CD MS Office 2010 Professional with media, manual and licensed CD Pre loaded Norton Antivirus with latest version of 3 years life time along with licensed CD
17.0	Column Nut	2 Nos.
	Washer	02 Nos.
	Graphite / vespe; ferrules different sizes	20 Nos. Each

	Inlet Septa (Self Sealing for injectors)	200 Nos.
	O-ring	20 Nos.
	Copper tubing with connectors	50 mtrs
	Micro Syringes for manual injection (5µl)	4 Nos.
	Micro Syringe for manual injection (10µl)	4 Nos.
	Copper Tube Cutter	01 No
	Auto Sampler Vials (2 ml)	500 Nos.
	Auto Sampler Septa and caps	2000 Nos.
	Auto sampler spare syringes	1.0 µl – 5 nos. 5.0 µl – 5 Nos. – additional
	Any Other	Any other spares and consumables sufficient for three years trouble free operation should also be included in the offer and supplied with each system
18.0	Accessories	
18.1	Operation and Maintenance Manual	Two Sets
18.2	Application notes for the analysis of	VOCs, PCBs, PAHs, Pesticides, Carbamates and Carbonyl compounds
18.3	Service Manual	One Set
18.4	Requisite Tool	One Set
18.5	List of Spare parts & Consumables	One Set
18.6	Troubleshooting guide	One Set
18.7	High Capacity Carrier Gas purifier	2 Each
18.8	Consumables for three years operation	One Set
18.9	Operation Kit	One set containing all essentials accessories and spares such as Column nut washers, inlet septa, O- ring copper tubing with connector, micro syringes, copper tube cutter, column cutter, brass / stainless steel nuts, brass / stainless steel ferules.

18.10	Gas Purification Panel	Complete with Gas Purification traps moisture trap – silica gel – Molecular sieve 50 : 50 length 10 inch – Two nos.
18.11	Gas Cylinders	High pressure Stainless Steel cylinder fitted with high purity 99.99% analytical gases (as mentioned ahead) having gas capacity 7 m3 (water capacity 47 ltrs). Cylinder 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 under Gas Cylinder Rules 1981. Gas Cylinder should be supplied with hydraulic test certificate and explosive certificate from Chief Controller of Explosives, Nagpur. Helium: One No., Nitrogen: One No. Hydrogen: One No.
18.12	Gas Cylinder Trolley	One No.

		<ul style="list-style-type: none"> • Gas Cylinder trolley for transporting gas cylinder from transport vehicle to Gas Room / Laboratory • Stainless Steel trolley heavy duty construction with rugged polypropylene straps, stainless steel cinch buckles with 8 inch wheel made up of high strength polymer material for safe easy and convenient transfer of single stage cylinder up to 12" in dia meter.
19.00	Warranty	Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. The AMC charges to be mentioned for next two years after warranty is over.
20.00	Head Space Sampler	Vendor should quote Head Space Sampler of 40 or more Vials based on pressure compensation technology in option.

21.0	Training	The principal supplier has to impart onsite training at the time of installation followed by complimentary one week training (all expenditure inclusive) to minimum two Scientist on operation, method development, maintenance, software training, data interpretation (qualitative and quantitative) at instrument manufacturer's application laboratory including application for analysis of VOCs, PAHs, PCBs, Pesticides and other hazardous organic compounds.
22.00	General Conditions of Supply	<ul style="list-style-type: none"> • The instrument and all its sub units should operate on 230±10 volts 50 Hz power supply. • All the operation and maintenance manuals, circuit diagrams, application notes and application software to be supplied in English language. • The supplier / manufacturer should have Indian Agent to provide after sales & service. • The principal should provide a certificate that they will provide the spares in future for at least 10 years. • The main unit and all the sub units of the instrument should be serviced by the Indian representative of supplier. • The Bidder should be a manufacturer / authorized representative of a manufacturer, who must have designed, manufactured, tested and supplied two numbers of such equipment in the past five years similar to the type specified, which shall be in successful operation for at least 2 years as on

		<p>the date of bid opening.</p> <ul style="list-style-type: none">• The bidder should furnish the information on past supplies and their satisfactory performance.• Bidder shall invariably furnish Documentary evidence (client's certificate –at least two) in support of the satisfactory operation of the equipment as specified above.
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Hot Air Oven

Specifications	Requirements
Internal Chamber Size	75cm x 75cm x 120cm (L x W x H)
Outer Body	Powder Coated Mild steel, White stoned enamel
Inner Chamber	Double walled construction inner chamber made of stainless steel
Trays	4 nos. stainless steel , perforated adjustable
Door	Single door fitted with heavy brass chrome plated hinged and door lock
Cabinet	Cabinet double walled mild steel
Insulation	Minimum thickness 5 cm of glass wool
Air Circulation	Ventilated through internal fan with ISI marked motor to assist circulation or air
Operating Temperature Range	Ambient to 300°C
Temperature Control	Digital temperature controller cum indicator with accuracy of $\pm 0.5^{\circ}\text{C}$, installation should be on top towards door side. The supplier will have to provide Calibration Certificate for Digital Temperature Controller from NABL recognized Calibration Laboratory
Timer	Digital with rage upto 999 minutes, installation should be at top towards door side, Automatic to control ON/OFF cycle.
Power	230 \pm 10 Volts AC 50 Hz
Heaters & heating load	ISI marked heating elements 2 KW
Ventilator	Two adjustable air ventilator on both upward side of the instruments
Standards	The apparatus should confirm to IS 6365 – 1971 (Reaffirmed 1995) with latest amendments in Indian Standard Specification for laboratory Electric Ovens or equivalent International Standards covering marking tests and safety requirements.

Hot Plate

Specifications	Requirements
General	General Purpose hot plate with digital electronic temperature controller cum indicator
Case Structure	Steel Epoxy coated case for structural strength to support heavy loads
Top Structure	Stainless Steel / Teflon Coated top plate to resist physical abuse and thermal shock
Size	600 mm x 450 mm
Maximum Temperature	300 °C
Operating Temperature	Ambient to 300 °C Selectable at any point
Temperature Control	Digital electronic temperature controller
Temperature Indicator	Digital Display
Temperature Uniformity	± 10°C
Temperature Stability	± 0.5°C
Heating Elements	Embedded long lasting nichrome heating elements (2 KW) transfer heat across the entire top place surface.
Accessories	Power cord ISI Marked 2 meter each two sets with male & female plug

