TECHNICAL SPECIFICATION OF ADSORABLE ORGANIC HALIDIES (AOX)

SL.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	For Analysis of Adsorbable Organics Halides (AOX) and Total Organic Halides (TOX) in Environmental Samples	01				
2.0	COMPOSITION	- Main AOX Module-One Unit - EOX Module-One Unit - POX Module-One Unit - Furnace-One Unit - Scrubber-One Unit - Titration Cell-One Unit - Data work station- One Unit					
3.0	TECHNICAL SPECIFICATIONS						
3.1	System Application	The system should be capable for measurement of AOX, POX, EOX, TX in solid, liquid or gaseous samples.					
3.2	System Operation	The window based software should offer easy to use menu control for all vital parts and complete the functions of analyzer i.e. movement of quartz boat, stirrer speed, temperature control etc.					
3.3	Operating gases	Oxygen : 99.996%					
		Argon : 99.996%					
		Tubular Furnace with Heater Capacity of 600-900 watt heating temperature range ambient to 1000 ^{o}C					
3.4	Furnace	Optimum temperature should reach in less than 45 minutes					
		Furnace cooling by continuous fan assisted.					
		It should work in controllable temperature range with ± 5 ^{o}C/set temperature.					
3.5	Gas Flow Control meter	System should be equipped with gas flow control meter capable for controlling maximum flow rate 500 ml/min					

3.6	Power Requirement	The complete unit should operate electric power of 230 ±10 V.					
3.7	Scrubber	Scrubber should be capable of cleaning and drying the gaseous steam coming from the combustion tube to the titration cell.					
3.8	Titration Cell	Titration cell should comparise of generator electrode & measuring electrodes.					
		The cell should reach full stability with in 30 minutes.					
		Titration cell capacity not less than 20 ml.					
4.0	**DATA WORK STATION**						
4.1	Application Software (Features)	Capacity of regulating/control of all AOX analysis methods (Column or batch method) EOX & POX determinations through PC.					
		Software should monitor all system parameters and acquires measurement data and titration curve, allow data and results to be assessed with precision and accuracy.					
		Capable of evaluating results concentrations in ppm and ppb or less (ppt).					
		Storage of complete analysis data for future reference.					
4.2	**Computer System**						
	Computer System						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Intel Core 2 Duo processor or above					
	RAM	4 GB (Upgradeable to 8 GB)					
	HDD	500 GB ultra DMA or higher HDD (7200 RMP)					
	Monitor	19" LCD /TFT colour (Digital)					
	VRAM	500 MB or above					
	CD ROM	52x CD-ROM					

	DVD-CDRW	CD-ROM and CDRW-Combo Drive Max speed 48x24x48					
	Ports	2 Serias, 1 parallel and 2 USB Front 6 Rear USB2 PS/2 Port, 1 VGA integrated Port 1 line in/out Port.					
	Key Boards	Cordless 104 Key IBM Compatible					
	Mouse	Cordless 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 Lasers Jet Printer 1200 x1200 dpi 12 PPM black					
	Software	Pre- Loaded Windows XP Professional operating system with Licensed CD					
		MS Office 2010 Standard with media, Manual and Licensed CD					
		Preloaded Antivirus with latest version along with Licensed CD					
4.3	ANALYTICAL SPECIFICATION						
	Measuring Principle	Combustion and coulometric Titration.					
	Parameters	AOX, EOX, POX, TX					
	Measuring Range	0.1 to 50 |ig Chlorine absolute					
	Confirmation of legislation/Protocols	DIN, ISO, EPA, ASTM, CEN, SCAN, NEN, APHA					
	Methodology Package	Comprehensive DIN, EPA, SCAN, ISO, ASTM methodology package (CD-ROM) for AOX, EOX, TX in liquid, solid, soil & sludge and other environmental analysis.					
	Average Analysis Time	5-10 Minutes.					
	Sample Matrix	Liquids, Particulated Samples, Semi Solids & Solid Samples.					
	Electrolyte	75 % HAC.					

5.0	**ADDITIONAL ITEMS**						
	Bench Top Shaker	Shaker with Shake table of 18"x 12" to permit agitation of 9-12 flask (250 ml Capacity) and load capacity up to 15 kg. Simultaneously giving their contents a circular motion. RPM should be between 0 to 300 with digital display & controlled by a knob					
		Attached with a timmer can be set 5 minutes interval up to 1 hour or infinite.					
	Filteration Assembly	Consisting of Complete Glass of Components like holder funnel, 25 mm base with 25 mm sintered disc, spring clamp, 1 L Vaccum Flask.					
		Consisting of Complete glass of Components like holder funnel 47 mm base with 47 mm sintered disc, spring clamp (Steel) 2 litre vaccum flask.					
	Vaccum / Pressure Pump for Filteration assembly	One Vaccum / Pressure pump, material of construction pump head and housing made of cast aluminium, chemically resistant head and diaphragm, oil free, molded PTFE diaphragm, PTFE/Ryton head, with vaccum / pressure gauge, seprate regulators for vaccum and pressure and simple switching, vaccum capacity 24" Hg (610 mm), 30 l/min trace air displacement and pressure capacity 35 psig, free air capacity o.5 cfm, 230 Volts/ 50 Hz AC operated,					
	Oxygen & Argon Gases Cylinders	High pressure **seamless steel** cylinder filled with High purity 99.999% Argon Gas, and another oxygen gas with having Gas Capacity 7M^3 water Capacity 47 liters, cylinders are '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.** Oxygen - One Cylinder Filled Argon -One Cylinder Filled					

	Gas Regulator for Oxygen & Argon Polycarbonate membrane filters for ADX	Oxygen & Argon Gas Regulators : Best quality Double stage, Static pressure regulators fitted with two Pressure gauges, having inlet range 0-280Kg/cm^2 , Outlet range 0-16 Kg/cm^2 , made of **Stainless steel.** Oxygen -One Argon - One 5 Packets of polycarbonate membrane filters (100 membrane in each packet) with 0.4 Lim pore size) for 25 mm with no or least chloride content. 5 Packets of polycarbonate membrane filters (100 membrane in each packet) with 0.4 Lim pore size) for 47 mm with no or least chloride content.					
	Quartz frits of various diameter for filtration	Optional					
	Activated Carbon	Suitable for batch method with 100 -200 mesh size, having no or very low apparent halide background.(6x10 gm).					
	p-chlorophenol Standard Solution	200 ppm					
	Potassium Chloride Standard Solution	200 ppmf					
	Manual	Operation and Maintenance Manual for each unit					
	Electrodes Septa Kit	Two sets of generating electrode and two sets of measuring electrodes with necessary wire & Connectors One set					
	Tool Kit	One					
	Gas Purifier	High Capacity carrier Gas Purifier for Oxygen and Argon					
	Temperature Sensor Probe	4 No's with each furnace					
	Micro Pipette	50 |Ll fixed volume – two					
		100 |Ll fixed volume – two					
		1000 |Ll Variable volume – two					
	Sysringe	1 to 5 |Ll—5 Numbers					
		1 to 10 |il—5 Numbers					

		1 to 25	il—5 Numbers				
	Quartz Boat and Combustion tube	Two Quartz boat and two combustion tube (one each for AOX & EOX) in addition of one each to be provided with the system.					
	Scrubber	One additional Set.					
6.0	**OPERATING CONDITIONS**						
	Power Supply	230 ± 10 Volts; 50 ± 1 Hz AC Power supply					
	Operating Temperature	10°C to 30°C					
	Relative Humidity	20 to 80 %, non-condensing					
7.0	**OPERATION & MAINTENANCE TRAINING COMPONENT**	Two weeks training to two scientists on operation, maintenance and trouble shooting aspect of the instrument at manufacturers facility/application laboratory in India.					
8.0	**GENERAL CONDITIONS OF SUPPLY**	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 supplier / manufacturer should have Indian agent to provide after sales service. 4. The main unit and all the sub units of the instrument 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 atleast 2 years as on the date of bid opening.					

		6. The bidder should furnish the information on past supplies and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client's certificate - atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. Maximum downtime period is 48 hours					

TECHNICAL SPECIFICATIONS OF INDUCTIVELY COUPLED PLASMA SPECTROMETER (ICP-MS)

Sr.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	Application		01				
	Metals analysis up to PPB at a time All Elements of the Periodic Table from the Environmental samples						
2.0	Basic Design	ICP-MS System for analysis of trace and ultra-trace level determination of elements. Its mainframe should be bench top utilizing lab bench & saves lab space. It should have external rotary pump which fits under the bench & a single 2-stage turbo molecular pump.					
3.0	Sample introduction system	Sample Introduction system should be capable of easy switching between liquid system.					
	Nebulizer	• Glass concentric nebulizer • Nebulizer for HF medium • Mein hard nebulizer (Supply along with equipments/optional should be separately indicated).					
	Spray chamber Peristatic pump	Following types of Peltier-cooled spray chambers should be quoted spray chamber for HF medium (Supply along with equipments/optional should be separately quoted). • It should have high precision 3-channel roller pump allowing precise computer control of sample pumping.					

		• Peristatic pumps should be located adjacent to spray chamber for faster rinse in/out & minimum transfer line volume.					
	Injector	Injector for all type of samples should be quoted as standard option: Platinum/PFA injectors suitable for HF medium and other sample environments.					
	Torch	One piece, quartz torch of 2.5mm ID for efficient matrix decomposition and sample ionization. System should be capable of using a demountable torch.					
	Computer control of torch	The torch position should be fully computer controlled & auto tunable in XYZ axes with movement in each axis independent of other two. Torch position resolution & reproducibility should be 0.1 mm in all three axes.					
4.0	**Auto sampler**	Auto sampler should be manufacture by the instrument vendor or supplied from a well know supplier.					
5.0	**Plasma generator**	Digitally driven with a quartz crystal controlled generator of 27 or 40 MHz RF with range 1300-1600 watts (max) generator for efficient and superior ionization when changed from aqueous samples to organic samples.					
6.0	**Plasma ion source and plasma gas control**	Should have desired digital Mass Flow Controllers for control Plasma, auxiliary makeup and carrier gases. Consideration will be given for a system with additional mass flow controllers which could be used for future up-gradation of the system.					
7.0	**Torch Mechanism**	Ability to analyze EIE element with or without using any shield or cool plasma conditions.					
8.0	**Extraction interface : Sample and skimmer cones**	Sample and skimmer cones should be easily mountable and dismountable. Scope of supply of standard Nickel and Platinum cones.					
9.0	**Ion focusing and extraction system**	• Should be capable of minimizing interface background (<0.5 CPS in gas mode) • Lens configuration should be provide a flat					

		mass response with the best low mass transmission, should be dual mode extraction system (conventional and soft extraction)					
10.0	Lens system	• System with off -axis system or a shadow stop mechanisms. • All ion lenses should be outside the high vacuum region for easy maintenance and replacement by operator. • Lens cleaning and replacement procedure should be without the need to put off or open the main vacuum system to minimize the down time of instrument					
11.0	Collision cell and Reaction cell technology	• The temperature controlled collision reaction cell of ICP-MS must be operated effectively in collision mode, using pure He (99.999%) for all the elements in periodic table or in reactive mode using pure H2 (99.999%). •The collision cell should be capable of upgrading the gas lines if required in future. • Published international journal papers or application notes should be supplied along with technical specification of equipment used to demonstrate the applicability of the instrument proposed on pure helium and pure hydrogen. •In case if other then gases above listed are used in collision and reaction cell then it must be declared with all supporting along with application note from international journal with technical specifications. • The Instrument shall be able to be used for the multi element analysis of unknown sample containing Cl, SO4 and Organic content, without the need for any interference correction equations. All interferences shall be removable by the Cell - avoiding the need for correction equations.The ICP-MS shall be able to remove CLO interference on Venadium, to enable good V measurement in chloride matrices. The ICP-MS shall be able to be used for semi quantitative analysis in cell mode for all analytes. The					

		instrument shall demonstrate it's applicability for the trace determination of V in a chloride matrix, in cell mode.					
12.0	**Quadrupole Mass analyzer**	• Quadrupole should be resolving better resolution power. • Quadrupole is driven by fully Digital RF generator with frequency equal or greater than 2.5 MHz. • Mass range : 2-260 amu or above • Signal to noise ratio would be less than 5 cps(In No gas mode) • Signal to noise ratio would be less than <0.5cps(In gas mode)					
13.0	**Ion detector assembly**	• Discrete dynode electron multiplier type detectors that can operate in simultaneous dual-mode. • Minimum of 9 orders of linear dynamic range • Dwell time of minimum 100 Micro seconds (in both pulse count and analog modes) • Working concentration range of the detectors should be from the detection limit to 500 ppm or more with a maximum of -1000 ppm in Gas mode without any adjustment of settings such as resolution, detector voltage etc..					
14.0	**Computer system and software for system control Data acquisition and analysis**	• Branded (HP/DELL/COMPAQ) Intel IV or core-duo processor with a minimum of 3.2. GHz. • Processor speed 2 GB RAM, 1 GB Catche, 160 GB HDD, CD/DVD RW with a					

		separate graphics card that can support multiple displays with separate 1GB onboard memory. • Software package should work on a Microsoft Windows Vista or XP Professional Service pack 2 platform • Software package should be comprehensive to handle the following basic options • Acquisitions in full spectrum, peak hoping and time resolved modes • Data analysis that is supported using isotope rations, isotope dilution, external and standard calibrations with or without internal standards • Sample analysis data, calibration curve and stability of internal standard must be viewed on a single screen • Should support semi-quantitative analysis with rapid screening of unknowns • Data archival and retrieval functions • Auto tuning of the Instrument from cold start • Data reporting and Macro programming of customized analysis routines System diagnostics software • Provision for auto-alignment of the torch after routine maintenance with reproducibility better than 0.1mm in x-y-z directions • Option of Manual override provision for the above mentioned movements should be available. • Both instrument control and data analysis should be performed on the same computer					
15.0	**Performance Specification**	The CeO/Ce ratio should less than 2% in no					

		gas option and less than 1% in the gas mode. • Sensitivity of elemental mass of Yttrium (Mass: 89) must be > 100Mcps/ ppm. • Sensitivity of elemental mass of Thallium(Mass: 205) must be > 60Mcps/ ppm. • Sensitivity of elemental mass of Lithium (Mass: 7)must be >50Mcps/ ppm. • Double change ratio (Ce++/Ce+) is <3% •Collision reaction cell should perform in Helium gas mode for all elements having polyatomic interference and application notes should be provided. • Resolution of mass should be 0.7amu at 10% of peak height and this is maintained across the mass range. • Quadrupole should be driven with RF frequency >2.5Mhz. •The resolution of the quadrupole should not be changed during the analysis. • Short term stability and long term stability of the instrument should be <4% for 8hours. • Autotune facility should optimize Plasma condition, lens & cell voltages, mass resolution & mass accuracy for best ionization and sensitivity. • Semi Quantitative mode should be able to operate in collision mode to generate qualitative scan of elements in less than a minute. • The ICP-MS system should have capability to integrate any commercially available laser ablation device for routine/research applications • It should have optional provision of					

		Arsenic & Chromium speciation kits for specialized applications. It should be compatible with intelligent sequencing software at later stage. • Give the lowest Detection limits (DL) of as many elements as possible and give the conditions at which the DLs are measured. •Software should be capable of including QC check in between samples and must be able to show graphically QC control data . • To facilitate the installation requirement the installation pre requirement and installation guide should be provided along with the quotation dually stamped and signed. • All the performance specification document should be provided along with tender dually stamped and signed.					
16.0	Accessories	Microwave Digestion System should dissolve all type of samples using acid, the system should be capable of digesting minimum 12 individual samples at a time, system should be capable of further up gradation to higher sample capacity viz. More then 30 , system should have temperature and pressure control and safely lock as per the industrial standards.					
17.0	FOLLOWING ITEMS MUST BE INCLUDED IN THE MAIN SYSTEM.						
	Manual	Operation and maintenance manual for each unit.					
	Application notes	Application notes (CD-ROM) for elemental analysis in environmental, geological, metallurgical, biological and industrial samples.					
	Methodology package	Comprehensive EPA methodology package software (CD-ROM) for environmental application.					
	Standards	Multi-elemental and single element standards - One set					

	Service manual	Service manual with set of required tools for each system/unit.					
	Spare parts catalogue	One set					
	Trouble shooting charts	Trouble shooting charts of all sub units					
	Dust cover	Dust cover for all sub units					
	Operation kit	Operation kit comprising all required items pump tubings, transfer tubings, work coils etc. for start up/regular operation of instrument					
	Consumables	Consumables for three years operation of the system for main ICP unit, spare torches, nebulizer, tubing are required					
18.0	OPERATION AND 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 after work order issue.					
19.0	GENERAL CONDITIONS OF SUPPLY	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 software to be supplied should be in Englis h language. 3. The supplier / manufacturer should have Indian agent to provide after sales service and need to give the complete details of the service facility with the profile of the experts who will be responsible for the service support. 4. The main unit and all the sub units of the instrument should be serviced by the Indian representative of supplier. 5. Bidder need to give list of similar units supplied locally and worldwide, bidder should also include complete list of their installation including all models locally and worldwide with their experience for the offered model / technique. 6. The bidder should furnish the information on past supplies 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. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. Maximum downtime period is 48 hours					

TECHNICAL SPECIFICATIONS OF UV-Visible Spectrophotometer

Sr.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	For the analysis of sea water Nutrient					
2.0	COMPOSITION	• Spectrophotometer • Quartz Cuvettes • Computer Accessories					
3.0	TECHNICAL SPECIFICATIONS						
3.1	Setting wavelength range	190 ~1100nm					
3.2	Measurement wavelength range	190 ~900nm					

3.3	Wavelength accuracy	±0.3nm with auto wavelength correction	**01**				
3.4	Wavelength repeatability	±0.1 nm or better					
3.5	Wavelength scanning speed	Wavelength slew rate: about 3200nm/min Wavelength scan rate: about 900 ~160nm/min Monitor scan rate: about 2500nm/min					
3.6	Wavelength setting	At 1 nm units for scan start and scan end wavelengths, and 0.1 nm units for other wavelengths					
3.7	Lamp interchange wavelength	Auto switching synchronized with wavelength, switching range selectable between 282 ~ 393nm (0.1 nm units)					
3.8	Spectral bandwidth	6-step switching among 0.1/0.2/0.5/1/2/5nm					
3.9	Resolution	0.1nm					
3.10	Stray light	*Less than 0.015% Less than 0.0003% (220nm, NaI 10g/L solution) Less than* 0.015% Less than 0.0003% (340nm, UV-39 filter)					
3.11	Photometric system	Double-beam, direct ratio system with dynode feedback					
3.12	Photometric modes	Absorbance (Abs.), transmittance (%), reflectance (%), energy (E)					
3.13	Photometric range	Absorbance: -4 ~ 5 Abs Transmittance, reflectance: 0 ~ 999.9%					
3.14	Recording range	Absorbance: -9.999 ~ 9.999 Abs Transmittance, reflectance: -999.9 ~ 999.9%					
3.15	Photometric accuracy	±0.002 Abs (0 ~ 0.5 Abs) ±0.004 Abs (0.5 ~1.0 Abs) ±0.3%T (0 ~ 100% T)					
3.16	Photometric repeatability	±0.001 Abs (0 ~ 0.5 Abs) ±0.002 Abs (0.5 ~ 1.0 Abs) ±0.1%T					
3.17	Baseline flatness	±0.001 Abs (excluding noise, using 2nm slit, and slow					

		wavelength scanning speed)					
3.18	Baseline correction	Auto correction using PC					
3.19	Drift	0.0004Abs/h (after power is on for 2 hours)					
3.20	Temperature and humidity requirements	15 ~ 35°C, 45 ~ 80% (no condensation, less than 70% above 30°C)					
3.21	Light source	halogen lamp, deuterium lamp and built in light source auto position adjustment					
3.22	Monochromater	Grating/Grating type double monochromator, Pre-monochromator: double-blazed holographic grating Main monochromator: high-performance blazed holographic grating in aberration-corrected Czerny-Turner mounting					
3.23	Detector	Photomultiplier					
3.24	Sample compartment	Distance between light beams: 100mm Maximum light path length of cell: 100 mm					
3.25	Power requirements	AC 220 V, 50 Hz					
4.0	**COMPUTER SYSTEM**						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Intel Pentium - Core 2 Duo Processor					
	RAM	4 GB. Upgradeable to 8GB or more					
	HDD	500GB or more					
	Monitor	19" LCD/TFT colour (Digital)					
	VRAM	500 MB					
	CD ROM	52 X CD ROM					
	DVD-CDRW	CD-ROM and CDRW-Combo Drive Max speed 48x24x48					
	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB PS/2					

		Port, 1VGA integrated Port1 line in/out port,					
	Key boards	Cordless 104 key IBM compatible					
	Mouse	Cordless optical mouse with pad					
	Ethernet	32 bit auto selectable 10/100 MBPS					
	Graphics	Internet ready with integrated graphics					
	Sound	• Integrated sound card					
		• Inbuilt stereo speakers sound should be between 0 to 300 with digital display and controlled by Knob. • Attached with a timer can be set 5 minutes interval up to 1 hour or infinite.					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 12 PPM color					
	Software	Pre-loaded Windows XP Professional operating system with Licensed CD					
		MS Office 2010 Standard with media, manual and Licensed CD					
		Preloaded Antivirus with latest version along with Licensed CD					
5.0	**SOFTWARE SPECIFICATION**						
	Data Acquisition Modes	Spectrum, Kinetics and Photometric					
	General	• Multitasking (Possible to execute data processing while measurement is being executed.) • Customizable measurement screen layout (wavelengths, data display font and font size, colors, displayed number of rows) • GLP/GMP compliant (security, history) • Real time concentration display					

	Spectrum Mode	• Comparison of multiple spectra/relative processing • Save all processed data with original data set including a history of all manipulations • Spectrum enlargement/shrinking, auto scale and Undo/Redo of these operations • Annotation on spectrum screen					
	Data Processing in Spectrum Mode	• Normalization, Point Pick, peak/valley detection, area calculation • Transformations: 1st - 4th derivatives, smoothing, reciprocal, square root, natural log, logarithm power, Abs. to %T conversion, and exponential, Kubelka-Munk conversion • Ensemble averaging, interpolation, data set and constants arithmetic (between spectra and constants)					
	Photometric (Quantitation) Mode	• Single wavelength, multi wavelength (includes 1, 2 or 3 wavelengths), spectrum quantitation (peak, maximum, minimum, area, etc. for specified wavelength ranges) • Multi-point, single point, K-factor calibration curves (1st, 2nd, 3rd order function fits, pass-through-zero specification) • Photometric processing with user-defined functions (+, x, Log, Exp, etc. functions, including factors) • Weight correction, dilution factor correction, and other corrections using factors • Averaging of repeat measurement data • Simultaneous display of standard table, unknown table and calibration curves • Display of Pass/Fail indications					

	Kinetics (Time Course) Mode	• Comparison/relative data processing of multiple time course data • Single or double wavelength measurement (difference or ratio) • Simultaneous display of time course data, enzyme table and graphs • Enzyme kinetics calculation (for single or multicell) • Michaelis-Menten calculations and graph creation (Michaelis-Menten, Lineweaver-Burk, Hanes, Woolf, Eadie-Hofstee), Dixon plot, Hill plot • Unitary management of sample information including original data, sample weight and dilution factors, etc. • Event recording such as addition of reagents during measurement • Time course spectrum data processing (same as in spectrum data processing)					
	Report Generator	• Preview and print functions for customized formats • Layout and editing of templates • Quick printing using report templates • Multi-page printout support • Insert date, time, text, and drawing objects including lines, circles and rectangles • Insert spectrum and quantitation data, method and history • Headers and footers easily inserted • Specify graph line thickness (as in all modulules), font style and size					

6.0	Accessories	a. Cuvette 1ml quartz - 2 No.s b. Cuvette 3ml quartz - 2 No.s c. Cuvette 3ml glass - 2 No.s d. Cuvette 5ml glass - 1 No e. Cuvette 10ml glass - 1 No f. Holders for the above cuvettes if not provided as a standard with the instrument					
	Down time	The maximum downtime is 48 hours					

TECHNICAL SPECIFICATION OF REAL TIME CONTINUOUS AIR MONITORING STATION (FIXED STATION) HAVING SPM, RSPM, PM 25,SO_2, NOx,VOCs, BTX AND METEOROLOGICAL PARAMETERS

SL.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	Measurement of Ambient Air Quality at fixed place for the following parameters: SPM, RSPM(PM10) PM 2.5,SO2, NOx, O3,CO.NH3, VOCs, BTX & Meteorological parameters					
2.0	PERMANENT REAL TIME CONTINUOUS AIR MONITORING STATION (FIXED STATION)						

	Container type Shelter for fixed station	One	01				
	Air quality monitoring Ambient SO_2 analyser	One					
	Ambient particulate (SPM) analyzer	One					
	RSPM analyser(PM 10 analyser)	One					
	PM $_{2.5}$ analyser	One					
	NO/NO2/NOx analyser	One					
	Ozone Analyzer	One					
	VOC analyzer	One					
	Carbon Monoxide Analyzer	One					
	Ammonia Analyzer	One					
	TELESCOPIC CRANK-UP METEOROLOGICAL TOWER FOR FIXED STATION WITH FOLLOWING METEOROLOGICAL INSTRUMENTATIONS	One Set					
	Wind direction equipment	One					
	Wind speed equipment	One					
	Ambient temperature sensor	One					
	Relative humidity	One					
	Precipitation Equipment	One					
	Solar radiation detector	One					
	CALIBRATION						
	EQUIPMENTS						
	Gas Calibration System	One set					
	Meteorological, Flow and Electronics Calibration	One set					
	Calibration and Zero Gases	One set					

	Data Acquisition System with Computer	One Complete Set					
	Analytical Software	One Complete Set					
3.00	**TECHNICAL SPECIFICATIONS**						
	Continuous Air Quality Monitoring Fixed Station	Container type					
	Instrument shelter	Dimensions: Approximately L 3m x W 2m x H 2.5 m					
	Temperature with in the shelter	Should be environmentally controlled by efficient air conditioners for protection and stable operation of the instruments.					
	Housing construction	Shelter construction should be avail to withstand extreme weather condition prevailing in Gujarat.					
	Meteorological sensors	Should be mounted atop a four stage ,10mtr high crank-up meteorological tower attached to the side of the shelter.					
	Sampling probe	Heated glass sample intake manifold with 10 ports and blower.					
		Teflon and Stainless steel sample handling valve train and sample lines should be provided with the shelter.					
		Sampling inlet for continues particulate monitor shall be installed 2 mtr above the shelter roof passing through the roof directly to the monitors.					
		A PVC exhaust manifold vented to the bottom of the shelter should be provided to prevent exhaust case from building up inside the shelter					
	Gas bottle rack	Gas bottle rack for securing expandable gas cylinders					

	Meteorological tower	Meteorological mast on side of the shelter					
	Power supply	220 V AC ,50 Hz					
	Power condition	Appropriate power conditioning capacity sufficient to assure uninterrupted power of sufficient quality to avoid data loss and to meet instrument /analyzers requirement					
	Working bench	Working bench of suitable dimension with the storage shelf and filing cabinets and desk light to be provided					
		Telephone jacks and additional electric point to be provided on the working bench					
	Interior lighting	Energy saving interior lighting ports mounted in the roof					
	Smoke sensor	Smoke detector to be provided					
	Fire Safety	Fire extinguisher one no to be provided					
	Analyzer mounting	Vertical instrument rack to be provided					
	Door entry	Heavy duty temper proof lockable door					
	Flooring	High quality vinyl floorings with wood paneling on the walls					
	Insulation	Insulated walls sealing and floor minimum R-16 rating					
	Exhaust manifold	PVC exhaust manifold					
	Shelter roof suitable as sampling platform	Shelter roof should be constructed as a sampling platform suitable for frequent mobile laboratory operator /Technicians use with non skid meter					

		Safety railing shall extend around the roof and exterior ladder to be provided for approach from ground to the roof.					
	UPS system	Appropriate capacity UPS system with battery backup to be provided for Air quality monitors, data loggers, inlet pumps for continues operation of minimum one hour duration.					
4.00	AIR QUALITY MONITORS						
	Sulphur dioxide (SO_2) analyzer	Microprocessor control rack mountable analyser with automatic calibration using an optional gas dilution calibrator and calibration gas standards.					
		Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Principle	Pulse UV Fluorescence					
	Ranges	0-1 ppm resolution 0.001 ppm or 0.1% Reading					
	Noise (at 0)	< 0.25 ppb or 1% reading which ever is less					
	Lower detection limit	<0.50 ppb or 0.2% of concentration reading					
	Total interference Equivalent	< 12 ppb					
	Zero drift	Less than 1 ppb/7 days and less than 1 ppb/24 hours					
	Span drift	Less than 0.5% / 24 hours					
	Lag ti me	Less than 10 sec					
	Rise time	Less than 60 sec to 95 %					
	Fall time	Less than 120 Sec to 95 %					

	Precision	0.5ppb or 1 % reading					
	Sample flow rate	0.5 ipm(nominal)					
	Temperature range	5 to 45 deg C					
	Digital output	DB50 status and multi drop RS 232 ports					
	Analog output	3 analog output 0-1 V, 0-10 V, 0-20 V or 4-20V					
	Power	220 V AC 50 hz					
	Chassis	Rack mounted 19 inch.					
	Consumable and spares	Requirement is for 3 years operation					
4.2	**Nitrogen Oxide/Oxides of Nitrogen/Nitrogen Dioxide ($NO/NO_2/NO_X$)**	Microprocessor controlled rack mountable analyzer with automatic calibration using an external gas dilution calibrator and calibration gas standards.					
		Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Principle	Chemiluminescence's					
	Ranges:	Auto ranging 0-2.0 ppm, resolution 0.001 ppm or 0.1% readi ng					
	Noise (at zero):	Less than 0.25 ppb or 1% reading whichever is less					
	Lower Detectable Limit:	Less than 0.5 ppb					
	Zero Drift:	Less than 1 ppb/ ppb/24 hours, 1 ppb/30 days					
	Span Drift:	Less than 1 ppb - 24 hours					
	Lag Time:	Less than 25 sec					

	Rise/Fall Time:	Less than <30 sec					
	Precision:	1 ppb or 1 % of reading					
	Sample Flow Rate:	0.6 lpm (nominal)					
	Temperature Range:	5 to 45°C					
	Analog Output	3 analog output 0-1 V, 0-10 V, 0-20 V or 4-20V					
	Digital Outputs:.	DB50 status and multi-drop RS-232 ports					
	Power:	220 VAC 50 HZ					
	Chassis:	Rack mounted, 19 inch.					
4.3	**Carbon Monoxide (CO) Analyzer**	Microprocessor controlled rack mountable analyzer with automatic calibration using an external gas dilution calibrator and calibration gas standards.					
		Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Principle	Non-Dispersive Infrared Photometry - Gas Filter Correlation					
	Display	Digital					
	Ranges:	Auto ranging 0-100 ppm, resolution 0.01 ppm or 0.1% readi ng					
	Noise (at zero):	Less than 0.03 ppm or 1% of reading					
	Lower Detectable Limit:	Less than 0.06 ppm or 0.2% of concentration					
	Zero Drift:	Less than 0.1 ppm/24 hours, 0.2 ppm/30 days					

	Span Drift:	Less than 1.0% full scale in 24 hours					
	Lag Time:	Less than 30 seconds					
	Rise/Fall Time:	Less than 60 seconds					
	Precision:	0.1 ppm or 1% of reading					
	Linearity	Continuous ±1%					
	Sample Flow Rate:	0.5-2.0 lpm (nominal)					
	Temperature Range:	5 to 45°C					
	Rejection Ratio:	Negligible interference from H2O vapor and CO2					
	Digital Outputs:	DB50 status and multi-drop RS-232 ports.					
	Power:	220 VAC 50 HZ					
	Chassis:	Rack mounted, 19 inch.					
4.4	**Ozone (O_3) Analyzer**	Microprocessor controlled rack mountable analyzer with automatic calibration using an external gas dilution calibrator and calibration gas standards					
		Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Principle	UV Photometric					
	Display	Digital					
	Ranges:	Auto ranging 0-1.0 ppm, resolution 0.001 ppm or 0.1% readi ng					
	Noise (at zero):	Less than 0.50 ppb or 1% of reading					

		whichever is less					
	Lower Detectable Limit:	Less than 1 ppb or 0.1% of reading					
	Zero Drift:	Less than 1 ppb/12 hours, 1 ppb/30 days					
	Span Drift:	Less than 1%/24 hours					
	Lag Time:	Less than 20 sec					
	Rise/Fall Time:	Less than 60 sec					
	Precision:	1 ppb or 1 % of reading					
	Linearity	Continuous ±1%					
	Sample Flow Rate:	0.5 lpm (nominal)					
	Temperature Range:	5 to 45°C					
	Analog output	3 analog output 0-1 V, 0-10 V, 0-20 V or 4-20V					
	Digital Outputs:	DB50 status and multi-drop RS-232 ports.					
	Chassis:	Rack mounted, 19 inch.					
4.5	**Volatile Organic Compounds (VOC) Analyzer**						
	Principle	Automated gas chromatographic/PID analysis of up to eight (8) VOC compounds including benzene, toluene, ethyl benzene, m-, o- and p-xylene. 1-3 butadiene using a microprocessor.					
	Display	Digital					
		Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Ranges:	0-100, 0-200 or 0-1,000 ug/m3					

	Measurement Cycle	15 or 30 minutes, selectable					
	Noise (at zero):	Less than 0.2% of reading					
	Lower Detectable Limit:	0.5 ug/m3 for 15 minute cycle; 0.25 ug/m3 30 minute cycle					
	Rise/Fall Time:	95% of final value within 300 seconds					
	Precision:	Better than 1 ppb or 1 % of reading					
	Sample Flow Rate:	70 ml/min (nominal)					
	Temperature Range:	10 to 35°C					
	Analog Outputs:	Selectable 0-1VD, or 0-10VDC with serial port RS-232.					
	Power:	220 VAC 50 HZ					
	Carrier & PID Gases:	Nitrogen					
	Case:	Rack mount, 19 inch.					
	Data Management Software:	Windows OS.					
4.6	**Ammonia (NH_3) Analyzer**	Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Principle	NH conversion to NO by oxidation. NO in the air stream is also converted to NO. The difference obtained by measuring NO in the output of the two sample streams is equal to the NH_3 concentration					
	Display	Digital					
	Ranges:	Auto ranging 0-2 ppm, resolution 0.001 ppm or 0.1% readi ng					

	Noise (at zero):	Less than 0.2% of reading					
	Lower Detectable Limit:	Less than 0.1% of reading					
	Converter Efficiency:	Better than 98% NH3 to NO conversion					
	Zero Drift:	Less than 0.2 ppb/oC; less than 0.005ppm 24-hours					
	Span Drift:	Less than 0.2%/oC; less than 1% of reading / 24-hours.					
	Lag Time:	Less than 120 sec					
	Rise/Fall Time:	95% of final value within 300 seconds					
	Precision:	Better than 1 ppb or 1 % of reading					
	Sample Flow Rate:	350 ml/min (nominal)					
	Temperature Range:	5 to 40°C					
	Analog Outputs:	Selectable 100mv, 1V, 5V or 10VDC with serial port RS-232 and DB50 ports. Independent outputs for NH3 and NH3+NO+NO2 channels.					
	Power:	220 VAC 50 HZ					
	Case Rack mount	, 19 inch					
4.7	**Continuous Ambient Particulate (both PM_{10} and**	Real time analyzer capable of measuring PM-10/2.5 with calibration facility.					
	PM) Analyzer	Conforming to USEPA AUTOMATED FEDERAL					
	2.5	REFERENCE METHOD					
	Principle	True Micro Weighing					
	Display	Digital					