**INDUCTIVE COUPLE PLASMA WITH MASS SPECTROPHOTOMETER
(ICP-MS)**

S. No.	Specification	Requirement
1.0	Instrument Composition	Dual channel ICP-MS Spectrometer with collision and reaction with Quadrupole inside cell
	RF System	One Unit
	Nebulizer & Spray Chamber	One Unit
	Peristaltic Pump	One Unit
	Plasma Torch	One Unit
	Mass Spectrometer	One Unit
	Auto Sampler	One Unit
	Data Work Station	One Unit
2.0	Technical Specification	
2.1	System Application	Computer controlled fully automatic, data work station based, ICP-MS system
		ppt analysis, simultaneous multi-elemental analysis with exceptional sensitivity and stability of diverse range of environmental, biological, geological and industrial samples
2.2	System Operation	Computer Controlled Solid State RF Generator, without any consumable parts.
		Auto start from Switch or computer key board.
		Automatic detector system controlled by Multitasking Windows based operating software with built-in diagnostics.
		High-speed data acquisition system, quality control protocols, calibration, auto optimization and auto tuning of system with status display.
2.3	RF System	<p>Ion Source and RF plasma system must include:</p> <ul style="list-style-type: none"> • Computer controlled preferably 40/27MHz Free Running RF generator operating from 500 to 1600 watts for automatic control of torch ignition, shutdown, and system warm up. • RF Generator and load coil shall be free from water cooling. • The RF Generator with fastest an impedance matching network and providing for adaptation to any change in plasma within nanoseconds. • Design shall not need plasma “screens” or “shields or straps to avoid secondary discharges”.
	Wattage	Computer controlled from 750 Watt to 1500 Watt in 1 watt

		increment with auto tuning.
2.4	Sample Introduction System	<ul style="list-style-type: none"> • Liquid sample flow rate (0.25 ml/minute) introduction system without O-rings concentric nebulizer cyclonic spray chamber, and quartz injector. • System shall be close coupled, computer controlled three-channel integral peristaltic pump, integrated within ICP-MS unit. • Cassette Torch mount with torch and injector assembly and flexibility with easy removal. • Fully automated X, Y, Z torch alignment thru software. • Demountable torch which allows changing of injector without torch removal.
2.5	Micro Flow Nebulizer	Ultrasonic nebulizer
2.6	Spray Chamber	Corrosion Resistant to most acids including Hydrofluoric acid and Aqua –Regia with ceramic torch & injector
	Location	Glass cyclonic spray chamber should be located in a thermally controlled area.
2.7	Plasma Torch	Plasma Interface <ul style="list-style-type: none"> • A Triple or dual cones design for better focusing of ions. • System free from Extraction lens creating higher backgrounds for various elements • Sampler and skimmer cones orifice with minimum 1.0 and 0.8 mm diameters respectively. • Rapid mounting and removal cone design, easily accessible from outside. • Quadrupole used shall be for complete separation of ions from photons and neutrals for making the cell and mass analyzing quadrupole completely maintenance free.
	Torch design	Several multiple loops of an induction coil with three concentric tubes. Central tube to inject sample aerosol and carrier gas introduction, middle tube for plasma gas (argon) and outermost tube for Auxiliary gas.
	Corrosion Resistance	Torch should be full corrosion resistant to all acids including Aqua – Regia full ceramic torch to be quoted.
	Torch Adjustment	Computer controlled plasma torch adjustment / alignment for optimal analytical positioning relative to ion sample interface.
	Neutral Plasma	Capable to produce electrically neutral plasma fully controllable through PC.
2.8	Plasma Gas Control	Computer Controlled Plasma Gas (Argon) flow controlled and Mass Flow Controller for nebulizer flow.
	Range	Range 0 to 20 LPM in 1 LPM increment
2.9	Safety Interlock	interlock status.

	Automation	Automatic shutdown of plasma, in case any of safety interlocks not met.
2.10	Plasma Ignition	Computer Controlled Plasma ignition. Software should have capability to ignite Plasma automatically at user determined time to warm up the system prior to analysis.
	Power Control	Automatic turn off of Plasma after analysis`
2.11	Cooling System	Water Re – circulating cooling system with appropriate flow & pressure and temperature between 15 to 25 ⁰ C.
2.12	Peristaltic Pump	Computer controlled, multi channel (3-4) pumps.
	Speed	0.25 to 5.0 ml/min in 0.1 ml/min increments, precise computer controlled pumping of the sample.
	Pump operation	Should be auto –fast for rapid rinse out, wash –out and analysis time
	Location	Located close to spray chamber for faster rise.
3.0	Mass Spectrometer	Quadrupole Mass Spectrometer, Reaction and collision cell with Quadrupole insides. The system shall be provided with both two independent modes using 100% pure gases like Helium (He), Methane (CH ₄), Oxygen (O ₂), CH ₃ Cl etc.
3.1	Detector	<p>The ion detector shall be a simultaneous dual-stage discrete dynode electron multiplier, providing element concentration calibration over 10 orders of magnitude (from 0.1 cps to > 1e9 cps)dynamic range in a single scan using both analog and pulse ion counting mode, and offer protection against overload in both pulse counting and analog modes.</p> <p>The system shall meet following performance criterion:</p> <p>Minimum Detection limits Element ng/L (ppt) ⁹Be <1 ,⁵⁹Co < 1 , ¹¹⁵In < 0.5 and ²³⁸U < 0.5</p> <p>Sensitivity Element M cps/mg/L ⁹Be > 3, ²⁴Mg > 20, ¹¹⁵In > 50 and ²³⁸U > 40</p> <p>Oxide and doubly-charged species .^{Ce}O⁺/^{Ce}+ < 2.5% and ^{Ce}+⁺/^{Ce}+ < 3.0%</p> <p>Background signal, Mass 220 < 1 cps Short-term precision3% RSD Long-term stability< 4% RSD over 4 hours Mass calibration stability< 0.05 amu over 8 hours of continuous operation</p>
3.2	Dynamic Range	Complete periodic table inclusive of all isotopes, dynode electron multiplier detector or equivalent.
		Capable of analysis of all measurable elements including of high ionization potential in a single run including As, Hg, Sb, Bi, Se elements in up to ppt level
3.3	Vacuum System	a. Vacuum system shall consist of three to four stage vacuum system utilizing a triple inlet turbo molecular

		<p>pump to maintain vacuum at $1e^{-6}$Torr (or lower), include vacuum chamber isolation valve which automatically close as plasma is extinguished or with system faults.</p> <p>b. In the event of vacuum failure, the entire vacuum system must be automatically back-filled by inert gas to preserve the cleanliness of the system.</p> <p>c. Turbo molecular vacuum pump must be purged by an inert gas during operation to prevent damage by reactive gases and/or corrosive vapors such as those generated by the analysis of phosphoric acid.</p>
3.4	Quadrupole	<p>Quadrupole Mass Analyzer:</p> <ul style="list-style-type: none"> • The Quadrupole mass with gold metalized ceramic rod technology for best stability, operating at 2.5 MHz for exceptional resolution and abundance sensitivity. • Scanning speed up to 4000 amu per second and Dwell times minimum 0.1 ms • Peak hop slew speeds up to 1.6M amu/sec • Offer mass range to m/z 280amu. • Quadrupole analyzer shall have the ability to discretely control the resolution of selected mass regions dynamically, without affecting the overall nominal resolution of the system
3.5	Mass Calibration stability	Better than 0.05 amu/day
3.6	Nebulizer	Cross flow / concentric
3.7	Mass Shift Analysis	Unit shall have built –in facility for performing Target element analysis with out interference in reaction mode.
4.0	Abundance sensitivity	Low mass $< 5.0 \times 10^{-7}$ – high mass $< 1 \times 10^{-7}$
4.2	Ion Beam Detection	Dual stage discrete dynode electron multiplier with a count response range of 2×10^6 cps/sec
4.3	High TDS capability	Should be able to perform direct analysis of 0.2% solids or greater without dilution. The direct analysis must also be automatically tuned for robustness depending on solid content via integrated software.
5.0	Water Chiller	Efficient thermal management, noise free, re-circulating heat exchange water chiller of reputed make.
6.0	Auto Sampler / Diluter	Highly effective auto sampler/ diluter compatible with operation along with ICP- MS without user intervention.
	Capacity	Auto sampler with 150 or more tubes holder space and cover with 500 nos. 15 ml capacity tubes.
	Programming Facility	Programmable complete with inert PTFE coated probe with PTFE inner tubing
	Extension Tube	Spare extension tube complete with 20 ml syringe for

		programmed auto dilution
	Auto Sampler Accessories	Complete with all accessories, racks, bottles, tubing assembly, dust cover etc.
7.0	Data Work Station	
7.1	Application Software (Features)	<p>Programme facility with multitasking software displaying method sample and analysis status.</p> <p>Instrument control reintegration/ report, multi level calibration, automatic data acquisition and processing.</p> <p>Calculation of data and report.</p> <p>External and dilution calibration, automatic correction for interferences and measurement with internal standards.</p> <p>Measurement of transient signals, self diagnosis, remote diagnostics and LAN Connectivity.</p> <p>Quality control protocols including preparation blanks, multiple quality control standards, calibration, check samples, spike recoveries, duplicates calibration failure and QC limits.</p> <p>Storage of complete spectrum of elements for future reference.</p> <p>Provision for statistical analysis, printer/plotter function and battery backup for memory protection.</p> <p>Linear least squares- weighted linear least squares, linear forced through zero least squares.</p> <p>Standard addition methods, addition calibration.</p> <p>Real time graphics with ability to display transient and continuous signal profile.</p> <p>Should control whole ICP-MS system sample introduction, calibration, quantitative analysis, data retrieval, data acquisition and reporting</p> <p>Auto optimization of plasma parameter customizable instrument status display software control of MS and other accessories.</p>
7.2	Computer system	Two nos. (with similar technical specification as below)-one online and additional for offline analysis.
	Make	Reputed brand such as HP/Compaq/Dell
	Processor	Intel core i7 (3 rd generation) processor
	RAM	4 GB DDR RAM (upgraded to 8 GB DDR RAM)
	HDD	500 GB SATA
	Monitor	21" TFT-LCD Flat Color (Digital)
	DVD Writer	DVD- Multi-Drive
	Ports	2 serial, 1 parallel and 2 USB front 3 Rear USB 2 Port, 1 VGA 4 bays (2 external & internal) with LAN 1 PS, 2 mouse port
	Keyboard	Latest Multimedia (HP/Microsoft)
	Mouse	Optical mouse with pad

	Ethernet	32 bit auto selectable 10/100 MBPS
	Graphics	Internet ready with integrated graphics.
	Sound	Integrated sound card and inbuilt stereo speakers
	Printer	HP Laser Jet Printer 1200x1200 dpi 12 PPM black
7.3	Software	Pre loaded windows XP Professional or windows 7 Professional operating system with Licensed CD Compatible with operational software
		MS Office 2010 Professional with media, manual and Licensed CD Compatible with operational software
		Preloaded Norton Antivirus with latest version of 3 years lifetime along with Licensed CD
8.0	Additional items	
8.1	Reference standards	Multi elemental calibration standards having at least 23 elements should be supplied in 100 ppm range- 5 nos.(List to be specified)
8.2	Manual	Operation and maintenance manual for each unit.
8.3	Application notes	Application notes(CD-ROM)for elemental analysis in environmental, geological, metallurgical, biological and industrial samples.
8.4	Methodology package	Comprehensive EPA Methodology package software (CD-ROM) for environmental application.
8.5	Service manual	Service manual with set of required tools for each system/unit.
8.6	Spare parts catalogue	One set
8.7	Trouble shooting charts	Trouble shooting charts for all sub units.
8.8	Dust cover	Dust cover for all sub units.
8.9	Operation kit	Operation kit comprising all required items pump tubings, transfer tubings, work coils etc. for start up/regular operation of instrument.
9.0	Consumables	Consumables for three years operation of the system for main ICP-MS unit, spare torches, nebulizer, tunings, moisture trap are required to be quoted.
10.0	Local Supplies	
10.1	Stainless steel Hood and Duct	Corrosion resistant Stainless steel Hood and Duct for exhausting of acidic fumes. May be quoted per meter basis. One 20 KVA UPS system with at least 30 minutes back up of any reputed make should be supplied.
10.2	Pressure Regulator	Corrosion resistant/ stainless steel two stage argon and nitrogen gas regulators with max cylinder pressure 4000 psi/ 280 kg/cm ² and line pressure 230 psi/16kg/cm.
10.3	Argon, Methane (CH ₄), Oxygen and Helium gas cylinders	Four Argon and two Methane (CH ₄), Oxygen and Helium gas cylinders. High pressure seamless steel cylinder filled with high purity 99.999% argon gas, and another nitrogen gas with having gas capacity 7m ³ water capacity 47 liters,

		<p>cylinders should be ISI marked, conforming to IS: 7285. Specification, flat bottom fitted with valve as per IS:3224, complete with neck ring and cap, painted as specified under gas cylinders rules, 1981 along with Hydraulic test certificate, ISI Inspection/ test certificate, explosive certificate from chief controller of explosives, Nagpur India as per BIS Standard with 47 liter cylinder: Argon- Four cylinder Filled Nitrogen- Two cylinder Filled</p>
11.0	Operation and maintenance training component	<p>On – site comprehensive training for scientific personnel operating the system and support services till customer satisfaction with the system followed by complimentary (all expenditure inclusive) two weeks comprehensive training to two scientists on operation and maintenance aspect of the instrument at manufacturer’s laboratory abroad.</p>
12.0	Warranty	<p>Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered, the AMC charges to be mentioned for next two years after warranty is over.</p>
13.0	General conditions of supply	<ol style="list-style-type: none"> 1. The instrument and all its sub units should operate on 230±10 volts 50 Hz power supply. 2. All the operation and maintenance manuals, circuit diagram, application notes and application software to be supplied should be in English language. 3. The supplier/ manufacturer should have Indian agent to provide after sales service. 4. The main unit and all the sub units of the instruments should be serviced by the Indian representative of supplier. 5. The bidder should be a manufacturer/ authorized representative of a manufacturer, who must have designed, manufactured, tested and supplied two numbers of such equipment similar to the type specified in the past five years, which shall be in successful operation for at least 2 years as on the date of bid opening. 6. The bidder should furnish the information (Address, telephone nos. & E-mail) on past supplies made during last 5 years and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client’s certificate – at least two) in support of the satisfactory operation of the equipment as specified above. 8. Not with standing anything stated above the purchaser reserves the right to assess the capability and capacity of the bidder to perform the contract, should the circumstances warrant such an assessment in the overall interest of the purchaser.