	Range: Resolution:	0- 5,000,000 ug/m3 0.1 ug/m3					
	Precision:	±1.5 ug/m3 (1 hour avg.), ±0.5 ug/m3 (24 hours)					
	Accuracy:	±0.75 % (mass measurement)					
	Measuring Cycle:	Real time mass concentration					
	Temperature:	1 to 60°C					
	Data Output Rate:	less than 60 seconds					
	Out Value:	Mass concentration in terms of volumetric flow rate					
	Output:	DB50 status and multi-drop RS-232 ports					
	Power:	220 VAC, 50 Hz					
	Inlets:	Separate PM10 & PM2.5 inlets					
4.8	**High Volume PM-10 Particulate Analyzer**	Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Vacuum Supply:	Squirrel cage motor without brushes or axial blower with model GB1 carbon brushes with sealed bearing ensuring maintenance free continuous operation. All parts shall be corrosion resistant.					
	Display	Digital					
	Flow Rate:	Constant flow rate of 40ACFM					
	Flow Control Accuracy:	±2.5 % deviation over 24 hour					
	Flow Controller:	Sensor controlled, not sensitive to high humidity and temperature.					
	Filter Media:	Standard 8-in.x 10-in. Glass or quartz					

		fiber filter media					
	Filter Holder:	Heavy-duty corrosion resistance, leak proof frame designed to accommodate filter media.					
	Ti mer:	Programmable timer					
	Sampler Housing:	Heavy-duty powder coated or marine grade anodized aluminum housing.					
	Size Selective Inlets:	PM10 and PM2.5 to be provided					
	Power Required:	220 VAC, 50 Hz.					
	Flow Calibration:	Complete kit required					
	Filter Media supplies:	1200 units					
4.9	**Low Volume PM-2.5 Particulate Analyzer**	Conforming to USEPA AUTOMATED FEDERAL REFERENCE METHOD					
	Display	Digital					
	Inlet:	WINS Impactor					
	Flow Rate:	Fixed at 16.67 lpm					
	Flow Control:	+- 5% of 16.67 lpm with CV of < 2%					
	Filter Media:	47mm PTFE Teflon					
	Data Storage:	> 15 days of 5-minute interval average flow data and 50 events					
	Sampler Controls:	Keypad with system menus to program sampling schedules					
	Data Port:	RS-232 serial port for data retrieval					
	Filter Media supplies:	2400 units					
5.0	**METEOROLOGICAL INSTRUMENTATION**	The supplier will provide and properly install meteorological sensors for wind speed, wind direction, temperature, precipitation, solar radiation, and					

		relative humidity					
		All meteorological equipment should comply with highest international standards.					
5.1	**Wind Direction**	Sensor has to provide low starting threshold, fast response and accuracy over a wide operating range in adverse environmental conditions.					
	Display	Digital					
	Accuracy:	+/- 4%					
	Wind Direction Operating Range:	0 to 360 degrees					
	Starting Threshold:	0.5 m/s					
	Distance Constant:	1.1 m of air maximum					
	Damping Ratio:	0.4 at 10 initial angle of attack					
	Temperature Operating Range:	-40°C to 60°C					
5.2	**Wind Speed (anemometer)**	Has to provide a low starting threshold, wide dynamic response and high accuracy over a wide range of wind speeds and a variety of environmental conditions.					
	Display	Digital					
	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:	3m of air maximum					
	Temperature Range:	-40°C to 60°C					
	Accuracy:	0.2 m/s or 1%, whichever is greater					
	Threshold:	0.22 m/s (0.5 mph)					
	Impedance:	4.7 k ohm					

	Power Requirement:	12 Vdc, 4.5 mA or 6Vdc at less than 1 mA					
5.3	**Ambient Temperature**						
	Display	Digital					
	Calibrated Temperature Range:	-50°C to 60°C					
	Response:	10 seconds in still air					
	Linearity: Accuracy:	+0.1 °C 0.15°C					
5.4	**Relative Humidity**						
	Display	Digital					
	Operation:	Tipping bucket operation					
	Operating Range:	0-100 mm					
	Resolution:	0.25 mm					
	Dimensions:	8 inch diameter orifice					
	Accuracy:	+/- 3% at 7-250 mm per hour					
5.5	**Barometric Pressure**						
	operating range	800-1100bar					
	Proof Pressure	2bar					
	Operating temperature	-10 to 60 deg C					
	Compensation Temperature range	-10 to 60 deg C					
	Non Linearity	0.1% FS					
	Repeatibi lity	0.2% FS					
	Temperature shift	0.3%FS /10 deg C					
	Response time	1 m sec					
	Long term stability	-0.1%FS					
5.6	**Solar Radiation**	Detector should be able to measure short-wave radiation, which is					

		comprised of the direct component of sunlight and the diffuse component of skylight.					
	Display	Digital					
	Sensitivity:	80 micro amps per 1000 W m2					
	Temperature Dependence:	0.15% per C max					
	Linearity:	1 % from 0 to 3000 watts m2					
	Response Time:	10 microseconds					
	Cosine Response: Orientation:	Corrected up to 80 angle of incidence 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%					
5.7	**Telescoping Crank-up Meteorological Tower**						
	Extended Height:	10 meters					
	Retracted Height:	Less than 3 meters					
	Wind Load Limit:	8.5 sq. ft at 50 mph					
	Number of Sections: Construction Materias:	4 Galvanized steel or aluminium					
6.0	**CALIBRATION EQUIPMENTS**	Calibration equipments should be provided for the calibration of the air quality analyzers, particulate samplers, data acquisition system, meteorological equipment, and gas calibration system.					

6.1	**Gas Calibration System**	The calibration system for the air monitoring equipment (listed above) should incorporate an automatic gas dilution calibrator, calibration gas standards, and a high performance zero air generator to calibrate all of the analyzers in the system. The calibration cycles should be configurable through the Data Acquisition System at any specific time during the day or night.					
		The dilution calibrator should be able to perform mixing of source gas (from the calibration gas bottles) with zero air (from the zero air generator) in order to generate a wide range of calibration gas concentrations and minimizing the number of calibration gas standards required.					
6.2	**Meteorological, Flow, and Electronics Calibration**	should provide calibration devices for all the meteorological and other electrical equipment					
	Wind Direction Calibrator	Degree Wheel					
	Telescopic	Orientation Sight					
	Wind Speed Sensor Accuracy -	Synchronous Motors					
	Temperature -	Precision Resistors and Thermometers					
	Aneroid Pressure Calibrator	Portable					
	Relative Humidity Calibrator	To be Provided					
	Data Acquisition System -	Voltage, Frequency, Resistor Standards and Calibrated Multi-meters					
	Calibrator Flow -	NBS Traceable Bubble Meter and Flow with Water Manometer					
	Gases -	EPA Protocol NBS Traceable 2% of					

		Analysis					
6.3	Calibration and Zero Gases	Must be equipped with zero-air generators and span gas dilution systems that can be activated by the DAS system. The gas dilution calibrator must provide a simple means of obtaining precise gas dilution calibrations for each of the instruments The calibrator must provide gases for precision checks and gas phase titration. Front panel-accessed or station PC-accessed setup system for single point or multipoint instrument calibrations Remote control provided via the DAS Mass Flow controller zero stability of less than 0.6% of full scale per year Not less than four (4) external span gas tank connections Stable, internal ozone generator to provide ozone precision checks					
7.0	DATA ACQUISITION SYSTEM	Provide and install data acquisition systems (hardware and software) that run on Windows operating systems The system should provide full control over the entire system enabling automatic calibration cycles to be performed and system errors to be detected and reported. Data acquisition system should feature automatic data validation software complete with data capture percentage. Should preferably collect data directly from the instruments in digital format. Data Acquisition System (DAS) should					

		be able to collect and store meteorological data and air quality data from all instruments DAS should be a low powered data logger designed to be used for recording and storing data. Industry Standard RS-232 Communication enables digital/analog communication with all supported monitoring and meteorological equipment. Supports remote communication enabling full control over the pollution monitoring system and direct interfacing with supported analyzers. Online and remote communication through radio, switched telephone, cellular telephone, as well as short hauls modems. Data storage space for minimum thirty (30) days of five (5) minute historical data. Captures minimum, maximum, average values and standard deviations. Lightning & surge protection facilities. Full control over calibration cycle periods Password protection					
8.0	**COMPUTER SYSTEM**						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor RAM	Intel Pentium - Core 2 Duo					

		Processor 4 GB. Upgradeable to 8GB or more					
	HDD	500GB or more					
	Monitor	19" LCD/TFT colour (Digital)					
	VRAM	500 MB					
	CD ROM	52 X CD ROM					
	DVD-CDRW	* CD-ROM and CDRW-Combo Drive Max speed 48x24x48					
	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB front 6 Rear USB PS/2 Port, 1VGA integrated Port1 line in/out port,					
	Key boards	Cordless 104 key IBM compatible					
	Mouse	Cordless optical mouse with pad					
	Ethernet	32 bit auto selectable 10/100 MBPS					
	Graphics	Internet ready with integrated graphics					
	Sound	• Integrated sound card • Inbuilt stereo speakers sound should be between 0 to 300 with digital display and controlled by Knob. • Attached with a timer can be set 5 minutes interval up to 1 hour or infinite.					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 12 PPM color					

	Software	Pre-loaded Windows XP Professional operating system with Licensed CD MS Office 2010 Standard with media, manual and Licensed CD Preloaded Antivirus with latest version along with Licensed CD					
	Analytical Software	Provide and install data collection, evaluation and, reporting systems (including required remote connections, hardware and software) to interrogate and control each station's data acquisition system and collect data into a centrally-located computer at local and at national level. Collection systems should simplify the tasks of automatically and manually retrieving and viewing measurement data, collating and storing data into a central database at city and national level, and evaluating and summarizing data into comprehensive reports. It should be capable of real-time viewing of measurement and diagnostic data and control calibration sequences and other system functions. The system should also be able to retrieve information directly from the station's data acquisition system following validation and support remote communication with full user interface via a TCP/IP network or dial up network. Data collection, evaluation and reporting systems should be able to collect and process data from a wide variety of					

		data acquisitions systems. The system shall compute and report, in a daily summary format, concentrations of all pollutants. The system shall also calculate and report the air quality index Software should be able to generate graphs and reports in the standard Windows format in definable periodic categories including hourly, daily, weekly, monthly and yearly Line and Bar Graphs of Average, Maximum and Minimum, of Running Averages, of Standard Deviation, of Percentile, of Log Mean. Reports and graphs of Average Pollution Plots, Percentage Pollution Concentrations, Frequency Distribution Histogram, Cumulative Frequency Distribution, Wind Rose, Polar Scatter Plots, and Pollution Indices. Supplier will include regular upgrades of software and/or replace software if required and provide full documentation of the DAS-data system including how reported pollutant averaging times and air quality standards are done. Windows OS compatible. File format conversation					

		Statistical analysis of data for maximum, minimum, average, standard deviation for various time intervals using the monitored data. Tabular and graphical format for report production. Wind rose graphs. File export facility. Windows based printer support.					
9.0	INSTALLATION	Whole system shall be tested and an inspection report based on ISO-9001 procedure be prepared and made available prior to shipment by the supplier. Shall install and operationalize all of the components of the monitoring system by factory trained service engineers Will calibrate all installed air quality monitoring equipments and meteorological sensors. Supplier will also carry out a detailed equipment and system's check to ensure proper installation and operation of all components for seven (7) days. Final hand-over will be formally verified through official certification of the 'acceptance certificate'. Supplier must possess all necessary items such as sample manifold, sample intake, instrument rack,					

		exhaust manifold, tubing, connections, etc. for complete general assembly of the equipment in all stations. Two (2) sets of manuals and drawings (Pneumatic, Mechanical, Electrical) depicting connections should be provided in English					
10.0	OPERATION AND MANTAINANCE TRAINING AT THE TIME OF INSTALLATION	Supplier shall provide on-job training for technical staff					
		The training program should be conducted by and include supplier's staff, local agent or distributor					
		Training course will be conducted in English. And all documentation should be provided in English Minimum One Week of Equipment basics, maintenance, calibration and diagnostics to be provided to Engineers and technicians of the board					
		One week of additional; training of Description, operation, maintenance and calibration of equipment to ensure proper data quality with maximum efficiency to be provided to Engineers and technicians of the board					
		Training will also include actual measurement, recognition of bad data, maintenance and calibration should be performed using manuals and actual equipment supplied.					
		One week of additional training to					

		understand Procedures necessary for proper data acquisition, quality assurance and quality control. Learn to use software, perform basic functions and recognize and solve basic problems to be provided to Engineers and technicians of the board					
		One week of additional training to understand description, operation, maintenance and calibration of equipment to ensure proper data quality with maximum efficiency to be provided to Engineers and technicians of the board. Actual measurement, recognition of bad data, maintenance and calibration should be performed using manuals and actual equipment supplied.					
	OPERATION AND MAINTENANCE TRAINING ABROAD	The supplier has to impart on-site operation trainings as detailed above at the time of installation followed by Complimentary (all expenditure inclusive) two week training to three scientists on application, Routine maintenance and software training at their application laboratory in India.					
11.0	SPECIAL CONDITIONS	Supplier to make sure the availability of all equipments, parts, and consumables for a period of at least 5 years					
		Any reasons, the supplier/manufacturer either changes or goes out of business, it must provide the Purchaser with design plans necessary for the alternative production of all needed spare parts					

		and consumables					
12.0	GENERAL CONDITIONS OF SUPPLY	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 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 instrument 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 on past supplies 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. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. Display of on line parameters should be connected between location of station and head office. 11. The maximum downtime is 96 hours for this equipment					

Inspections and Tests

Manufacturer's test and inspection certificate to be provided along with the supply.

Inspection and tests prior to shipment of Goods and at final acceptance are as follows:

(i) **Inspection:** The Drawing of each of the equipments is to be certified by a qualified expert as may be nominated by the Member Secretary, State Pollution Control Board, Odisha - Bhubaneswar. The equipments shall be inspected at the manufacturer's place, prior to dispatch and also after successful installation at ICZMP Project Paradeep by the supplier / Manufacturer expert. Such agency shall take the inspection and clearance certificate from the said qualified expert as nominated by the Member Secretary will be a mandatory document for release of payments.

(ii) The inspection of the goods shall be carried out to check whether the instruments are in conformity with the technical specifications contained in the bid document and attached with the letter of acceptance and shall be in line with the inspection/test procedures laid down in the technical specifications and the ,manufacturer's warranty certificate. The purchaser will test the equipment at the manufacturer's place before dispatch and also after completion of the installation and commissioning at the site of the installation. For site preparation, the supplier should furnish all details to the purchaser sufficiently in advance so as to get the works completed before receipt of the equipment. Complete hardware and software as specified should be supplied, installed and commissioned properly by the supplier prior to commencement of performance tests.

(iii) The acceptance test will be conducted by a committee chaired by The Member Secretary, Odisha State Pollution Control Board, Bhubaneswar with following members will inspect and make recommendation on the specification for acceptance.

a. Nodal Officer cum Project Coordinator, ICZMP on behalf of State Pollution Control Board, Odisha, Bhubaneswar
b. Scientific Experts from Different Institutes of Odisha as desired by MS, SPCB, BBSR
c. APD Operation, SPMU, ICZMP
d.. APD Finance, SPMU, ICZMP
e. Procurement officer, SPMU, ICZMP
f. Scientists from Laboratory of SPCB, Odisha

At its option the committee can co-opt any other subject matter specialist to facilitate the inspection. The acceptance will involve trouble- free operation for seven consecutive days. There shall not be any additional charges for carrying out acceptance tests. No malfunction, partial or complete failure of any part of hardware or excessive heating of engines and sub-systems attached to instruments should occur. The supplier shall maintain necessary log in respect of the results of the tests to establish to the entire satisfaction of the purchaser, the successful completion of the test specified. An average uptake efficiency of 98% *(to modify as considered appropriate for each case)* for the duration of test period shall be considered as satisfactory.

(iii) In the event of the hardware and software failing to pass the acceptance test, a period not exceeding two weeks will be given to rectify the defects and clear the acceptance test, failing

which the purchaser reserves the rights to get the equipment replaced by the supplier at no extra cost to the purchaser

Manuals and Drawings

(a) Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation and maintenance manuals together with drawings of the goods and equipment. These shall be in such detail as will enable the Purchaser to operate, maintain, adjust and repair all parts of the works as stated in the specifications.

(b) The manuals and drawings shall be in the ruling language (English) and in such form and numbers as stated in the contract.

(c) Unless and otherwise agreed, the goods and equipment shall not be considered to be completed for the purpose of taking over until such manuals and drawings have been supplied to the Purchaser.

For the System and Other Software the following will apply:

The Supplier shall provide complete and legal documentation of hardware and all subsystems so necessary for operation of the equipments.. The supplier shall also indemnify the purchaser against any levies/penalties on account of any default in this regard.

Acceptance Certificates:

(a) On successful completion of acceptability test, receipt of deliverables etc, and after the purchaser is satisfied with the working on the equipments, the acceptance certificate signed by the supplier and the representative of the purchaser will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the systems.

(b) The training as specified in Technical Specifications shall be conducted on the dates mutually agreed upon and within two months from the date of acceptance of supply.