MICROWAVE DIGESTER

SL. No.	Specifications	Requirement
1.	Description	Microwave Digester must have 10 high throughput closed vessel microwave. Digestion / extraction / synthesis workstation suitable for AAS spectrophotometer samples for the best digestion. The workstation meets the need of batch processing of samples and raises safety and reaction control accuracy with following features
2.	Chamber	Chamber capacity – 65 L, with double magnetron microwave emission, with the highest microwave output power of 1800 W. the operating power realises automatic variable frequency control (VFC) and non – pulse continuous microwave heating via reaction temperature and pressure feedback
3.	Chamber Door	Six – layer steel structure armoured glass explosion proof chamber door is equipped with an automatic pop up buffer structure and electronic and mechanical dual- control door lock
4.	Reaction Vessel	High pressure reaction vessel must have a fully closed anticorrosive super strength composite fiber outer vessel under the support of high strength frame structure and vertical explosion pressure relief technique with Max. Sustained pressure of 15 MPa (2250psi) and the highest sustained temperature of 300°C.
5.	Pressure Control & Display	System have piezoelectric crystal pressure sensors controls and displays the internal pressure and pressure rise curve of reaction vessel in real time, with pressure control range of 0 to 10 MPa (1500psi) and control precision of 0.01 MPa.
6.	Temperature Control & Display	System have high precision platinum resistor sensor controls and displays the internal temperature and temperature rise curve of the reaction vessel in real time, with temperature control range of 0 to 270°C and the precision of $\pm 1^\circ\text{C}$
7.	Reactions Vessels Table	Should be high throughput reaction rotary table can bear upto 15 high pressure reaction with the capacity of 100 ml simultaneously, and system should have the facility to increase or decrease such vessels according to need.
8.	Technical Specifications	
	Maximum Stand	15 MPa (2250psi)

	Pressure	
	Temperature	300°C
	Inner Vessel Capacity	100 ml
	Outer Vessel material	fully closed anticorrosive super strength composite fiber
	Inner Vessel Material	TFM (intensified Polytetrafluoro Etylene)
	Cooling Mode	Automatic Air Cooling inside chamber / natural cooling outside chamber
	Sample Processing Capacity	More than 10 pieces per time

MICROPROCESSOR BASED MERCURY ANALYZER

S. No.	Specification	Requirement
1.0	DIGITAL MERCURY ANALYZER	Main Unit – One set
	Measuring Range in Solutions	20 – 200 ng Absolute (with small reaction vessel)
		20 – 600 ng (with B.O.D. Bottle as reaction vessel)
	Sensitivity	3 ng Absolute for 1% Transmittance
	Detection Limit	10 ng Absolute or 0.0001 ppm (0.1 µg/Litre)
Stability	+/- 1% of full scale	
2.0	VAPOUR GENERATION SYSTEM	All glass reaction assembly including B.O.D. Bottle (one set with magnetic stirrer & stand – Two sets)
	Read Out	Digital display of Absorbance % Transmittance on DPM
	Radiation Source	Mercury Lamp
	Detector	Silicon Photo detector
3.0	MERCURY ANALYZER INTERFACE	RS 232 Interfacing with mercury analyzer:
		Include interface cable and windows based software
4.0	DATA STATION	Mercury Analyzer Data Station with mercury software CD & interface cable
4.1	Computer System	Reputed make such as HP/Compaq/IBM/Dell
	Processor	Intel Core 2 Duo processor 3.00 GHz or above
	RAM	4 GB (upgradeable to 8 GB)
	HDD	500 GB ultra DMA or higher HDD (7200 RMP),
	Monitor	21” TFT – LCD Flat Colour
	CD ROM	52x CD-ROM
	DVD-CDRW	32x DVD-ROM and CDRW-Combo Drive Max speed 48x24x48
	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB2 PS/2 Port,
4.2	Application Softwares	Windows based application software capable to fully control the Digital Mercury Analyzer operation data capture, data calculation, quality control protocols etc.

4.3	Softwares (General)	Pre-loaded Windows 7.0 Professional operating system with Licensed CD compatible with Application software
		MS Office 2000 Standard with media, manual and Licensed CD compatible with Application software
		Preloaded Antivirus with latest version along with Licensed CD compatible with Application software
5.0	ADDITIONAL ITEMS	
	Manual	Operation and maintenance manual for each unit.
	Application notes	Application notes (CD-ROM) for mercury analysis in environmental, geological, metallurgical, biological and industrial samples.
	Service manual	Service manual with set of required tools for each system/unit.
	Trouble shooting charts	Trouble shooting charts of all sub units
	Dust cover	Dust cover for all sub units
	Consumables	Consumables for three years operation of the system, spare tubings, magnetic beads, glass impingers are required.
6.0	Operation & Maintenance Training Component	Complimentary (all expenditure inclusive) two weeks training to two Scientists on operation and maintenance aspect of the instrument at manufacturer's facility / application laboratory in India.
7.0	General Conditions of Supply	<ol style="list-style-type: none"> 1.The instrument and all its sub units should operate on 230 ± 10 volts 50 Hz power supply. 2. All the operation and maintenance manuals, circuit diagrams, application notes and application softwares to be supplied should be in English language. 3. The main unit and all the sub units of

		<p>the instrument should be serviced by the supplier.</p> <p>4. The Bidder should be a manufacturer/authorized representative of a manufacturer, who must have designed, manufactured, tested and supplied two numbers of such equipment similar to the type specified in the past five years, which shall be in successful operation for at least 2 years as on the date of bid opening.</p> <p>5. The bidder should furnish the information on past supplies and their satisfactory performance.</p> <p>6. Bidders shall invariably furnish documentary evidence (client's certificate – at least two) in support of the satisfactory operation of the equipment as specified above.</p>
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MUFFLE FURNACE

- Temperature range : Up to 1000°C
- Power requirement : 230 Volt Single /440 Volts three Phase
- Programmable Digital temperature controller cum indicator should be provided.
- Digital timer of 99 hours should be provided
- Energy regulator should be provided
- Overload protection
- Construction should be lightweight with ceramic fiber Wool insulation.
- Outer body is made of thick M.S. with enamel painted.
- Size inner chamber- 8"x8"x18"(L x W x depth)
- Silver Fuse should be provided
- CE / ISO 9001 certified
- Lock & key arrangement.

NETWORKING FACILITY

Cisco 24-Port 10/100/1000Mbps Unmanaged Gigabit 1U Rack Mount), D-Link CAT6 UTP 305, RJ 45 Connector, D-Link 24-Port CAT6 Patch Panel, OEM Make 1U Plastic Loop Cable Manager , Loaded 1U Rack Mount, D-Link Dual Port Information Outlet with Gang Box, MTS Digital 17U 600x650mm/Front Glass & Back Metal Door/1x4-Wheels Set/1x2-FAN Tray/1x6-Port 5-15Amp PDU with MCB/1xStationary Shelf, Laying / Installation.

PM_{2.5} SAMPLER

The instrument should be tested with any accredited laboratories like CPCB, NEERI, IIT etc. Towards its compliance for USEPA norms. The instruments should possess following specifications.

Flow Rate	Fixed, 1M ³ /hour [16.7 lpm] controlled by Mass Flow Controller
Elapsed time indicator	Up to 9999 hours with two decimals
Vacuum Pump	Diaphragm type, brush less motor
Flow Recorder	Chart type / Memory based downloadable to computer and/or manually displayed on screen.
Dry Gas Meter [Volume totalizer]	For measuring total volume of air sampled.
Volumetric Flow rate compensation	Ambient temperature and pressure sensors to control volumetric flow rate
Power requirement	230 ± 10 VAC, 50 Hz ± 3%
Size Selective inlets	Opposed jet impaction for PM10 cut and Cyclonic /WINS impactor for PM2.5 Cut off
Special Features	The system should have an option to be used for PM10 sampling
Calibration Unit	Calibration unit to calibrate the flow rate of the instrument
Additional supply	Manufacturers standard operation kit including all required items, fittings for start up / regular operation of instrument. Operation and maintenance manual for each unit. Spares and consumables for three year operation.
Optional Accessories	Pure Nylon membrane [1µm, 47mm] developed specially for acidic dry deposition measurements PTFE membrane filter with PMP [poly methyl pentene] support ring [1µm, 47mm] Pure Quartz filter [max. operating temp.> 1000°C] 47mm

PC-CONTROLLED UV - VISIBLE SPECTROPHOTOMETER

Specification	Requirement
Type	Double beam, automatic scanning
Light source	Tungsten-halogen and deuterium
Wavelength range	should cover 190-1100 nm range or better
Wavelength accuracy	± 0.1 nm at D2 peak, 656.1 nm or better
Wavelength reproducibility	± 0.05 nm 656.1 nm or better
Band pass range	Variable 0.5 nm to 4 nm
Stray Light	0.01% Tat 220nm (NaI) or better
Scan speed	5 to 2800 nm/min
Photometric drift	0.0003 absorbance units/hour at 340 nm
Automatic switch Over	Pre aligned Deuterium and Tungston – Halogen Lamp
Photometric Stability	At least 0.0002 A/Hour (at 1A, 500nm) or better
Power Requirement	220 VAC $\pm 25\%$, 47 to 53 Hz
Accessories	PC , compactable for operation control and monitoring of UV – Spectrophotometer and accessory modules, Colour monitor, Printer, Essential spare parts including Holonium Oxide filter for five year of operation, Voltage stabilizer, Dust cover, Operation manual, Matching cuvettes (2 pairs).

Software performing analysis at least as per DIN/ISO/US-EPA, calibration, blank correction, data import, data export, data handing and reporting, quality control protocols, computer based training.

RESPIRABLE DUST SAMPLER

Specifications	Requirements
Blower	0.8 to 1.4 meter cube per minute free flow with flow controller and brushless motor operated at 230 Volts preferably noiseless.
Particle Size	Particles of 10 microns and below collected on filter paper, Filter holder designed to accept any standard filter sheet of 203mm x 254 mm. Separate provision for collecting particles bigger than 10 microns under the cyclone.
Sampling Time	0 to 24 hours flexible to set any time interval.
Time Totalizer	0 to 9999.99 hours. Time totalizer circuit detects blower stoppage due to any reason including brush failure.
Automatic sampling	24 hours programmable timer to automatically shut off the system after pre-set time intervals.
Power	Normal 230 ± 10 V, single phase, 50 Hz AC, Built in requirement voltage stabilizer with automatic shut off beyond 170 – 270 V range.
Handling	Portable and as sleek as possible
Housing	Sturdy aluminium cabinet consists of blower, filter case assembly, time totalizer, real time timer, flow meter, flow controller & flow measurement device. RSPM should be collected on filter paper and coarse dust should be collected in a cup under cyclone.
Flow Measurement	Glass Manometer tube accurately graduated directly in M ³ /Min and calibrated across orifice.

Gaseous Sampling Attachment

Flow Rate	0.3 to 3 lpm, 2% accuracy
Flow Control	Four inlet and one outlet manifold with built in needle valve for flow control of each inlet.
Sampling Train	4 nos. of 35 ml. Borosilicate glass impingers kept in ice tray. Dimension as per IS: 5182 Part V

ROTARY EVAPORATOR

Rotary evaporator suitable for processing of samples for analysis of organics. Should have a diagonal design, a reproducible and digital of RPM with a Buchi type or equivalent movable and high vacuum proof sealing. Should be provided with Ball servo lifter. water bath, sealing for the RE system, spare clams for the evaporating and receiving flask, a self contained and chemical resistant. The system should have following specifications:

[A] Rotavapor :

Operating voltage	100 – 240 V
Frequency	50/60 Htz.
Power consumption	60 W
Rotation Speed	20 – 280 rpm
Flask size	50- 4000 ml
Max. Flask capacity	3 kg
Display	Rotation speed and vapor temperature
Approval	Reputed Certification

[B] Heating Bath:

Operating voltage	100 – 120 V or 220 – 240V
Frequency	50/60 Htz.
Heating Power	1300W
Power consumption	1700 W
Flask size	up to 4000 ml
Controlled temperature range	20 - 180°C [water and oil]
Display	actual and specified temperature, water /oil
Temperature deviation	± 2°C
Approval	Reputed Certification

[C] Evaporating Flask: The evaporating flask should be pear shaped with standard joint and capacity 250ml.