TECHNICAL SPECIFICATION OF ENERGY DISPERSIVE X-RAY FLORESCENCE (EDXRF) SPECTROMETER

Sl.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	INSTRUMENT COMPOSITION						
	X-Ray Source	One set					
	Fluorescers	One set					
	Detector	One set					
	Sample Chamber	One set					
	Bench Top ED-Computer Data Station	One set					
2.0	TECHNICAL SPECIFICATIONS						
2.1	System	ED-XRF System for trace metal analysis of Particulate Matter collected on filter papers, solid waste, semi solid waste, thin film, solid material, powdered material, fused bead state etc under vacuum and/or helium atmosphere					
	Analysis Range	Perform multi element analysis on samples in sub ppm levels with all analysis parameter changes automated by the computer					
2.2	X-Ray Source Power	X Ray tube/generator to provide at least 500 watts of power or higher					
	Potential	Operate to maximum potential of at least 100 kV, adjustable in steps of 1 kV or less.					
	Current	Atleast 10 mA.					
	Selection of kV and mA	Computer selectable and adjustable.					

	Transmission Filters	Computer controlled automated beam transmission filters					
	Protection	Fully protected against potential, current and power overloads					
2.3	**Secondary Target or Fluorescers**	Provision for getting polarized X-rays for analysis of trace elements in sub ppm level.					
2.4	**Detector**	Solid-state detector for the full analytical range for environmental analysis					
	Resolution	145 eV or better at Manganese Radiation					
	Cooling	100% efficient liquid Nitrogen / Peltier cooled detector					
	Energy range	Energy range from 1 to 100 keV					
	Count rate	Maximum count rate 10^6 cps or better.					
2.5	**Counting Electrons**	Multi channel analyzer with 10,000 channels or more					
2.6	**Sample chamber**	Sample chamber shall be configured to analyse in air, vacuum and helium environments					
	Vacuum pump	Suitable vacuum pump must be supplied with spectrometer.					
	Helium atmosphere	For use in helium atmosphere, all fittings and regulators necessary for connection to the Helium cylinder must be supplied					
	Analytical selection	Computer controlled and user selectable analysis environment					
	Sample holder	Capable of accommodating 47 mm Teflon filters in planar geometry					
	Sample tray	Capable of simultaneously holding at least 30 or more sample holders of different kinds like air filters, pallets etc.					
2.7	**Minimum Detection limits**						
	Air filter paper	As per Annexure ^A', Minimum detection limit for soil/sediment, solid material sample may be specified by bidder.					

3.0	**COMPUTER SYSTEM**						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Intel Core 2 DUO Processor or above					
	RAM	4 GB (upgradeable to 8 GB)					
	HDD	500 GB ultra DMA or higher HDD (7200 RMP),					
	Monitor	19" LCD/TFT Colour Monitor (Digital)					
	VRAM	500 MB or above					
	CD ROM	52x CD-ROM					
	DVD-CDRW	CD-ROM and CDRW-Combo Drive Max speed 48x24x48					
	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB2 PS/2 Port, 1VGA integrated Port1 line in/out port,					
	Key board	Cordless 104 Key IBM Compatible					
	Mouse	Cordless Optical mouse with pad					
	Ethernet	32 bit auto selectable 10/100 M BPS					
	Graphics	Internet ready with integrated Graphics					
	Sound	Integrated sound card and inbuilt stereo speakers					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 0r above					
	Software's	Pre-loaded Windows XP Professional operating system with Licensed CD MS Office 2010 Standard with media, manual and Licensed CD Preloaded Antivirus with latest version along with Licensed CD					

<table>
<tr><td>4.0</td><td>ESSENTIALCALIBRATION STANDARDS</td><td>Calibration standards for filter paper / thin film for following elements will be provided
<table>
<tr><th>Element</th><th>Element</th><th>Element</th><th>Element</th></tr>
<tr><td>Na</td><td>Pb</td><td>Co</td><td>Se</td></tr>
<tr><td>Mg</td><td>V</td><td>Ni</td><td>Cd</td></tr>
<tr><td>Si</td><td>Cr</td><td>Cu</td><td>Sn</td></tr>
<tr><td>K</td><td>Mn</td><td>Zn</td><td>Sb</td></tr>
<tr><td>Ca</td><td>Fe</td><td>As</td><td></td></tr>
</table></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5.0</td><td>OPTIONAL ITEM</td><td>Calibration standards for solid/solid waste/semi-solid waste/powdered material for following elements may be provided as optional item:</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.0</td><td>ADDITIONAL ITEMS</td><td>Manufacturers standard operation kit including all required items, fittings for start up / regular operation of instrument
Ca Cr Fe Ni Zn Se Sn
Operation and maintenance manual for each unit.
Spares and consumables for two year of operation.
Analytical manual including applications for various system
Service manual with one set of required tools for each sub-system/unit
Trouble shooting charts spare charts catalogue</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Application notes for trace metal analysis in</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>environmental, biological, geological, metallurgical and industrial samples</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Dust cover</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>7.0</td><td>INSTALLATION</td><td>The vendor shall provide installation, system checks of the spectrometer and all accessories and energy calibration.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.0</td><td>OPERATION AND MAINTENANCE TRAINING</td><td>One week of informal on-site training on the use and operation of the instrument completion of installation followed by complimentary (all expenditure inclusive) one</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

		week training to two scientists on software training, operation, maintenance and trouble shooting aspects of instrument at its application laboratory abroad.					
9.0	GENERAL CONDITIONS OF SUPPLY	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 supplier / manufacturer should have Indian agent to provide after sales service. 4. The main unit and all the sub units of the instrument 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 atleast 2 years as on the date of bid opening. 6. The bidder should furnish the information on past supplies and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client's certificate - atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The Maximum downtime period is 48 hours					

Detection limit for filter papers (EPA Method No.IO 3.3)

Annexure A'

Element	Detection Limit	
	ng/cm^2	ng/m^3
Na	5.3	1.59
Mg	3.2	0.96
Al	17.6	5.29
Si	8.0	2.41
P	2.6	0.78
S	2.6	0.78
Cl	4.8	1.44
K	6.3	1.89
Ca	9.0	2.71
Sc	1.5	0.45
Ti	16.9	5.08
V	5.3	1.59
Cr	3.0	0.90
Mn	0.8	0.24
Fe	0.7	0.21
Co	0.4	0.12
Ni	0.6	0.18
Cu	0.7	0.21
Zn	1.0	0.30

Ga	1.6	0.48
Ge	1.1	0.33
As	0.8	0.24
Se	0.7	0.21
Br	0.6	0.18
Rb	0.7	0.21
Sr	1.1	0.33
Y	1.2	0.36
Zr	1.2	0.36
Mo	1.6	0.48
Rh	25.9	7.79
Pd	22.9	6.89
Ag	20.2	6.02

Based upon sampling for24 hours at sampling rate of 1.0 m^3/hour

TECHNICAL SPECIFICATION OF GAS CHROMATOGRAPH WITH ELECTRON CAPTURE DETECTOR (GC-ECD)

Sl. No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	For Analysis of Trace organics, contaminants, such as Pesticides, PAH, and other organics in Environmental Samples.					
	INSTRUMENT COMPOSITION						
2.0	Gas Chromatograph	One set					
	Capillary Column with accessories	One set each of specified columns					
	ECD Detector	One set					
	FPD Detector	One set					
	FID Detector	One set					
	GC Data Station	One set					
3.0	TECHNICAL SPECIFICATION						
3.1	GC System	Computer controlled Data Workstation based computer compatible (GC). Built in Diagnostics and Comprehensive Self-Testing					
3.2	Oven temperature programming ramps	At least four ramps					
3.3	Heated zones	At least six including Oven, Two Injectors, Two Detectors and One Auxiliary Functional keyboard with four line alphanumeric display					
3.4	Display	Display include temperature and pressure / flow parameters, type of carrier gas, carrier gas column pressure, flow rates, split flow, detector gas flow rates					

		and all detector parameters					
3.5	Memory protection	Power fail memory protection,					
3.6	Storage facility	8 methods and automated sequences.					
3.7	Networking and data communication	RS-232 interface					
3.8	Method editing facility	Non-active methods should have editing facility					
3.9	System leak check	Unattended and automated system leak simultaneous check					
3.10	Injector / Detector mounting	2 Injectors and 2 detectors simultaneous mounting and capable to hold 100 um to 530 um different diameter capillary to mega bore					
		columns					
3.11	Purge system	Effective Gas Saver and Septum Purge System					
3.12	Injection facility	Automatic / Manual Injection					
4.0	**COLUMN OVEN**	High performance, large capacity oven accommodating capillary column and mega bore column					
	Volume	More than 10 Litres					
	Operating temperature	Maximum 4 °C above ambient to 450 °C					
	Temperature set point	± 1°C					
	Temperature Stability	± 0.01 °C for 1 °C ambient change					
	Ramp rate	Up to 120°C / minute					
	Heating time	Maximum 8 mins (50 - 400 ^{0}C)					
	Cooling time	Maximum 5 mins (400 - 50 ^{0}C)					
	Facility for	Column bleed compensation					
	Vent temperature control	Microprocessor control in automatic sequence and fast					
5.0	**FLOW / PRESSURE CONTROLLER**						

5.1	Electronic Pneumatics Control (EPC) channels	Inlets, detectors, or auxiliary gases through Data Processor with Screen display of pressure					
5.2	Pressure adjustment	flow 0.01 psi increment					
5.3	Compensation (pressure/temp.)	Atmospheric pressure compensation for altitude and ambient temperature variations					
5.4	Pressure / flow programming ramps	Two or more					
5.5	EPC setting facility	Computer work station system					
5.6	EPC sensor	Inlets and detectors for all gases (carrier gas, make up gas and support gas in detectors, and carrier and split vent gas in inlets)					
5.7	Flow/pressure set points	On each inlet on detector parameter screen					
5.8	Flow sensor for control and storage of	Split ratio in split / split less and PTV injector					
6.0	**INJECTOR**	Two injectors mounting, one split / split less injector one PTV (Programmable Temperature Vaporizer)					
6.1	Protection	Heater, Temperature Sensor and protection from overheating					
6.2	Capacity	To hold all types and all sizes of capillary columns and mega bore columns as well					
6.3	Purge adjustment	Efficient Septum Purge system, purge time adjustable					
6.4	Compatibility	Solid Phase Micro Extraction (SPME) system					
7.0	**SPLIT / SPLITLESS INJECTOR**	Forward inlet pressure programming with an optimized modular, uniform thermal profile for split / splitless injections					
7.1	Injection volume	Large volume splitless injections					
7.2	Flow control	Electronic pressure / flow control					
7.3	Temperature control	Upto 400°C for split/splitless injector with 1 °C increment					

7.4	Solvent / backflush facility	Solvent Rejection and backflush					
8.0	**PTV INJECTOR**						
	Pressure/flow control	Electronic pressure/flow control					
	Operating temperature	Upto 400 °C					
	Programme ramps	Atleast 3 temperature programme ramps					
9.0	**DETECTORS**	Detector combination would be ECD-FPD					
	Temperature range	Upto 400 °C					
	Detector mounting	Two detectors should be mounted					
	Pressure control	EPC and electronic on/off facility for all detector gases					
	Auto zero & protection	Detector with make up gas and automatic zeroing facility and overheat protection					
9.1	**ECD Detector**	Coaxial design based on Ni^{63} Source					
	Linear Dynamic Range should be	Better than 10^4					
	Departure from linearity should be	Less than ±1 % for the entire range					
	Operating temperature (maximum)	400 °C					
	Pressure / Flow control	Electronic pressure/flow control					
	Minimum Detection Limit (MDL)	Less than 10 fg/sec of Lindane					
	Makeup Gas	Argon / 5% Methane or Nitrogen					
9.2	**FPD Detector**	Electronic pressure control, Dual wavelength version					
	Temperature operating limit	Up to 400 ^{0}C					
	Dynamic range	Better than 10^6					
9.3	FID Detector	Mass flow type					
	Linear Dynamic range	10^7 with Nitrogen					

	Departure from linearity	Less than ± 1 % for the entire range					
	Operating Temperature (maximum)	400 ^{0}C					
	Pressure / Flow control	Electron pressure /Flow control					
	Minimum detection limit	Less than 100 pg/sec of Lindane					
	Support gas	Hydrogen and Air					
	Ignitation	Auto Ignitation facility through computer auto flame Ignitation					
	Flame detection	Flame out detection facility					
10.0	**AUTOSAMPLER**						
	Syringe capacity	Up to six different syringe capacity					
	Injection volume	Between 1 and 200 micro litre or more should be available for accurate sample dosing					
	Washing solvent Injection port access	Upto four different washing solvents in 10 ml bottles. Access two injection ports without requiring an additional tower					
	Internal standard calibration	Automated internal standard calibration and "sandwich" technique					
	Programming	Completely programmed by a dedicated controller or GC keyboard					
11.0	**COLUMNS**	Bonded phase, fused silica capillary column with (one each)					
		DB-1701 or equivalent 30 m x 0.25 mm ID having x 0.25 |im film thickness Film - 14% cyanopropyl phenyl and 86% dimethyl polysiloxane co-polymer column					
		Ultra-125 m x 0.2 mm ID having 0.33 urn film thickness Film - 100% dimethyl polysiloxane					
		HP-5-MS 60 m x 0.25 mm ID with 0.25 um film					
		Film - 5% di-phenyl and 95% dimethyl					

		polysiloxane copolymer column					
		Ultra-225 m x 0.2 mm ID having 0.33 um film thickness, Ultra low bleed column Film - 5% diphenyl and 95% dimethyl polysiloxane co-polymer column					
	DATA STATION						
	Application Software	With basic programming facility, Accurate and Reproducible Integration					
12.0	Data acquisition	At least two simultaneous chromatograms and data acquisitions Reintegration Report Multilevel Calibration Baseline Correction Area Calculation Background Subtraction and Custom/tailored report format facility should be in-built					
	Memory Protection	Battery back up for memory protection					
	Data export / import	Data Export/Transformation to data base software i.e., Excel and Access should be supplied with the system					
	Quality control	Software for Quality Control Protocols					
	Data display / handling	Software for data display, handling, data export/import and reporting					
13.0	**COMPUTER SYSTEM**						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Intel Pentium - Core 2 Duo Processor					
	RAM	4 GB. Upgradeable to 8GB or more					
	HDD	500GB or more					
	Monitor	19" LCD/TFT colour (Digital)					
	VRAM	500 MB					
	CD ROM	52 X CD ROM					
	DVD-CDRW	CD-ROM and CDRW-Combo Drive Max speed 48x24x48					

	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB PS/2 Port, 1VGA integrated Port1 line in/out port,					
	Key boards	Cordless 104 key IBM compatible					
	Mouse Ethernet Graphics	Cordless optical mouse with pad 32 bit auto selectable 10/100 M BPS Internet ready with integrated graphics					
	Sound	• Integrated sound card • Inbuilt stereo speakers sound should be between 0 to 300 with digital display and controlled by Knob. • Attached with a timer can be set 5 minutes interval up to 1 hour or infinite.					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 12 PPM color					
	Software	Pre-loaded Windows XP Professional operating system with Licensed CD					
		MS Office 2010 Standard with media, manual and Licensed CD					
		Preloaded Antivirus with latest version along with Licensed CD					
14.0	**ACCESSORIES**						
	Start up kit / Soap bubble / gas flow meter	Manufacturers Standard accessories start up kit including tools, Digital gas flow meter 0.1 ml/min to 1000 ml/min					
	Operation / maintenance manual	Operation and maintenance manual					
	Application Notes	Application notes in (CD) for pesticides, PAHs, PCBs, PCPs, VOCs, THMs, Dioxins & Furans in environmental samples					
	Service manual	Service manual					
	N_2 Gas Regulator	N_2 gas regulator (2 stage) with necessary tubing and					

		connectors (1 No.)					
	Hydrogen gas regulator Zero air regulator	H_2 gas regulator with (2 stage) with necessary tubing and connectors (1 No.) Zero air regulator (2 stage) with necessary tubing and connectors (1 No.)					
	Carrier gas purifier	High capacity carrier gas purifier (2 Nos.)					
	H_2 gas purifier	High capacity H_2 gas purifier (2 Nos.)					
	Air compressor	Air compressor (GT free) with air filter and regulator unit					
	Air purifier	High capacity air purifier (2 Nos.)					
	Moisture trap	Moisture Trap (Silica Gel - Molecular Sieve 50:50; length 10" - two nos.					
	Hydrocarbon trap	Activated charcoal filter for hydrocarbon Hydrocarbon removal length 10" - two nos.					
	Oxygen trap	High Capacity Oxy trap capacity more than 125 cc - two nos.					
15.0	**SPARES & CONSUMABLES**	Spares and consumables sufficient for two years trouble free operation should be included in the offer and supplied with each system					
	Column nut	2 Nos.					
	Washer	2 Nos.					
	Graphite / vespel ferrules	20 Nos.					
	Inlet Septa (self sealing for injectors)	200 Nos					
	O ring	20 Nos.					
	Copper tubing with connectors	50 mtrs.					
	Micro syringes for manual injection (5 |ul)	4 Nos.					
	Micro syringes for manual injection (10 |ul)	4 Nos.					