[D] Drying Flask: The drying flask should be suitable for powdery substances. The integrated baffles encourage through mixing and prevent crushing of the sample. The drying flask should be complete with standard joint having the capacity of 500ml.

[E] Receiving Flask: The receiving flask should be round shaped with ball joint having capacity 500 ml.

SMOKE DENSITY METER

Sl. No.	Specifications	Requirement
1.	Result compatibility	Measurement results should be fully compatible with Hartridge Smoke Unit (HSU)
2.	Range/Accuracy/Resolution	
	(A) OPACITY	
	Measuring Range	0 – 100%
	Accuracy & repeatability	$\pm 1\%$ of full scale
	Resolution	0.1 %
3.	(B) ABSORPTION	
	Measurement Range	0 – 99.00 M ⁻¹
	Accuracy & repeatability	Better than 0.10 M ⁻¹
	Resolution	± 0.01 M ⁻¹
4.	(C) RPM Sensor Magnetic Type	RPM sensor should be universal which can be work with any diesel engine (CRDI, Common Rail Engine etc)
	Measurement Range	400 – 6000 rpm
	Accuracy & repeatability	$\pm 10\%$
	Resolution	± 1 rpm
5.	(D) OIL TEMPERATURE	
	Measurement Range	0 – 150 ^o C
	Accuracy & repeatability	± 2 ^o C
	Resolution	± 1 ^o C
6.	Application	For free acceleration test only
	Calibration	Automatic (self-calibration immediately after switch – on or at the press of a key.
	Approval (India)	ARAI (Certificate should be submitted)
	Display	Digital
	Standard	LED (7 segment) 4x 15 mm)
	Linearity Check	Built in Linearity check to confirm the overall calibration of smoke Meter at any given time.
	Probes	Set of probe of three different size (10,16 and 27 mm internal diameter) to cater all size of exhaust pipe.
	Trolley	Should be trolley mounted
	Operating unit	LED Remote (with 5 m connecting cable)
	Computer interfacing	Data communication to a computer or terminal or other compatible devices is possible through built in Serial in /Out

		socket (RS – 232 Interface). Start of operation and its remote controlling is also should be via computer or Terminal or other Compatible devices.
	Automatic Calibration	Calibration should be automatic at the time of switch on along with physical calibration system with standards.
	Compliance Standard	MORTH/CMVR/TAP-115/116 issue No. 2, Part VIII

SERVER RACKS

42U, Size (mm) 2000 (ht) x 600(width) x 1000(depth).

Static weight capacity > 1000 kg.

Customizable and compatible with systems of all standard companies with proper cable route system.

SURVEILLANCE SYSTEM

Full HD 1080P IP Outdoor infrared Box Camera, 1/2.7-inch CMOS, Sensor Pixels (1920 x 1080), IR LED high efficiency array, for night viewing minimum 25 mtrs, Varifocal 3 to 9mm, DC Iris Lens, Audio Input / Output, IP66 (NEMA Type 4X) Housing, True day/night switching, WDR Impact Protection IK08, tamper/motion detection, ONVIF, UL Certified complete with wall/pole mounting arrangement and power supply.

IP Camera	Full HD 1080P IP Indoor infrared dome Camera, 1/2.7-inch CMOS, Sensor Pixels (1920 x 1080), IR LED high efficiency array, for night viewing minimum 15 mtrs, Varifocal 3 to 9mm, DC Iris Lens, Audio Input / Output, True day/night switching, WDR ,tamper/motion detection, ONVIF, UL Certified, power supply complete as per required specification.
Fish eye camera	5 Megapixel Panaromic 360degree view IP camera Audio Input / Output, IP66 Housing, True day/night switching, WDR Impact Protection IK10,ONVIF, UL Certified power supply.

STORAGE DEVICE

Stand alone Network Video Recorder of server client base video manager system including hardware and software for 32 cameras (expandable option up to 32 channel) Inclusive of 8TB Storage, Intel i3-2120 processor 1333 MHz, 4 GB memory installed, 1 x USB DVI port, onboard graphics VGA port UL Certified, including 5 Client PC License, 1 Keyboard License, 5 Forensic Search client License.

STACK MONITORING KIT

The In – Stack monitoring Kit (USEPA Method 17) should be Portable, Compact, Light Weight and user Friendly. Control Module, with Multi – Function Electronic Unit, Digital Electronic Manometer, Programmable Start and Stop facility for Sampling Pump, Digital Display for Stack Gas & Dry Gas Meter Temperatures, Light Weight Sampling Pump and Impinger Module Design Complies with Specifications, recommended by USEPA. The facility for mounting of thermocouple, pitot tube and probe together to keep all the components functional during the period of sampling is mandatory.

Stack Velocity range	:	3 to 30 m/sec
Stack temperature range	:	0 to 600 °C and 500°C to 1000°C [shall be quoted separately]
Particulate Sampling	:	At 6 to 60 lpm
Gaseous Sampling	:	At 0.6 to 6 lpm collection on a set of impingers, containing selective reagents.

Pitot Tube: Modified S- type pitot shall be fabricated from SS 304 or equivalent. The construction features should be as per USEPA method 1 to 4 & 17 (or) CPCB Doc. No. Emission Regulation [Dec. 1985] Part – III.

Sampling Probe: Fabricated from SS 304 tube of suitable diameter [not less than 15mm ID]. The lengths of the pitot tube and the sampling probes shall be decided by the users. The supplier have to quote separately for all sizes available.

Nozzles: A set of nozzles (min. 04 nos.) fabricated from SS 304 or equivalent material with internal diameter suitable to cover the full range of stack velocities. The leading edge of the nozzle should be sharp and tapered. The minimum internal diameter of the nozzle should not be less than 4mm

Thimble Holder: Filter holders fabricated from SS 304 suitable to hold cellulose/ glass fibre or other thimbles.

Thermocouple:

1. Thermocouple sensor with digital display capable of measuring temperature from 0 to 600 °C covered with acid resistant proper casing and appropriate length (same as length of pitot tube)
2. A separate suitable thermocouple with digital display capable of measuring temperature from 500 °C to 1000 °C covered with acid resistant proper casing and appropriate length (same as length of pitot tube)

Stack Gas Sampling Module:

The stack sampling console shall contain the following:

- Timer (Stop Watch)
Range 0 to 60 minutes
Minimum resolution - one second
Residual Battery Backup facility
- Temperature sensor at metering point (0 to 50 °C)

- Temperature displays with select toggle switches for display of ambient, Stack (Flue Gas) and temperature at metering point
- Rotameter (separate for Particulate and Gas)
 - a) 6 to 60 lpm for particulate monitoring and
 - b) 0.6 to 6 lpm for gaseous monitoring
- Vacuum gauge Digital or Analog, Dual Scale, range 0 to 30 psi & 0 to 1552 mmHg
- Dry gas meter should be in built. The minimum resolution of digital Dry Gas Meter should be 1 L
- A cold box with a capacity to hold at least 6 to 8 impingers shall be provided with glass impingers.
- Control panel (Console) shall have the facility for leak check with orifice or other type of control knobs.