	Copper tube cutter	1 No.					
16.0	OPERATION AND MAINTENANCE TRAINING	The supplier has to impart on-site operation training at the time of installation followed by Complimentary (all expenditure inclusive) one week training to two scientists on application, Routine maintenance and software training at their application laboratory in India.					
17.0	GENERAL CONDITIONS OF SUPPLY	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 software's 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 instrument 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 on past supplies 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. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The Maximum time period is 48 hours					

TECHNICAL SPECIFICATION OF GAS CHROMATOGRAPH WITH NITROGEN PHOSPHOROUS DETECTOR (GC-NPD) AND FLAME PHOTOMETRIC DETECTOR (GC-FPD)

Sl.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	For Analysis of Trace organics, contaminants, such as Pesticides, PAH, and other organics in Environmental Samples .					
2.0	INSTRUMENT COMPOSITION						
	Gas Chromatograph	One set					
	Capillary Column with accessories	One set each of specified columns					
	NPD Detector	One set					
	FPD Detector	One set					
	ECD Detector	One set					
	GC Data Station	One set					
3.0	TECHNICAL SPECIFICATION						
3.1	GC System	Computer controlled Data Workstation based computer compatible (GC). Built in Diagnostics and Comprehensive Self-Testing					
3.2	Oven temperature programming ramps	At least four ramps					
3.3	Heated zones	At least six including Oven, Two Injectors, Two Detectors and One Auxiliary					
3.4	Display	Functional keyboard with four line alphanumeric display					

		Display include temperature and pressure / flow parameters, type of carrier gas, carrier gas column pressure, flow rates, split flow, detector gas flow rates and all detector parameters					
3.5	Memory protection	Power fail memory protection,					
3.6	Storage facility	8 methods and automated sequences.					
3.7	Networking and data communication	RS-232 interface					
3.8	Method editing facility	Non-active methods should have editing facility					
3.9	System leak check	Unattended and automated system leak simultaneous check					
3.10	Injector / Detector mounting	2 Injectors and 2 detectors simultaneous mounting and capable to hold 100 um to 530 um					
		different diameter capillary to mega bore columns					
3.11	Purge system	Effective Gas Saver and Septum Purge System					
3.12	Injection facility	Automatic / Manual Injection					
4.0	**COLUMN OVEN**	High performance, large capacity oven accommodating capillary column and mega bore column					
	Volume	More than 10 Litres					
	Operating temperature	Maximum 4 °C above ambient to 450 °C					
	Temperature set point	± 1°C					
	Temperature Stability	± 0.01°C for 1°C ambient change					
	Ramp rate	Upto 120°C / minute					
	Heating time	Maximum 8 mins (50 - 400 ^{0}C)					
	Cooling time	Maximum 5 mins (400 - 50 ^{0}C)					

	Facility for	Column bleed compensation					
	Vent temperature control	Microprocessor control in automatic sequence and fast					
5.0	**FLOW / PRESSURE CONTROLLER**						
5.1	Electronic Pneumatics Control (EPC) channels	Inlets, detectors, or auxiliary gases through Data Processor with Screen display of pressure					
5.2	Pressure adjustment	flow 0.01 psi increment					
5.3	Compensation (pressure/temp.)	Atmospheric pressure compensation for altitude and ambient temperature variations					
5.4	Pressure / flow programming ramps	Two or more					
5.5	EPC setting facility	Computer work station system					
5.6	EPC sensor	Inlets and detectors for all gases (carrier gas, make up gas and support gas in detectors, and carrier and split vent gas in inlets)					
5.7	Flow/pressure set points	On each inlet on detector parameter screen					
5.8	Flow sensor for control and storage of	Split ratio in split / splitless and PTV injector					
6.0	**INJECTOR**	Two injectors mounting, one split / splitless injector one PTV (Programmable Temperature Vaporizer)					
6.1	Protection	Heater, Temperature Sensor and protection from overheating					
6.2	Capacity	To hold all types and all sizes of capillary columns and mega bore columns as well					
6.3	Purge adjustment	Efficient Septum Purge system, purge time adjustable					
6.4	Compatibility	Solid Phase Micro Extraction (SPME) system					
7.0	**SPLIT / SPLITLESS INJECTOR**	Forward inlet pressure programming with an optimized modular, uniform thermal profile for split / split less injections					

7.1	Injection volume	Large volume split less injections					
7.2	Flow control	Electronic pressure / flow control					
7.3	Temperature control	Upto 400°C for split/split less injector with 1 °C increment					
7.4	Solvent / back flush facility	Solvent Rejection and back flush					
8.0	**PTV INJECTOR**						
	Pressure/flow control	Electronic pressure/flow control					
	Operating temperature	Upto 400 °C					
	Programme ramps	At least 3 temperature programme ramps					
9.0	**DETECTORS**	Detector combination would be NPD-FPD while ECD will be additional.					
	Temperature range	Upto 400 °C					
	Detector mounting	Two detectors should be mounted					
	Pressure control	EPC and electronic on/off facility for all detector gases					
	Auto zero & protection	Detector with make up gas and automatic zeroing facility and overheat protection					
9.1	NPD Detector	Mass flow type					
	Dynamic range	10^{6}					
	Departure from linearity	Less than ± 1 % for the entire range					
	Operating Temperature (maximum)	$400\ ^{0}C$					
	Pressure / Flow control	Electron pressure /Flow control					
	Minimum detection limit	Less than 10 pg/sec of lindane					
	Support gas	Hydrogen and Air					
9.2	**FPD Detector**	Electronic pressure control, Dual wavelength version					
	Temperature operating limit	Upto $400\ ^{0}C$					

	Dynamic range	Better than 10^6					
9.3	**ECD Detector**	Coaxial design based on Ni ^{63} Source					
	Linear Dynamic Range should be	Better than 10^4					
	Departure from linearity should be	Less than ±1 % for the entire range					
	Operating temperature (maximum)	400 °C					
	Pressure / Flow control	Electronic pressure/flow control					
	Minimum Detection Limit (MDL)	Less than 10 fg/sec of Lindane					
	Makeup Gas	Argon / 5% Methane or Nitrogen					
10.0	**AUTOSAMPLER**						
	Syringe capacity	Upto six different syringe capacity					
	Injection volume	Between 1 and 5 micro litre or more should be available for accurate sample dosing					
	Washing solvent	Upto four different washing solvents in 10 ml bottles					
	Injection port access	Access two injection ports without requiring an additional tower					
	Internal standard calibration	Automated internal standard calibration and "sandwich" technique					
	Programming	Completely programmed by a dedicated controller or GC keyboard					
11.0	**COLUMNS**	Bonded phase, fused silica capillary column with (one each) DB-1701 or equivalent 30 m x 0.25 mm ID having x 0.25 um film thickness Film - 14% cyanopropyl phenyl and 86% dimethyl polysiloxane co-polymer column					

		Ultra-125 m x 0.2 mm ID having 0.33 um film thickness Film - 100% dimethyl polysiloxane HP-5-MS 60 m x 0.25 mm ID with 0.25 um film thickness ultra low bleed column Film - 5% di-phenyl and 95% dimethyl polysiloxane copolymer column Ultra-225 m x 0.2 mm ID having 0.33 um film thickness, Ultra low bleed column Film - 5% diphenyl and 95% dimethyl polysiloxane co-polymer column					
12.0	**DATA STATION**						
	Application Software	With basic programming facility, Accurate and Reproducible Integration					
	Data acquisition	At least two simultaneous chromatograms and data acquisitions Reintegration Report Multilevel Calibration Baseline Correction Area Calculation Background Subtraction and Custom/tailored report format facility should be in-built					
	Memory Protection	Battery back up for memory protection					
	Data export / import	Data Export/Transformation to data base software i.e., Excel and Access should be supplied with the system					
	Quality control	Software for Quality Control Protocols					
	Data display / handling	Software for data display, handling, data export/import and reporting					
13.0	**COMPUTER SYSTEM**						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Intel Pentium - Core 2 Duo Processor					

	RAM	4 GB. Upgradeable to 8GB or more					
	HDD	500GB or more					
	Monitor	19" LCD/TFT colour (Digital)					
	VRAM	500 MB					
	CD ROM	52 X CD ROM					
	DVD-CDRW	CD-ROM and CDRW-Combo Drive Max speed 48x24x48					
	Ports	ar 2 Serial, 1 parallel and 2 USB front 6 Rear USB PS/2 Port, 1VGA integrated Port1 line in/out port,					
	Key boards	Cordless 104 key IBM compatible					
	Mouse	Cordless optical mouse with pad					
	Ethernet	32 bit auto selectable 10/100 MBPS					
	Graphics	Internet ready with integrated graphics					
	Sound	• Integrated sound card • Inbuilt stereo speakers sound should be between 0 to 300 with digital display and controlled by Knob. • Attached with a timer can be set 5 minutes interval up to 1 hour or infinite.					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 12 PPM color					
	Software	Pre-loaded Windows XP Professional operating system with Licensed CD					
		Preloaded Antivirus with latest version along with Licensed CD					
14.0	**ACCESSORIES**						
	Start up kit / Soap bubble / gas flow meter	Manufacturers Standard accessories start up kit including tools, Digital gas flow meter 0.1 ml/min to 1000 ml/min					
	Operation / maintenance	Operation and maintenance manual					

	manual						
	Application Notes	Application notes in (CD) for pesticides, PAHs, PCBs, PCPs, VOCs, THMs, Dioxins & Furans in environmental samples					
	Service manual	Service manual					
	N_2 Gas Regulator	N_2 gas regulator (2 stage) with necessary tubing and connectors (1 No.)					
	Hydrogen gas regulator	H_2 gas regulator with (2 stage) with necessary tubing and connectors (1 No.)					
	Zero air regulator	Zero air regulator (2 stage) with necessary tubing and connectors (1 No.)					
	Carrier gas purifier	High capacity carrier gas purifier (2 Nos.)					
	H_2 gas purifier	High capacity H_2 gas purifier (2 Nos.)					
	Air compressor	Air compressor (GT free) with air filter and regulator unit					
	Air purifier	High capacity air purifier (2 Nos.)					
	Moisture trap	Moisture Trap (Silica Gel - Molecular Sieve 50:50; length 10" - two					
	Hydrocarbon trap	Activated charcoal filter for hydrocarbon Hydrocarbon removal length 10" - two					
	Oxygen trap	High Capacity Oxy trap capacity more than 125 cc – two					
15.0	**SPARES & CONSUMABLES**	Spares and consumables sufficient for two years trouble free operation should be included in the offer and supplied with each system					
	Column nut	2 Nos.					
	Washer	2 Nos.					
	Graphite / vespel ferrules	20 Nos.					
	Inlet Septa (self sealing for	200 Nos					

	injectors)						
	O ring	20 Nos.					
	Micro syringes for manual injection (5 |ul)	4 Nos.					
	Micro syringes for manual injection (10 |ul)	4 Nos.					
	Copper tube cutter	1 No.					
16.0	**OPERATION AND MAINTENANCE TRAINING**	The supplier has to impart on-site operation training at the time of installation followed by Complimentary (all expenditure inclusive) one week training to two scientists on application, Routine maintenance and software training at their application laboratory in India.					
17.0	**GENERAL CONDITIONS OF SUPPLY**	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 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 instrument 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 on past supplies 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. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The maximum downtime period is 48 hours					

TECHNICAL SPECIFICATION OF GAS CHROMATOGRAPH WITH NITROGEN PHOSPHOROUS DETECTOR (GC-NPD) AND FLAME PHOTOMETRIC DETECTOR (GC-FPD)

Sl.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	For Analysis of Trace organics, contaminants, such as Pesticides, PAH, and other organics in Environmental Samples .					
2.0	INSTRUMENT COMPOSITION						
	Gas Chromatograph	One set					
	Capillary Column with accessories	One set each of specified columns					
	NPD Detector	One set					
	FPD Detector	One set					
	ECD Detector	One set					
	GC Data Station	One set					
3.0	TECHNICAL SPECIFICATION						
3.1	GC System	Computer controlled Data Workstation based computer compatible (GC). Built in Diagnostics and Comprehensive Self-Testing					
3.2	Oven temperature programming ramps	At least four ramps					
3.3	Heated zones	At least six including Oven, Two Injectors, Two Detectors and One Auxiliary					

3.4	Display	Functional keyboard with four line alphanumeric display					
		Display include temperature and pressure / flow parameters, type of carrier gas, carrier gas column pressure, flow rates, split flow, detector gas flow rates and all detector parameters					
3.5	Memory protection	Power fail memory protection,					
3.6	Storage facility	8 methods and automated sequences.					
3.7	Networking and data communication	RS-232 interface					
3.8	Method editing facility	Non-active methods should have editing facility					
3.9	System leak check	Unattended and automated system leak simultaneous check					
3.10	Injector / Detector mounting	2 Injectors and 2 detectors simultaneous mounting and capable to hold 100 um to 530 um					
		different diameter capillary to mega bore columns					
3.11	Purge system	Effective Gas Saver and Septum Purge System					
3.12	Injection facility	Automatic / Manual Injection					
4.0	COLUMN OVEN	High performance, large capacity oven accommodating capillary column and mega bore column					
	Volume	More than 10 Litres					
	Operating temperature	Maximum 4 °C above ambient to 450 °C					
	Temperature set point	± 1°C					

	Temperature Stability	± 0.01°C for 1°C ambient change					
	Ramp rate	Upto 120°C / minute					
	Heating time	Maximum 8 mins (50 - 400 ^{0}C)					
	Cooling time	Maximum 5 mins (400 - 50 ^{0}C)					
	Facility for	Column bleed compensation					
	Vent temperature control	Microprocessor control in automatic sequence and fast					
5.0	**FLOW / PRESSURE CONTROLLER**						
5.1	Electronic Pneumatics Control (EPC) channels	Inlets, detectors, or auxiliary gases through Data Processor with Screen display of pressure					
5.2	Pressure adjustment	flow 0.01 psi increment					
5.3	Compensation (pressure/temp.)	Atmospheric pressure compensation for altitude and ambient temperature variations					
5.4	Pressure / flow programming ramps	Two or more					
5.5	EPC setting facility	Computer work station system					
5.6	EPC sensor	Inlets and detectors for all gases (carrier gas, make up gas and support gas in detectors, and carrier and split vent gas in inlets)					
5.7	Flow/pressure set points	On each inlet on detector parameter screen					
5.8	Flow sensor for control and storage of	Split ratio in split / splitless and PTV injector					
6.0	**INJECTOR**	Two injectors mounting, one split / splitless injector one PTV (Programmable Temperature Vaporizer)					
6.1	Protection	Heater, Temperature Sensor and protection from overheating					
6.2	Capacity	To hold all types and all sizes of capillary columns and mega bore columns as well					

6.3	Purge adjustment	Efficient Septum Purge system, purge time adjustable					
6.4	Compatibility	Solid Phase Micro Extraction (SPME) system					
7.0	SPLIT / SPLITLESS INJECTOR	Forward inlet pressure programming with an optimized modular, uniform thermal profile for split / split less injections					
7.1	Injection volume	Large volume split less injections					
7.2	Flow control	Electronic pressure / flow control					
7.3	Temperature control	Upto 400°C for split/split less injector with 1 °C increment					
7.4	Solvent / back flush facility	Solvent Rejection and back flush					
8.0	3. PTV INJECTOR						
	Pressure/flow control	Electronic pressure/flow control					
	Operating temperature	Upto 400 °C					
	Programme ramps	At least 3 temperature programme ramps					
9.0	DETECTORS	Detector combination would be NPD-FPD while ECD will be additional.					
	Temperature range	Upto 400 °C					
	Detector mounting	Two detectors should be mounted					
	Pressure control	EPC and electronic on/off facility for all detector gases					
	Auto zero & protection	Detector with make up gas and automatic zeroing facility and overheat protection					
9.1	NPD Detector	Mass flow type					
	Dynamic range	10^{6}					
	Departure from linearity	Less than ± 1 % for the entire range					
	Operating Temperature (maximum)	400 ^{0}C					

	Pressure / Flow control	Electron pressure /Flow control					
	Minimum detection limit	Less than 10 pg/sec of lindane					
	Support gas	Hydrogen and Air					
9.2	**FPD Detector**	Electronic pressure control, Dual wavelength version					
	Temperature operating limit	Upto 400 ^{0}C					
	Dynamic range	Better than 10^{6}					
9.3	**ECD Detector**	Coaxial design based on Ni ^{63} Source					
	Linear Dynamic Range should be	Better than 10^{4}					
	Departure from linearity should be	Less than ±1 % for the entire range					
	Operating temperature (maximum)	400 °C					
	Pressure / Flow control	Electronic pressure/flow control					
	Minimum Detection Limit (MDL)	Less than 10 fg/sec of Lindane					
	Makeup Gas	Argon / 5% Methane or Nitrogen					
10.0	**AUTOSAMPLER**						
	Syringe capacity	Upto six different syringe capacity					
	Injection volume	Between 1 and 5 micro litre or more should be available for accurate sample dosing					
	Washing solvent	Upto four different washing solvents in 10 ml bottles					
	Injection port access	Access two injection ports without requiring an additional tower					
	Internal standard calibration	Automated internal standard calibration and					

		"sandwich" technique					
	Programming	Completely programmed by a dedicated controller or GC keyboard					
		Bonded phase, fused silica capillary column with (one each)					
		DB-1701 or equivalent 30 m x 0.25 mm ID having x 0.25 um film thickness					
		Film - 14% cyanopropyl phenyl and 86% dimethyl polysiloxane co-polymer column					
		Ultra-125 m x 0.2 mm ID having 0.33 um film thickness					
		Film - 100% dimethyl polysiloxane					
11.0	**COLUMNS**	HP-5-MS 60 m x 0.25 mm ID with 0.25 um film thickness ultra low bleed column Film - 5% di-phenyl and 95% dimethyl polysiloxane copolymer column					
		Ultra-225 m x 0.2 mm ID having 0.33 um film thickness, Ultra low bleed column Film - 5% diphenyl and 95% dimethyl polysiloxane co-polymer column					
12.0	**DATA STATION**	With basic programming facility, Accurate and reproducible integration					
	Data acquisition	At least two simultaneous chromatograms and data acquisitions Reintegration Report Multilevel Calibration Baseline Correction Area Calculation Background Subtraction and Custom/tailored report format facility should be in-built					
	Memory Protection	Battery back up for memory protection					
	Data export / import	Data Export/Transformation to data base					

		software i.e., Excel and Access should be supplied with the system					
	Quality control	Software for Quality Control Protocols					
	Data display / handling	Software for data display, handling, data export/import and reporting					
13.0	**COMPUTER SYSTEM**						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Intel Pentium - Core 2 Duo Processor					
	RAM	4 GB. Upgradeable to 8GB or more					
	HDD	500GB or more					
	Monitor	19" LCD/TFT colour (Digital)					
	VRAM	500 MB					
	CD ROM	52 X CD ROM					
	DVD-CDRW	CD-ROM and CDRW-Combo Drive Max speed 48x24x48					
	Ports	ar 2 Serial, 1 parallel and 2 USB front 6 Rear USB PS/2 Port, 1VGA integrated Port1 line in/out port,					
	Key boards	Cordless 104 key IBM compatible					
	Mouse	Cordless optical mouse with pad					
	Ethernet	32 bit auto selectable 10/100 MBPS					
	Graphics	Internet ready with integrated graphics					
	Sound	• Integrated sound card • Inbuilt stereo speakers sound should be between 0 to 300 with digital display and controlled by					