Stack Gas Velocity Module:

For velocity measurements the module should have provision for housing of:

- Digital manometer (capable to measure in the range 0 to 1300 mm of H₂O)
- Digital pyrometer suitable for measuring ranges (0 to 600°C and 500°C to 1000 °C)

Vacuum pump: Compatible, portable, light weight, heavy duty pump capable to ensure 60 lpm effective gas flow with single phase motor, 220 ± 10 V AC, 50 Hz ± 3%.

Sample Collection Tubes (Hose) : All the sample collection hose / conduits should have push fit system to prevent leakages. The hose should be flexible and protected from outer shocks and aberrations. The length of the hoses is user selectable. Two separate sizes (10 m and 30 m) shall be quoted.

Calibration Certificates: Third party (any Nationally or Internationally Accredited Calibration laboratory) Calibration Certificates for Manometer, Rotameter, Pitot Tube, Nozzles, Thermocouple and Dry Gas Meter etc. with a validity of at least one year should be provided along with the supply.

Impingers: Four numbers of 120 ml and two numbers of 250 ml capacity Borosilicate glass impingers. Facility should be there for keeping ice at the bottom of impinger box.

Tools: A kit containing the essential tools required for connecting various components and routine maintenance shall be provided with the equipment.

Spares and consumables: The supply shall include spares and consumables for at least three years trouble free operation.

Warranty: All the components and whole kit will be under warranty for three years

TOTAL KJELDAHL NITROGEN ANALYSER (TKN Assembly)

The analyzer should be fully automatic / semiautomatic system consisting of a digestion unit, a scrubber unit, and a distillation unit.

1. Digestion unit: Automated with integrated programmable control, Should have electrically heated (230 ± 10 Volts, 50 Hz AC) metal blocks. It should be capable of providing a temperature range from 100°C - 440°C With $\pm 10^{\circ}\text{C}$ repeatability. Should have inbuilt temperature controller with digital display and LED display along-with manual temperature adjustment. Heating time setting with steps from 1- 150 minutes should have the capacity to accommodate at least eight numbers of digestion tubes each of at least 250ml 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. Proper digestion exhausts system.

2. 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 230 ± 10 Volts, 50 Hz, AC power supply

3. Distillation unit

Fully programmable distillation unit including sample dilution, alkali and receiver addition, distillation and tube draining facility. Validated procedure/ certification for TKN distillation like AOAC, EPA, DIN, ISO etc, Should be made-up of standard quality borosilicate glass. Should possess a steam generator made-up of borosilicate glass along with heater and have 3 step manual control facility i.e. standby, water inlet and distillation. Should have inbuilt bellows pump for accurate reagent (alkali / acid) dispensing. Should have ventilation valve. Should have 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 230 ± 10 Volts, 50 Hz, AC power supply. Complete unit should provided with one set of digestion tubes along-with the servicing, operating and maintenance manuals. Can able to monitor and measurement of distillate temperature. Self adjusting cooling water control facility
Safe feature for safe distillation. Can be upgradeable whenever required

Accessories: 2 set of digestion tubes, Digestion tube stand, Spillage tray for the condensers, Tube removing device

Spares: Spares and accessories for its 2 years of continuous use. Digestion tablet 1000 nos.

TOC ANALYZER

General	The analyzer should possess aqueous sample for analysis of the Total Organic Carbon [TOC], Total Inorganic Carbon [TIC] and Non- Purgeable Organic Carbon [NPOC] contents of the sample.
Technology	Method TC: Acid and Per sulphate reaction Method TIC: Acidification with Phosphoric Acid and sparging Method TOC: NPOC by heated per sulphate oxidation or TC - TIC
Standard compliance	USEPA, Standard methods, ASTM, DIN/ISO/CEN, USP and EU
Measuring Ranges	2 ppb C to 30000 ppm C
Heating	Adjustable up to 100°C in 1°C increments
Analysis Time	From 3 minutes
Oxidation Technique	Wet chemical heating persulphate, liquid sample
Option Availability	EPC, A _{toc} , data management graphic software, Windows brand PC software
Particulate Handling	Up to 750 µm
High Salt tolerance	Up to 26%
Reproducibility	1.5% Or 2 ppb whichever is greater
Calibration stability	30+ days variable with programmable auto – validation
Sample Pathway	Color coded Teflon with automatic cleaning in all injection modes
Sample injection	Manual syringe, sipper, auto sampler or on line
Sample Handling	Automatic syringe with an isolation loop to prevent contamination
Sample Injection Volume	10 µl to 10ml
IC treatment	Should be With auto sampler
Certification	CE, EMC: EN 61326 / Safety : IEC 61010-1: 2001
Operation Modes	Windows CE or networked via PC software (Windows 2000 Pro or XP Pro or better)
Operating Interface	Touch screen LCD or windows PC
Basic Software	Single instrument operation and simple data transfer to PC
A_{toc} Software	Network LAN/LIMS operation, data management, custom reports, 21 CFR 11 compliance [optional]
PC Specifications	Pentium 4, 512 MB RAM, 40 GB (1 GB HD for TOC), 1024 X 768, CD – ROM
Reagent Purge	Yes
Reagent Required	Sodium Per sulphate, 5% Phosphoric Acid, rinse water
Automatic Dilution and beginning Point	Serial / auto dilution 1: 1000, over calibration curve
Communications	Parallel and serial communications (RS 232C), Ethernet
Ana log Out put	Four, 4 to 20 mA/ 0 to 10 V
Input and Output relays	Two users programmable inputs, two users programmable out puts
Relay Out Put	For users programmable out puts
Ambient Temperature Range	10 to 45°C

Humidity	< 90% non condensing
Printer	Serial from analyzer and / or PC from A _{toc} software
Power Supply	Variable voltage inputs, 100 to 240 VAC, 50/60 Hz, 950 W
Gas Supply	<p>High pressure Stainless Steel cylinder fitted with high purity 99.99% analytical gases (as mentioned ahead) having gas capacity 7 m³ (water capacity 47 ltrs). Cylinder 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 under Gas Cylinder Rules 1981.</p> <p>Gas Cylinder should be supplied with hydraulic test certificate and explosive certificate from Chief Controller of Explosives, Nagpur. Nitrogen (99.998% purity or better), zero grade air or Oxygen (99.998%), 345 – 415 kPA, < 700 ml /min</p>

TOP LOADING ELECTRONIC BALANCE

- **Weighing Range** : At least Up to 2200 gms
- **Minimum Display** : 0.01 gm
- **Repeatability** : ≤ 0.01 gm
- **Standard Deviation** : ≤ 0.01 gm
- **Linearity** : ± 0.02 gm
- **Response Time** : 10 sec. approx.
- **Ambient Temperature** : 5 to 40 Deg.C
- **Temperature Coefficient of sensitivity** : ± 3 ppm/Deg.C
- **Pan Size** : 160 X 124 mm
- **Power Requirement** : Should operate on 220 ± 10 volts 50 Hz AC Power supply.