		Knob. • Attached with a timer can be set 5 minutes interval up to 1 hour or infinite.					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 12 PPM color					
	Software	Pre-loaded Windows XP Professional operating system with Licensed CD					
		Preloaded Antivirus with latest version along with Licensed CD					
		MS Office 2010 Standard with media, manual and Licensed CD.					
14.0	**ACCESSORIES**						
	Start up kit / Soap bubble / gas flow meter	Manufacturers Standard accessories start up kit including tools, Digital gas flow meter 0.1 ml/min to 1000 ml/min					
	Operation / maintenance manual	Operation and maintenance manual					
	Application Notes	Application notes in (CD) for pesticides, PAHs, PCBs, PCPs, VOCs, THMs, Dioxins & Furans in environmental samples					
	Service manual	Service manual					
	N_2 Gas Regulator	N_2 gas regulator (2 stage) with necessary tubing and connectors (1 No.)					
	Hydrogen gas regulator	H_2 gas regulator with (2 stage) with necessary tubing and connectors (1 No.)					
	Zero air regulator	Zero air regulator (2 stage) with necessary tubing and connectors (1 No.)					
	Carrier gas purifier	High capacity carrier gas purifier (2 Nos.)					
	H_2 gas purifier	High capacity H_2 gas purifier (2 Nos.)					
	Air compressor	Air compressor (GT free) with air filter and regulator unit					

	Air purifier	High capacity air purifier (2 Nos.)					
	Moisture trap	Moisture Trap (Silica Gel - Molecular Sieve 50:50; length 10" - two					
	Hydrocarbon trap	Activated charcoal filter for hydrocarbon Hydrocarbon removal length 10" - two					
	Oxygen trap	High Capacity Oxy trap capacity more than 125 cc - two					
15.0	SPARES & CONSUMABLES	Spares and consumables sufficient for two years trouble free operation should be included in the offer and supplied with each system					
	Column nut	2 Nos.					
	Washer	2 Nos.					
	Graphite / vespel ferrules	20 Nos.					
	Inlet Septa (self sealing for injectors)	200 Nos					
	O ring	20 Nos.connectors					
	Micro syringes for manual injection (5 |ul)	4 Nos.					
	Micro syringes for manual injection (10 |ul)	4 Nos.					
	Copper tube cutter	1 No.					
	Copper tubing with	50 mtr.					
16.0	OPERATION AND MAINTENANCE TRAINING	The supplier has to impart on-site operation training at the time of installation followed by Complimentary (all expenditure inclusive) one week training to two scientists on application, Routine maintenance and software training at their application laboratory in India.					

17.0	GENERAL CONDITIONS OF SUPPLY	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 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 instrument 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 on past supplies 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. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The maximum downtime period is 48 hours					

TECHNICAL SPECIFICATIONS OF HIGH PERFORMANCE LIQUID CHROMATOGRAPH (HPLC)

Sl.No	SPECIFICATION	REQUIREMENT	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	**Applications**	Environmental samples : Qualitative and quantitative Analysis of Pesticides from					
2.0	**INSTRUMENT COMPOSITION**						
	High Pressure Liquid Chromatograph	One set					
	Scanning Fluorescent Detector	One set					
	Ultraviolet Detector	One set					
	RI Detector	One set					
	Conductivity detector	One Set					
3.0	**TECHNICAL SPECIFICATIONS**						
3.1	**System Type**	Computer Controlled, Modular type High Pressure Liquid Chromatography (HPLC) System					
3.2	**Operation Requirements**	- Dual piston and Gear driven with life time maintenance free lubrication system pumping system - Gradient mixer should provide gradient mode upto two or more solvents and also usable in isocratic mode - Gradient Mixer and Central Processor Unit controlled through					

		Computer Software via a interface through PC					
	Pumping System						
3.3	*Gradient System*	Binary gradient system with two independent pump upgradeable to quaternary and permitting the mobile phase to be composed of two or more solvents under computer control					
	Flow Mode	Constant flow modes, with inbuilt facility for degassing of the solvents					
	Flow Range	Atleast 10 ml/min, programmable in the 0.01 ml/min or smaller increments					
	Flow Accuracy	Flow accuracy and stability of ± 0.1% or better					
	Flow Precision	Flow precision of ± 0.3% RSD or better.					
	Press ure/Flo w com pensa tion	Automatic compressibility correction and automatic compensation for changes in operating pressure to ensure accurate flow rates					
	Solvent Mixture composite	Solvents mixtures composition should range from 0 to 100% in 0.1% increments.					
	Operating Pressure range	Operating pressure range normal to 6000 psi pressure with user selectable upper and lower limits					
	Gradient Mixture range	Gradient Mixer System should be higher pressure gradient system coupling both pumps, user programmable through the computer data station					
	Display	Digital display of operating parameters and pressure					

	Operating parameter	Flow rate, gradient curve, stroke volume, upper and lower pressure limits and %A and %B of the solvents in gradient mode					
	Battery backed storage	Battery backed storage facility for upto atleast 8 methods including time programming. Automatic start up and shut down methods. Editing of the stored methods should be possible during a run.					
3.4	**Injector**	Rheodyne design with auto start switch.					
	Sample loops	Sample loops (one each) of 2 |ul, 5 |ul, 10 |ul, 20 |ul capacity.					
3.5	**Column Oven**	Thermostatically controlled with an adjustable temperature range of atleast upto 80 ^{0}C.					
3.6	**Columns**	Columns of length and diameter suitable for the analysis of pesticides, PAHs, and phenols alongwith scavenger columns and guard columns to be provided. Selectivity to reverse phase analysis for C_8 and C_{18} with a particle size of less than or equal to 5 | or equivalent columns (two each).					
		Amino bonded spherical silica with a particle size of less than or equal to 7 u or equivalent columns (two numbers).					
3.7	**Scanning Fluorescent**	Programmable detector					
	Detector						
	Excitation range	Extraction range of 230 - 700 nm					

	Emission range	Emission range of 230 - 900 nm					
	Wave length repeatability	Wavelength repeatability of ± 1 nm or better					
	Accuracy	Accuracy of ± 2 nm or better					
	Flow cell	Flow cell 5 ul capacity					
3.8	**Ultraviolet Detector (Diode Array Detector)**	Light source, D2 Tungsten lamp					
	Wave length range	190-800 nm wavelength range					
	Adjustment	Adjustable in 1 nm or smaller increments					
	Silt programme	Slit programme 1 to 16 nm continuous spectra band width (SBW) 5 nm or less					
	Accuracy	Accuracy ± 1 nm or better					
	Noise	Noise ± 1.0 x 10^{-5} AU peak to peak or less					
	Drift	Drift 2 x 10^{-4} AU per hour or less					
	Flow cell volume	Flow cell volume capacity should be anywhere between 8-15 ul					
	Path length	10 mm					
3.9	**RI Detector**	Microprocessor controlled with LED source.					
	Noise	Noise ± 2.5 x 10^{-9} RIU					
	Drift	Drift ± 2 x 10^{-4} RIU/Hr/^{0}C					
	Flow cell volume	Between 8 - 15 ul.					
3.10	**Conductivity Detector**	Microprocessor based, compatible with Electronic suppressor, built in temperature control					
	Measuring range	0.01 to 10000 microseimen in multiple steps					
	Flow Cell	Atleast 5 ul capacity					
		Should have basic programming facility for					

		method					
3.11	COMPUTER DATA STATION	development and simulation concerning analysis of PAH, phenols, pesticides, Herbicides, 2-4-D & its derivatives, phthalate esters, poly-acrylic and carbonyl compounds in environmental samples					
		Capable of providing accurate and reproducible					
3.12	Application Software	Integration, reintegration/report and multilevel calibration, software for diode array should appear.					
		Recording of run detail (e.g. pressure, time profile, pump condition etc.)					
		Reporting of elution profile with comparison of stored					
		standard profile					
		Reporting of data with elution profile Baseline correction, area calculation, data subtraction and report formats. Provision for statistical analysis and representation of data in all possible graphical format, trouble shooting					
3.13	Computer System						
	Make	Reputed brand such as HP/Compaq/IBM/Dell					
	Processor	Core 2 Duo Processor or above					
	RAM	4 GB (upgradeable to 8 GB)					

	HDD	500 GB ultra DMA or higher HDD (7200 RMP),					
	Monitor	19" LCD/TFT Flat Colour (Digital)					
	VRAM	500 MB or above					
	CD ROM	52x CD-ROM					
	DVD-CDRW	CD-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 Port1 line in/out port,					
	Key board	Cordless 104 Key IBM Compatible					
	Mouse	Cordless Optical mouse with pad					
	Ethernet	32 bit auto selectable 10/100 MBPS, ,					
	Graphics	Internet ready with integrated Graphics					
	Sound	Integrated sound card and inbuilt stereo speakers					
	Printer	HP LaserJet Colour Printer 1200 x 1200 dpi 12 PPM black					
	Softwares	Pre-loaded Windows XP Professional operating system with Licensed CD MS Office 2010 Standard with media, manual and Licensed CD Preloaded Antivirus with latest version along with Licensed CD					
4.0	**ADDITIONAL ITEMS**						
	Application Notes	Application Notes (CD-ROM) for HPLC Analysis of organo-chlorine pesticides, herbicide, 2-4-D and its derivatives,					

		PAH'S, Phenols, Phthalate Esters, Poly-acrylic acid and carbonyl compounds.					
	Operation & Maintenance Manual	Operation & Maintenance Manual					
	Dust cover	Dust cover					
	Spares and consumables	Spares and consumables for two years of operation for each of the following sub-system: • Pumping system • Injector • Column oven • Detectors - including D2 lamp (2 nos.); Halogen lamp (2 nos.); Xenias lamp (1 no.); check valves (2 sets); seal for injectors (5 nos.)					
	Analytical manual	Analytical manual alongwith application notes for the analysis of PAH compounds, pesticides and phenols.					
	Service manual	Service manual					
	Starting kit	Starting kit with one set of required tools for each system/unit					
	Spare Parts catalogue	Spare Parts catalogue					
	Trouble shooting charts	Trouble shooting charts					
	Methodology package software	Comprehensive EPA methodology package software (CD-ROM) for environmental application					
	Micro syringe	Micro syringe (two each) of 2 Lil, 5 Lil, 10 Lil, 25 Lil capacity					
	Sample filtration cartridges	Sample filtration cartridges for reverse phase analysis (150 cartridge), normal phase analysis (150 cartridge)					

	Membrane Filters	Millipore membrane filter for organic and inorganic solvents with dia as per filter holder size alongwith pre filter.					
5.0	**OPERATION & MAINTENANCE TRAINING COMPONENT**	Two weeks training to two scientists on operation, maintenance and trouble shooting aspect of the instrument at manufacturers facility/application laboratory in India.					
6.0	**GENERAL CONDITIONS OF SUPPLY**	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 supplier / manufacturer should have Indian agent to provide after sales service. 4. The main unit and all the sub units of the instrument 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					

		atleast 2 years as on the date of bid opening. 6. The bidder should furnish the information on past supplies and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client's certificate - atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The maximum time period is 48 hours					

TECHNICAL SPECIFICATION OF SOLVENT EXTRACTION (ACCELERATED)

Sl. No.	Specifications	Requirement	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	APPLICATION	Method should be USEPA Approved. for extraction of below mentioned motives from soils, sediments, sludge, PUF filters & Charcoal absorbents. a) Pesticides & Herbicides b) Semi volatiles & PAHs like Naphthalene, Anthracene, Pyrene & Fluorine c) PCB's d) PCDPs & PCDFs e) Organochlorine & Orgonophosphorus pesticides f) Dioxin & Furans					
2.2	INSRUMENT COMPOSITION						
	Accelerated Solvent Extraction	One Set with requisite accessories					
	Sample cells	One set for operation and another set for standby spare					
	Collection Bottles	One set for operation and another set for standby spare					
	Solvent Controller Computer Control Software	One set with requisite accessories One set of each Electronic as well as hard printed					
	Operation, Trouble shooting maintenance manuals	One set of each Electronic as well as Hard printed					
	Service Tools spares & consumables	One set of each.					

3.0	**Technical Specification**						
3.1	ASE System Control	Computer controlled as well as Instrument control Panel, Capability to control and monitor several system by single workstation, method transfer between similar system					
3.2	Computer operating System compatibility	Compatible to window XP or latest operating System					
3.3	Method Compliance	Compliance with established methodologies of USEPA e.g method 3545& 3545A					
3.4	Method Storage	Method building from computer software as well as from control panel and multiple method storage. Easy to Use icons for quick access to control functions.					
3.5	Display	Display of Extraction process as colour graphics. Sensors and display of temperature, pressure and solvent vapors.					

EXTRACTION SYSTEM

3.6	**Automation**	**Automated sample extraction, filteration, automated**					
3.7	Sample Size	Sample cell volume up to 100 ml					
3.8	Number of Sample	Minimum 12 number of sample cells.					
3.9	Collection Bottle	250 ml capacity.					
4.0	Rinsing between Sample	Variable rinse volumes					
4.1	Temperature Range	Ambient to 200^0 C					
4.2	Operating pressure range	500 to 1500 psi					

5.0	Solvent Controller						
5.1	Programmability	Solvent controller shall be controlled and programmable from the computer software.					
5.2	Automation & Solvent control	Unattended operation and automatic switching between different solvents					
5.3	Multiple solvent delivery and gradient	Solvent delivery from one or up to four solvent reservoirs with variable mixing ratios from 5 % up to 95 % of total volume.					
5.4	Solvent Bottle holding	Capacity to hold up to four reservoirs of up to 2 L of each solvent.					
5.5	Waste solvent collection	Provision for collection of waste solvent.					
6.0	Computer	Computer of reputed brand with latest configuration upgradeable for next few year.					
6.1	CPU	Intel core 2 duo processor, 3.0 GHz , 800 MHz.FSB< 1 GB ram 160 GB Hard disk, 1.44 M.B FDD, DVD read/CD write Drive, 19" LCD fkat digital Monitor, compatible keyboard and mouse.					
6.2	Removable media drive	USB (Front & Rear) for USB storage and printers etc.					
6.3	Networking	Networking ready for integrating several ASE systems for future expansion.					
6.4	Printer	Small footprint Laser printer suitable for the printing of method and sample process					
6.5	Operating System	Latest and upgradable operating system. Licensed preloaded media as well as CD.					
6.6	Antivirus soft ware	Latest definition Antivirus software with Licensed preloaded media as well as CD.					
6.7	Office Assistance	Microsoft Office 2007 Standard Licensed preloaded as well as CD.					

7.0	Spares & Consumables	Spares and consumables sufficient for three years trouble free operation should be included in the offer and supplied with each system.					
4.0	**OPERATION & MAINTENANCE TRAINING COMPONENT**	The supplier has to impart on site training at the Time of installation Including software training					
5.0	**GENERAL CONDITIONS OF SUPPLY**	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 software's 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 instrument 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 on past supplies and their satisfactory performance.					

		7. Bidders shall invariably furnish documentary evidence (client's certificate - atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The maximum downtime period is 48 hours					

TECHNICAL SPECIFICATION OF TOTAL ORGANIC CARBON (TOC) ANALYZER

Sl. No.	Specifications	Requirement	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1.0	INSTRUMENT COMPOSITION						
	TOC Instrument	One set					
	Auto Sampler/ Diluter	One set					
	Data Work Station	One set					
2.0	TECHNICAL SPECIFICATIONS						
2.1	Basic System	Computer controlled integrated system with inbuilt diagnostics capable of analyzing Solid/Sludge samples as well as aqueous sample. TOC analyzer should be capable for oxidizing all kind of environmental samples and must be controlled through single point, using instrument software without any hardware changes/replacement during changeover from solid to liquid mode or vice-versa. All features of analyzer should be controlled from Computer Keyboard and software.					
		TOC analyzer must work on high temperature combustion followed by multi-channel NDIR detection for measurement of the evolved CO_2 and O_2 as carrier as well as oxidant. Analyzer should be capable of inorganic carbon removal in solid samples.					
		TOC analyzer with High-speed data acquisition system, quality control protocols, calibration, auto optimization and auto tuning of system with status display.					
		TOC analyzer should be with Auto sampler provision for range selection (auto and manual both features).					
	Application	TOC analysis in Solid / Sludge and aqueous sample with inbuilt Inorganic Carbon removal in solid sample, covering all kind of environmental and industrial samples.					