WATER BATH

Double walled inner chamber made of Stainless Steel and Outer wall made of mild steel sheet finished in white enamel. The Gap between outer and inner wall is filled with special grade glass wool insulation. The top cover with 12 holes of 75 mm dia. And concentric rings are made of stainless steel. Electrically operated fitted with suitable best quality heaters and with automatic cut off device when bath goes on dry. With digital temperature display cum temperature controller. On / Off switch card and plug , suitable to operate on 220V, 1Ph, 50Hz AC supply only. Temperature range above room temperature to 90 Deg.C. Size of Chamber 405 X 300 X 100mm (app.)

Water Bath with stirrer for circulation of water with speed control and uniform temperature in water bath.

WATER PURIFICATION SYSTEM

Ultrapure grade water purification system are designated to support Atomic Absorption Spectrophotometer (AAS), ICP, ICP/MS, Ion Chromatography (IC), Gas Chromatography (GC), GCMS and HPLC etc.

Standard features should include compensated and uncompensated purity measurement, volumetric or timed dispensing of ultrapure water, automatic sanitization cycle, 0.2 μ m absolute final filtration and integral pressure regulating valve.

Flow Rate	0.05 Lpm to 2.0 Lpm
Resistivity	18.2 M Ω cm @ 25°C
Conductivity	0.055 μ S/cm @ 25°C
Particles	\leq 1/ml (particle size > 0.22 μ m)
Feed Water Type	Double Distilled water from DM Unit
Feed Water	PE reservoir to purification system
Feed Water Tank	PE with vent filter vertical type, Capacity – 50 Lit, Bottom tap valve for feeding to instrument with base stand for holding Feed Water Tank.
Inlet Tubing OD	8mm Length – 2 Meter
Inlet Water Temperature	4 to 49°C
pH Range	4 to 8
Conductivity Range	< 100 μ S/cm @ 25°C
Display	Resistivity, Conductivity, Temperature and TOC
Flow Display	Range 0.5 Lpm to 3.0 Lpm
Power Source Voltage	100-230 V \pm 10%
Consumable	Requirement of consumable and frequency of replacements. Minimum 3 replacements of consumable items should be supplied with the main unit.
Warranty	Minimum 3 years from the date of installation.

WEATHER MONITORING STATION

WIND DIRECTION	<p>The sensor to provide low starting threshold, fast response and accuracy over a wide operating range in adverse environmental conditions. Specifications are as follows:</p> <p>Accuracy : $\pm 4\%$ Wind Direction Operating Range : 0 – 360 Starting Threshold : 0.5 m/s Distance Constant : 1.1 m or air maximum Damping Ratio : 0.4 at 10 initial angle of attack Temperature operating range : - 10°C to 60°C</p>
WIND SPEED	<p>The anemometer to provide a low starting, wide dynamic response and high accuracy over a wide range of wind speeds and a variety of environmental conditions. Specifications are as follows:</p> <p>Maximum Operating range : 0 – 50 m/s Distance constant : Vinyl: 1.5 m of air maximum Stainless Steel : 2.4 m of air maximum Heavy duty : 3.0 m of air maximum Temperature Range : - 10°C to 60°C Accuracy : 0.2 m/s or 1%, whichever is greater Impedance : 4.7 k ohm Power Requirement : 12VDC, 4.5 mA or 6VCD at less than 1 mA</p>
AMBIENT TEMPERATURE	<p>Temperature measurement system specifications are as follows:</p> <p>Calibrated temperature range : - 10°C to 60°C Response : 10 seconds in still air Linearity : $\pm 0.1^\circ\text{C}$ Accuracy : 0.15°C</p>
RELATIVE HUMIDITY	<p>Specifications are as follows:</p> <p>Measuring range : 0 to 100% RH Accuracy : $\pm 1.0\%$ [5 – 95% RH] Response Time : < 2 minutes for RH 10% to 90% < 5 minutes for RH 40 To 90% Typically 10 seconds Linearity : Better than $\pm 2\%$ Reproducibility : 0.5% Temperature Range : - 10°C to 60°C</p>
SOLAR RADIATION	<p>The detector should be able to measure short – wave radiation which comprises the direct component of sunlight and the diffuse component of skylight. Specifications are as follows:</p> <p>Sensitivity : 80 micro amps per 1000 W m² Temperature dependence : 0.15 % per °C Max.</p>

	Response Time : 10 microseconds Linearity : 1% from 0 to 3000 watts m ² Cosine Response : Corrected up to 80 angle of incidence Orientation : No effect on instrument performance Calibration : Calibrated against an Eppley Precision, Spectral Pyranometer [PSP] under natural day light conditions. Absolute error under these conditions is 5% maximum, typically – 3%
RAIN FALL	Measuring Range : 0.2 mm to 100 mm/hr Accuracy : ≤ 0.2mm or 1% for ≤ 50 mm /hr, 2% for > 17.50 mm/hr Temperature Operating Range : -10°C to 60°C

SPECIFICATION OF DATA LOGGER: Data Logger with 8 analog and 24 digital inputs. Ability to log channels at different intervals and should have capability of averaging and displaying real time data and averaged data over a period of 1 min., 10 min., ½ hr, 1 hr, 4hrs, 8 hrs, 24 hrs, 1 month and year. Communication between data logger and computer using standard multi drop RS 232 Connector. The data logger should have internal battery with charger. The data logger should support PSTN line or GSM modem for data transfer.

SOFTWARE FOR DATA ANALYSIS: Software should be compatible to Window XP. For analysis like averaging for different timings including daily and monthly averages, plotting diurnal variation and daily variation, making wind rose.

CHECK LIST

ENVELOP “A”	Earnest Money of requisite amount and tender cost in case of tender document is downloaded from web site.
ENVELOP “B”	<ul style="list-style-type: none"> • Technical compliance details in Annexure “1” • Company Profile. • Leaf let / brochure of the applied item. • Copy of sales tax registration number. • Copy of PAN No. • Undertaking regarding not being blacklisted. • User’s List & Performance reports etc. • Manufacturer’s authorization certificate, in case the offer is not submitted by Manufacturer. • Commercial Terms & conditions
ENVELOP “C”	<ul style="list-style-type: none"> • Price schedule for Indigenous items in annexure “4” • Price schedule for Imported items in annexure “3” • Price schedule for AMC in annexure “2”