	Operation	Analyzer should be fully automatic with features for even unattended operation for direct measurement of TC, TIC, TOC in both Solid and Liquid samples and upgradeable for the measurement of NPOC, POC and TN_b {Total Nitrogen (bound)}.					
	Interference Circumvent	Salinity up to 35 g/l should not interfere in accurate analysis of measurands, and system should be capable to take up to 500 um of suspended particles size in aqueous samples					
2.2	**Measuring Range**	For Solid sample - 5 ug to 30 mg Carbon absolute					
		For Liquid sample - 50 ppb to 20,000 ppm (with or without dilution)					
2.3	**Sample Volume**	For Solid sample - Upto 1 gram or more					
		For Liquid sample - Upto 2 ml or more					
2.4	**Detector**	Non-dispersive infrared (NDIR) with Mass Flow Controller to ensure constant flow					
2.5	**Furnace Temperature**	Furnace temperature should be adjustable / user selectable through software in both liquid and solid mode.					
		For Solid samples - up to 900 ^{0}C or more					
		For Liquid samples - (catalytic combustion) at least 680 ^{0}C or more					
2.6	**Precision**	**Precision**					
2.7	**Reproducibility**	< 2%.					
3.0	**AUTO SAMPLER / DILUTER**	Auto sampler/ Diluter should be compatible with TOC analyser, with sipper tube, sample delivery system, providing automatic analysis including measurement and rinse time					
	Carrousel	At least 50 or more positions carrousel with 25 ml capacity tubes.					
	Automation	Automatic acidification for TIC removal, replicate injection, automatic draining of vials, individual Stirring in vials with adjustable stirring speed.					
	Auto Diluter	Should be programmable complete with inert PTFE coated probe with PTFE inner tubing, spare extension tube complete with all accessories, racks, bottles, dust cover etc.					
	Sample line flushing	Should automatically flush the sample line and prepare sample for injection.					
4.0	**DATA WORK STATION**	Programme facility with multitasking software displaying method sample and analysis status.					

4.1	Application Software	Instrument control reintegration/ report multi level calibration.					
		Calculation of data and report formatting. External and dilution calibration, automatic correction for interferences and measurement with internal standards.					
		Measurement of transient signals.					
		Comprehensive quality control protocols including preparation blanks, multiple quality control standards, calibration, check samples, spike recoveries, duplicates calibration failure and QC limits.					
		Provision for statistical analysis. Should control whole TOC system, sample introduction, calibration, data retrieval, data acquisition and reporting. Auto optimization of NDIR, customizable instrument status display. Reputed brand of Computer (Compaq/HP/IBM/Dell)					
4.2	Computer System	Reputed brand of Computer (Compaq/HP/IBM/Dell)					
	Processor	Intel Pentium - Core 2 Duo Processor					
	RAM	4 GB. Upgradeable to 8GB or more					
	HDD	500GB or more					
	Monitor	19" LCD/TFT colour (Digital)					
	CD ROM	52x CD-ROM					
	DVD-CDRW	CD-ROM and CDRW- COMBO DRIVE 48 x 24 x 48 (max speed)					
	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB PS/2 Port, 1VGA integrated Port1 line in/out port,					
	Graphics	Internet ready with Integrated graphics.					
	Audio	Integrated sound Card with inbuilt Stereo speaker.					
	Mouse	Wireless Optical mouse with Pad and driver software					
	Key Board	Wireless 104 keys IBM compatible					
	Ethernet	32 bit Auto selectable 10/100 mbps with Windows 2000 Preloaded with media					
	Printer	Colour Laser Printer; Speed 12 ppm black; Licensed, Resolution 1200 x					

		1200 dpi or better					
4.3	Softwares	Preloaded Windows 2000 or latest version along with licensed CD					
		Preloaded Windows XP Professional along with licensed CD					
		MS Office 2010 Standard along with licensed CD with media & manual					
		Latest version Antivirus with one-year free upgrade along with licensed CD					
5.0	ADDITIONAL ITEMS	Manufacturers Standard Accessories					
		Operating kit comprising all required items pump, tubing, transfer tubing bottles 500 ml and 250 ml. Samples degassing accessories etc. for start up/regular operation of instrument.					
		Operation and maintenance manual for each unit.					
		Application notes (CD-ROM) for TOC analysis in environmental, geological, metallurgical, biological and industrial samples					
		One set of multi and single Range calibration Standards for TOC analysis					
		Service manual with set of required tools for each system/unit					
		Spare parts catalogue					
		Trouble shooting charts.					
		Dust Covers for each unit.					
		O_2 Gas Regulator (2 stage) with necessary tubing and connectors.					
		Spares and consumables for two years operation of the system for main TOC unit, and other peripheral system including Homogenizor, tubing, O-rings etc.					
		Micropipettes - (a) 10/20 - 100/200 ul, 1 ul increment one set (b) 50/500 -1 ul increment one set (c) 100/200 - 1000 ul, 1 ul increment one set					
6.0	OPERATION & MAINTENANCE TRAINING COMPONENT	The supplier has to impart on site training at the time of installation followed by complimentary (all expenditure inclusive) one week training to user scientist (two) on					
		operation and maintenance aspect of the instrument at application laboratory of manufacturer abroad including software training					

7.0	GENERAL CONDITIONS OF SUPPLY	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 software's 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 instrument 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 atleast 2 years as on the date of bid opening. 6. The bidder should furnish the information on past supplies and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client's certificate - atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding 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. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. The maximum downtime period is 48 hours					

TECHNICAL SPECIFICATION OFWATER PURIFICATION SYSTEM

Ultra pure, Water purification System Reverse Osmosis and Ion Exchange:

It Should be with Pretreatment System with Activated Carbon Filter, Hardness Stabilizer, Filter Insert, 5um,1um 10" Hose set (2x1.56 mts), Micro-processor based Tabel Top model with Reverse Osmosis, Ultra Pure water System, Dual wavelength UV lamp, re-circulation pump to generate ASTM Type-I ultra pure water capacity 1Ltr/min with conductivity 0.055 uS/cm, TOC value 1-5 ppb, Integrated Tank Capacity 6 Liter with Vent Filter, Conical bottom and food grade polyethylene, should be with 99% Retention of bacteria, Retention of Particales, Digital microprocessor control with LCD display for monitoring the conductivity of output ultra pure water keypad for entering start and flow of operations RS232 interface for external data print.

- WPS SHOULD BE CAPABLE TO PROCESS FEED WATER(Inlet

Quality) Having 1000 PPM of TDS.

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**DO sampler** 1. To collect water samples for determination of dissolved oxygen by Winkler titration or test kit analysis. 2. The volume of sample chamber should be 1000 ml to contain three BOD bottles (each of 300 ml capacity). **3.** The sampler should be supplied with the chain of at least 15 m, lead ballast weight.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Soil samplers (Coliwasa, Thief Sampler, Trier, Augur)** 1) Coliwasa sampler Should consist of PVC translucent tube of Inner dia 4.13 cm and outer dia 4.26 cm, length 162 cm equipped with an end closure made up of Neoprene tapered stopper. Can open or close while the tube is submerged in the material to be sampled. 2) Thief sampler Consists of two concentric slotted tube. The outer tube has a conical pointed tip that allows the thief to penetrate the waste which is being sampled. The inner tube can rotate to open or close the sampler. Total length of the sampler = 100 cm with outer					

	tube dia 2.54 cm. 3) Trier Sampler The tube should be cut half lengthwise with a sharpened tip that allows penetration of the tube into the sampling source. Total length 100 cm long with diameter 2.54 cm. 4) Auger Consists of sharpened spiral blade attached to a hard metal central shaft. Total length 105 cm size.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Plankton sampler** **No Specification**					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Macro invertebrate sampler** 1. *Ekman Grab*:The Ekman Grab sampler should consist a stainless steel dredge with handle , messenger and Cable Kit					

	2. *Shovel* 3. *Hand net* 4. *Scrapper*					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Hot air Oven** 1. Inside chamber size: 440 mm x 460 mm 2. Double walled with inside wall made of thick stainless steel and outside wall made of mild steel furnished in durable white enamel paint. 3. The space between the walls should be at least 75 mm thick and packed with pure white glass wool. 4. Heating elements should be located at appropriate locations to enable temperature controls through a built-in air circulating fan and thermostat arrangement from room temperature to 250^0C. 5. Temperature variation: $\pm 4.4^0$C, temperature fluctuation $\pm 1.1^0$C. 6. Should have a built in digital thermometer and 2 adjustable air ventilators located near the top of the sides.					

	7. With a thermometer for comparison of internal temperature with digital display temperature. 8. Should have provision for timer (up to at least 2 hours and adjustable in multiples of 15 minutes or less) with auto-cut-off. 9. Should be complete with pilot lamp, digital temperature display, at least three perforated adjustable shelves, power cable and plug. **10.** Power requirement: 220 ± 10 volts 50 Hz AC.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Hot Plate (Rectangular)** 1. Should be in rectangular in size of dimension 45 cm x 60 cm x 15 cm 2. Body of the hot plate should be made from thick (at least 18 mm) mild steel painted with hammer ton paint. 3. The plate should be of thick (at least 25 mm) iron plate or machine casted iron plate which can withstand high temperature, 4. Should have provision for temperature control with sunvic energy regulator, indicator lamp on front panel of the unit.					

	5. Should operate on 230 V, 50 Hz, AC Mains power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Muffle furnace** 1. Rectangular horizontal electrically operated furnace with heating up to 1000^0C. 2. Chamber size : 450 x 230 x 230 mm 3. Outer metal cabinet of heavy gauge should be painted with heat resistance paint. 4. Should have provision for chamber exhaust fume exit and a heat proof handle to access the chamber. 5. Unit should be fitted with a thermal fuse as safety system which will melt and break the circuit to the heating element when working temperature exceeded. 6. Should have provision for temperature control with sunvic energy regulator, indicator lamp, digital display of operating and set temperature on front panel of the unit. 7. Should operate on 230 V, 50 Hz, AC Mains power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Heating mantles** 1. Heating mantles to provide uniform heating of flasks up to 400^0C 2. Holding capacity for 250 ml, 500 ml, 1000 ml flask 3. Built in energy regulator, temperature controlled, indicator light fitted in painted metallic box					

	4. Should operate on 230 V, 50 Hz, AC Mains power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Rotamantle** 1. Heating mantles deigned to meet laboratory requirement of convenient stirring in flask with simultaneous uniform heating. 2. Accurate step-less speed control allows smooth variation up to 1200 rpm. 3. Heating mantles to provide uniform heating of flasks up to 400^0C 4. Holding capacity for 500 ml flask 5. Built in energy regulator, temperature controller, rotating speed controller, indicator light, fitted in painted metallic box 6. Should provide minimum 2 PTFE coated stirring bars of 2 cm length 7. Should operate on 230 V, 50 Hz, AC Mains power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Water bath (Thermostatic control)**					

	1. Doubled walled, stainless steel chamber with concentric rings, ON/OFF switch, temperature controlled + 95^0 C with indicator light 2. 12 holes with concentric ring covers **3.** Power requirement : 220 $\pm$ 10 volt 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Magnetic stirrer with hot plate** 1. The top should be chemically resistant white ceramic top 2. Top plate dimension: 10 x 10 cm 3. Electronic speed control from 0-2000 rpm 4. Should be supplied with a PTFE coated stirring bar. 5. Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Sieve shaker** 1. **Test Sieves:** Test sieves of 200 mm diameter in accordance with ISO 9002, from precision woven wire mesh fitted into brass frames. **2. Sieve shaker** a. Can accept up to 10 full height 200 mm diameter sieves and one sieve receiver, which are held in place by suitable clamping system. b. There should be even distribution of the sample over the whole sieve surface. c. Continuous shaking or timer provision up to 60 minutes.					

Nominal aperture size (mm) :	Quantity
16.0 mm	1 no.
8.00 mm	1 no.
4.00 mm	1 no.
2.00 mm	1 no.
1.40 mm	1 no.
1.00 mm	1 no.
500 microns	1 no.
212 microns	1 no.
63 microns	1 no.
38 microns	1 no.
Sieve lid, brass	1 no.
Sieve Receivers	1 no.

	d. Variable oscillation amplitude within 3000-oscillations/ minute. e. Power requirement: 220 10 volts 50 Hz AC **3. Sieve Analyser** a. The analyzer should produce, store and compare sieve test results. b. Output result will be on visual display as well as with printing facility c. Max. Weighing capacity: 3000 g d. Readability 0.1 g e. Accuracy: ± 0.1 g f. Max. Sieve diameter: 200 mm **g.** Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Vacuum Pump** 1. Single phase motor with IP 44 types of protection with carrying handle and sturdy					

	rubber feet to serve as vacuum pump adequate enough for smooth filtration of surface water samples for estimation of suspended solids, chlorophyll, biomass etc. 2. Rating : At least 0.12 KW 3. Power requirement: 220 ± 10 volts 50 Hz AC **4.** Accessories : Power chord, hose pipe, toggle switch					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Rotary Shaker** 1. Ideal for shaking solutions in Erlenmeyer Flasks offered in interchangeable top platform to hold different sizes of flasks in different quantities. 2. Shaking motion : Rotary 3. Shaking lift : 30 mm 4. Enamel painted shaking platform of size 390 x 320 mm 5. Load : Maximum limit up to 10 kg 6. Speed : Variable and electronically controlled speed adjustment with range from 10 to 300 oscillations per minute 7. Speed Indicator : Digital 8. Operation : Simple and continuous operation with timer providing pre-selection of shaking time up to 60 minutes **9.** Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in	Cost	Tax	Total Cost

			(Rs)	(Rs)		(Rs)
1	**Flask Shaker** 1. Useful for vigorous mixing action during solution preparation by simulating hand shaking. 2. The machine should be fitted with ¼ H.P. motor having mechanical arrangements for adjusting the motion. 3. Shall be mounted on four rubber feet to absorb vibration and prevent unnecessary movement on the bench. 4. Shall hold up to eight flasks or bottles, up to 500ml capacity 5. Analogue timer covers 10 to 60 minutes with a manual override. 6. Shall be supplied with two side arms, eight adjustable clamps and Allen key. 7. Speed range 8 to 800 oscillations/min 8. Maximum load 3kg **9.** Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Separatory funnel shaker** 1. Shaker with a large mounting surface and loading capacity of 15 Kg. 2. With attachments for separating funnels/ dropping funnels with 100 to 500 ml					

	capacity. Attachment includes one basic holding device, 6 tension rollers and 12 clamping pieces. 3. Digitally displayed speed control from 0-300 rpm. 4. Continuous operation or timer operation from 0-56 min. **5.** Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Colony Counter (Electronic)** 1. Microprocessor controlled colony counter for determination of microbial count in water samples. 2. It should provide uniform lighting of round or square culture dish up to 100 mm wide by a peripheral metal reflector. 3. Field area is to be magnified by a 1 to 7 mm lens of 100 mm diameter magnifying lens, mounted adjustably on panel.					

	4. The counting plate should have standard Wolfhugel ruling. 5. It should provide a manual electrode for counting the colonies by touching the surface of culture colony at each point being counted. 6. Count is totalized automatically on a 5 digit register, reading to 99,999. 7. Facility to manually reset the digital register **8.** Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Centrifuge** 1. Table top centrifuge made up of corrosion resistant steel body with a see through acrylic lid					

	2. Maximum speed : 7000 RPM 3. Maximum centrifugal Force “G” = 7000 4. Timer : up to 60 minutes and adjustable 5. Speed Regulation : Step less with zero start switch 6. Speed meter : Continuous reading type 7. Protection : Protection fuse, operation possibility with lid closed only, unbalance cut-off 8. Head : 4 place swing out suitable for 200 ml and 100 ml carriers 9. Carrier : A set of 4 metal carriers suitable for the above head, with reduction adaptors and a set of 4 polypropylene tubes for each of the above two volumes 10. Rotor : 12 x 50 ml angle rotor with set of 12 polypropylene tubes of 15 ml capacity 11. Power requirement: 220 ± 10 volts 50 Hz AC 12. The unit should be complete with operation manual, power cable with plug, dust cover and with power safety cut-off.					

Sl No.	Specification of Materials	Units	Rate in	Cost	Tax	Total Cost

			(Rs)	(Rs)		(Rs)
1	**Ultrasonic Water Bath** 1. Microprocessor controlled ultrasonic water bath for cleaning of small glassware's 2. Shall be provided with a removable basket for holding the glassware's inside the tank during cleaning operation and to prevent them from touching the sides of the tank 3. Material of construction : SS 316 L Inner material 4. Frequency : 40KHz 5. Temperature range : ambient to 80^0C 6. Heater cut off : at 45ºC 7. Timer : continuous, 0.1 to 99.9 minutes – Digital 8. Tank size (LxWxH) (cm) : 46 x 15 x 10 9. Tank capacity : 6.5 L 10. Should have operational safety provision by over temperature-cut out 11. Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Autoclave** 1. Should be vertical with internal depth of 600 mm and internal diameter of 450 mm. 2. The inner chamber should be made of thick stainless sheet and the outer shell should be made of S.S. having S.S lid with radial locking system. 3. The Autoclave should be hydraulically tested upto 40 psi and can be operated at any pressure from 5 to 20 psi. 4. Should be fitted with pressure gauge, steam release cock, spring loaded safety valve, perforated dead weight safety valve, water level indicator, water drain cock, and timer for upto 2 hrs operation and adjustable in multiples of 15 minutes or less with auto cut offs. 5. Should operate on 230 + 10 volts/50 HZ AC power supply. 6. Should be provided with spare gaskets (2 Nos.), power cable & plug, mains ON/OFF switch and line indicator. **7.** Optional Accessories: Automatic Low Water Level cut off device.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Bacteriological Incubator** 1. Should be double walled with inside wall made of stainless steel, and outside wall made of mild steel furnished in durable white glass wool. 2. Inside chamber size should be 605 mm x 910 mm x 605 mm. 3. The door should have double glass viewing window of size adequate enough to permit observations without disturbing the thermal conditions. 4. The internal light should have switch facilities at the outside panel board for viewing without disturbances. 5. Heating elements should be located at appropriate locations to enable temperature controls through a built-in air circulating fan and thermostat arrangement from room temperature to 70^0C, with a sensitivity of ± 0.5^0C in the entire temperature range. 6. A built-in digital thermometer and two adjustable air ventilators located near the top					

	of the sides. 7. A thermometer for comparison of internal temperature with digital display temperature 8. Should operate on 230 ± 10 volts / 50 Hz AC power. **9.** Complete with pilot lamp, at least three perforated shelves adjustable at any levels, power cable and plug.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**BOD Incubator** 1. Double walled with superior quality insulation. Inside wall made of stainless steel and outside wall made of mild steel. 2. Temperature control from 5^0C to 50^0C with an accuracy of ± 0.5^0C with built-in electronic digital thermometer and automatic temperature control. 3. Inside chamber size: (h x w x d) : 900 mm x 580 mm x 650 mm. 4. 3 numbers of perforated adjustable stainless steel trays.					

	5. Hermetically sealed compressor with open type relay of 0.25 H.P. capacity. 6. Air circulation by a constant duty smooth running blower fan. 7. Should be provided with temperature setting knob and in-built voltage stabilizer (range 160-260 V) with indicator. External automatic voltage stabilizer should be provided as additional accessory. 8. Should be provided with a delay relay system to safeguard the refrigeration compressor as safety device. **9.** Should operate on 230 ± 10 volts / 50 Hz AC power					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Horizontal Laminar Flow** 1. Horizontal Laminar Flow type conforming to Class 100 conditions of the US Federal Standards 290 B 2. Principle : Double filtration of air through High Efficiency Particulate Air (HEPA) filter					

	3. Air flow : Zero leak air flow system with at least 90 cubic feet per minute 4. Noise : Less than 65 dB(A) at work area 5. Vibration : Less than 0.0001 inch average displacement of work table 6. Blower : Dynamically balanced and with at least 0.25 HP electric motor operating on 230 ± 10 volts / 50 Hz AC power supply. 7. Housing : wood melamine or equivalent which is termite proof, fire retardant and weather resistant. 8. All exterior surfaces should be covered with white laminates. 9. Cabinet size (LxWxH) : 4' x 2' x 2' 10. Cabinet work zone shall be enclosed with thick transparent flexi glass hood. **11.** Cabinet finish shall be textured, baked white enamel for easy cleaning, work surface shall be white, high impact melamine plastic 12. The laminar flow bench shall contain fluorescent lamps hidden from direct operator view that will provide a lighting intensity of 100 foot candles on the work surface, and a UV germicidal light., 13. Shall contain an instrument panel providing a. ON/OFF switch for motor/ blower b. ON/OFF switches for Fluorescent light and UV light c. Speed control for blower 14. The Laminar flow bench shall be transportable through a 4 ft standard door and shall be completely serviceable from front of the unit.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Deep Freezer** 1. Deep Freezer (Top loading) should be fabricated from stainless steel sheets, Aluminium and other corrosion resistant material, and finished with enamel paint. 2. Should be provided with drain for condensate water outlet and for cleaning the storage compartment. 3. Temperature range : Should cover -10 to +10^{0}C (Automatic and adjustable) 4. Compressor : Quiet in operation 5. Capacity : Shall be in between the range of 280-320 litre 6. Voltage stabilization : Should be provided with stabilizer **7.** Should operate on 230 ± 10 volts / 50 Hz AC power					

Sl No.	Specification of Materials	Units	Rate in	Cost	Tax	Total Cost

			(Rs)	(Rs)		(Rs)
1	**TKN Analyzer automatic with aluminium block digester** The analyser should be a semi-automatic system consisting of a digestion unit, a scrubber unit, and a distillation unit. 1. **Digestion Unit** a. Should have electrically heated (230±10 Volts, 50 Hz AC) metal blocks. It should be capable of providing a temperature range from 45-450ºC. Should have inbuilt temperature controller with digital display along with manual temperature adjustment. b. Should have the capacity to accommodate at least eight numbers of digestion tubes each of 200ml capacity. c. Should have leak proof integrated condensers (fume carriers) made up of glass, fixed on a movable panel along with adopter for outlet to the scrubber unit. 2. **Scrubber Unit** a. Should be an oil free centrifugal suction type, with manual vacuum adjustment facility. b. Corrosion and impact resistant provided with condensate and acid fumes collection vessels. c. Should operate on 230±10 Volts, 50Hz, AC power supply. 3. **Distillation Unit**					

	a. Should be made-up of standard quality borosilicate glass. b. 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. c. Should have inbuilt diaphragm pump along with push button for alkali dispensing with manual volume adjustment. d. Should have ventilation value. e. Should have timer for 5-15 minutes with audio signal. f. Steam inlet tube should be of PTFE. g. Unit should have quick clamping device for digestion tube with adaptor. h. Should operate on 230±10 Volts, 50Hz, AC power supply. i. Complete unit should be provided with one set of digestion tubes along with the servicing, operating and maintenance manuals. **Accessories** a. 1 set of digestion tubes. b. Digestion tube stand c. Spillage tray for the condensers d. Tube removing device **Spares** a. Spares and accessories for its 2 years of continuous use. b. Operation and maintenance manual **c.** Commitment for maintenance service of the instruments and supply of its spares					

	for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**COD Digester with Heating Block system** 1. Complete with aluminium alloy heater block with 12 places, one set of digestion tubes, tube holder, heat deflector plates, one set of water cooled reflux condensers and one dial type thermometer. 2. The digestion tubes are to be provided with ball joint, which should be compatible with a condenser's end. 3. Digestion tube capacity: 100 ml 4. Digestion temperature ranges from 40- 450^{0}C with temperature adjustment knob. 5. Provision for continuous or time setting between 1-9999 minutes for the digestion process. 6. Should operate on 220 ± 10 volts 50 Hz AC power supply **Accessories** 1. 1 set of digestion tubes. 2. Digestion tube stand 3. Operation and maintenance manual					

	4. Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Water Current meter** 1. Should be suitable for direct measurements of velocity in rivers, canals, drains and streams at different depths by suspending the probe from a boat / platform. 2. Should be water tight, compact and corrosion resistant 3. Should provide a direct display with recorder output and cover a current velocity range from 0-300 cm/second. 4. Should be battery operated, with rechargeable battery charger for 230 V ± 10 V 50 Hz AC. 5. Provision should be there for measuring velocity at different depth. 6. Should be provided with suitable weight to withstand high current. 7. Should have proper case for transportation. 8. Calibration system should be provided with the current meter. **9.** It should have adequate cable to measure depth from high level platform / bridges.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Binocular Microscope** **1. Microscope stand :** a. It should have adjustment by vertical movement of the nosepiece, by means of coaxial coarse and fine adjustment kinds. b. Stage should be fixed. c. Roller guide stroke (from the focal point on the stage surface) **2. Stage :** a. Cross movement stage : Atleast 20 cm x 20 cm minimum b. Traversing area 5 cm x 5 cm with low positional coaxial control knobs; provision for accommodation of various culture vessels and specimen holders, sadwick rafter					

	counter, slides of various dimensions, watch glasses etc. **3. Illumination :** a. Light source : It should have halogen bulb 12 v 50 watt with bulb cantering device & light intensity control b. Filter holder : It should have provisions for 4 flip-up filter holders green, light blue interference filter and frosted filter. c. Condenser holder : It should be flip-up or swing out type. **4. Observation system :** a. Light path for photomicrography, 3 setting posions, linking with focusing reticles for observation tubes, 35 mm camera & multitube mounting part. b. Binocular tube inclined 45^0 inter papillary distance adjustment from 53 mm to 75 mm, constant tube length adjustment c. Eyepiece 5 x and 10 x d. Multitube light path, provision for mounting photomicrographic equipment directly as well as the multitude attachment. **5. Condenser** a. There should be working distance furret condenser light annuli for 4x , 10x, 20x , 40 x, 100x objectives. **6. Objectives** a. Phase contrast objectives 4x , 10x, 20x , 40 x, 100x **7. Accessories :**					

	a. Spare bulbs : 6 nos. b. Spare set of eyepiece : 1 no c. Spare set of objectives : 1 no **d.** with cover and case complete					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Dissecting Microscope** 1. Dissecting microscope with illumination of 6V 20 W (upper) , 5W cool fluorescent light source, 0.75 A, 250 v fuse (lower) 2. It should have a zoom body magnification ranging from -6.5 to 60 x					

	3. Should have illuminated specimen plate with overlying disposable Petri dish 4. Trinocular head rotating at 360º and inclined at 45^0 5. Objective Nosepiece: Fixed Single 6. Objective Lens Sizes: 2X 7. Eyepiece 1: 10x Huygens 8. Eyepiece 1 Field of View: 20 mm (0.79 in) 9. Eyepiece 1 Magnification (Power): 20X 10. Eyepiece 2: 20X Huygens 11. Eyepiece 2 Magnification (Power): 40x 12. Stage: 60mm Diameter (2.4"), Working Distance Range - 108mm 13. Focus System: Coarse 14. Should have an adapter for attachment of digital camera					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)

1	**Magnifier** • Illuminated magnifier of glass material, with 5 times magnifying power and 75mm dia and handle of 10.5cm 1.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Liquid handling systems (Dispensers)** 1. Bottle top dispensers should fit to 2.5 L glass reagent bottles **2.** Analog adjustable in the dispensable volume range 1.0 to 10.0 ml					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Digital Burette** 1. Should display automatically and instantly the dispensed volume from 0.01 to 50.00 ml. with an accuracy of 0.01 %. 2. Volume addition should be automatic and the display can set to zero at the touch of a button 3. Dispenser should be supplied with 50 ml syringe capacity. **4.** Delivery shall include three different adapters from different bottles, discharge hose,					

	including extended screw cap and closure cap, suction tube and batteries.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Barometer** Wall mounting Aneroid Barometer with accuracy ± 1 hPa over the whole scale of 930 to 1080 x 1 hPa and 700 to 810 x 1 mm Hg.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Hygrometer** 1. High precision direct reading model with hair 2. Relative Humidity Range : 0 to 100 % 3. Tolerance ± 3% of scale 4. Dial 102 mm diameter 5. Brushed aluminium with black divisions and indexing pointer					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Max. Min thermometer** 1. Maximum and minimum thermometer should be contained within a strong metal, weather resistant case. 2. Should have provision for wall hanging 3. Temperature range from -30^{0}C to 60^{0}C and – 20 to 140^{0}C **Thermometer (Mercury) up to 50^{0}C** 1. Mercury thermometer with temperature range upto 50^{0}C. 2. Temperature scale should be in Celsius. 3. Accuracy : ± 0.5 to 1.0^{0}C **4.** Resolution : ±0.1^{0}C **Thermometer (Mercury) upto 100^{0}C** 1. Mercury thermometer with temperature range upto 100^{0}C. 2. Temperature scale should be in Celsius. 3. Accuracy : ± 0.5 to 1.0^{0}C **4.** Resolution : ±0.1^{0}C **Thermometer (Mercury) upto 200^{0}C**					

	1. Mercury thermometer with temperature range upto 200^{0}C. 2. Temperature scale should be in Celsius. 3. Accuracy : ± 0.5 to 1.0^{0}C **4.** Resolution : ±0.1^{0}C **Thermometer (Mercury) upto 300^{0}C** 1. Mercury thermometer with temperature range upto 300^{0}C. 2. Temperature scale should be in Celsius. 3. Accuracy : ± 0.5 to 1.0^{0}C **4.** Resolution : ±0.1^{0}C					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Rain gauge** 1. Should meet Meteorology Office pattern 2. Should be constructed of copper with heavy brass and complete with inner copper receiver and glass bottle. **3.** Camden measure of capacity 10 mm, divided 0.1 mm for use with 127 mm diameter rain gauge.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Refrigerator**					

	1. Double door, frost free, 230 L capacity refrigerator with central lock system and metallic finish external 2. External Handle on both doors 3. Adjustable shelves, more utility shelves on the door 4. Compressor : Kirloskar Copeland 5. Refrigerant : R 134a Environmental friendly CFC free 6. Insulation PUF 50 mm CFC free **7.** Should operate on 230±10 Volts, 50Hz, AC power supply.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Grinder** 1. Should have a 500w powerful motor 2. Should be provided with Online Indicator, Overload protector and indicator and speed regulator 3. 3 stainless steel jars with caps 4. 4 inter Changeable blades **5.** Operation manual					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Mercury Analyser (Digital)** 1. Based on Cold Vapour Atomic Absorption Spectrophotometer principle. 2. Detection limit for Mercury: 0.1 microgram/l 3. The instrument should be equipped with a low pressure Mercury lamp emitting the 253.7 nm line, absorption cell, filter, a detector with associated electronics and a vapour generation system. 4. Sensitivity: 3 ng absolute for 1 % absorption 5. Short term fluctuation: ± 1% of Full signal 6. Vapour generation system: All glass reaction assembly (including BOD bottles) 7. Readout 2 ½ Digit display. 8. The equipment should be supplied along with a magnetic stirrer and standard accessories. **9.** Should operate on 220 ± 10 volts 50 Hz AC power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**pH meter with combined glass electrode** 1. Bench top pH meter with digital display of pH, MV and Temperature 2. Calibration with three/ two standard buffers e.g. pH 4.0, 7.0 and 9.2. 3. With automatic temperature compensation (0 to 100^{0}C) using the temperature					

	probe 4. **Range –** pH: 0.00 to 14.00 MV: 0.0 to 399.9 mV ISE Temperature: (0 to 100^{0}C) 5. **Resolution** -- pH: 0.01 MV: 0.1 mV Temperature: 0.1^{0}C 6. **Accuracy** --- pH: ±0.01 MV: ±0.2 mV Temperature: ± 0.4^{0}C **7.** Free Double junction combination pH electrode and temperature probe and electrode stand **8.** Should operate on 220 ± 10 volts 50 Hz AC power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Conductivity meter**					

	1. Bench top Conductivity meter with digital display and should be capable of measuring conductivity, TDS, and salinity using a single probe. 2. Readings should be automatically temperature compensated from 0 to 100^{0}C. 3. **Range:** Conductivity : 0.1miceoSiemens to 100 milliSiemens i. TDS: 0.1 mg/l to 19.9 g/l (with adjustable TDS factor **ii.** Temperature: 0 to 100^{0}C iii. Salinity: 0 to 40 ppt 4. **Resolution :** Conductivity: 0.1 microSiemnes i. TDS: 0.1 mg/l **ii.** Temperature: 0.1^{0}C iii. Salinity: 0.1 ppt **5.** Should operate on 220 ± 10 Volts 50 Hz AC power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Portable analyzer Kit (pH, DO, Temp, Conductivity)** 1. Portable analyzer kit capable of measuring pH, Dissolved Oxygen (DO), Temperature and Conductivity (EC) **2. Measuring Range :** a. **pH :** 0 to 14.00 b. **O_2 Conc.** : 0.00 to 19.99 mg/l c. **O_2 Saturation :** 0.00 to 199.9 % d. **EC :** 0.0 µS/cm to 500 mS/cm e. **Temp . :** -5.0 to 90.0 ^{0}C **3. Accuracy :** a. **pH :** ± 0.01 b. **O_2 Conc.** : 0.5% of value c. **EC :** ± 1% of value d. **Temp . :** -± 1% of value 4. Automatic Temperature Compensation over the whole range of temperature 5. Graphics display 60 x 60 mm visible area, simultaneous display of pH, DO, Conductivity and temperature 6. Calibration for pH with atleast two buffer standards, for DO with 0% and 100% DO solutions, for EC with 0.01 M KCl 7. Data storage for atleast 200 data sets (measurement, temperature, date/time, indent no.) 8. Data output via display or printout					

	9. Compatible to Computer though Serial RS 232 interface 10. Rechargeable battery back up power **11.** Can also operate on 220 ± 10 volts 50 Hz AC power supply					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Nepheloturbidity meter** 1. Measuring principle : Nephelometric (90^0 scatter) 2. Light source: Tungsten lamp 3. Measuring range NTU: 0 -1000 NTU 4. Resolution: 0.01 NTU from 0.00—9.99 a. NTU from 10.0—99.9 5. NTU from 100…. 1000 6. Accuracy: ± 2% of value or ± 0.01 NTU 7. Reproducibility: < ±1 % of value or ± 0.01 NTU 8. Operating temperature 10 – 40^0C 9. Calibration: Automatic 1, 3 point calibration 10. Response time < 3 seconds **11.** Power requirement: 220 ± 10 volts 50 Hz AC					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Flame photometer** 1. Capable of 40measuring Sodium, Potassium, Lithium, Calcium in the environmental samples. The system should comprise of an aspirator unit, oil free compressor, burner unit, nebuliser cleaning wire 2. **Instrument response/ sensitivity:** Sodium: upto 100 units for 2 ppm or less Potassium: upto 100 units for 1 ppm or less Lithium : Calcium : **3. Limits of detection, ppm** Sodium: ≤ 0.2 ppm Potassium: ≤ 0.2 ppm Lithium: ≤ 0.25 ppm Calcium: ≤ 15 ppm					

	4. **Accuracy and reproducibility:** ± 2% 5. **Display**: Atleast 3 digit LCD **6. Filters**: Filters for Sodium, Potassium, Lithium, Calcium should be inbuilt. 7. **Detector**: Photoconductive cell 8. **Power requirement**: 220 ± 10 volts 50 Hz AC **9. Accessories and spares:** For 2 years of continuous use.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Visible spectrophotometer** 1. Single beam optics 2. Light source: Tungsten-halogen lamp 3. Gratings: minimum 1200 groves/mm 4. Wavelength range: 340-1000 nm 5. Wavelength accuracy: Better than 2 nm at 365 nm and 546 nm 6. Wavelength readability: Better than 1.0 nm 7. Wavelength repeatability: Better than 1.0 nm 8. Spectral slit width: minimum 8 nm 9. Photometric readout: Digital display, selectable for transmittance (T), absorbance (A) or concentration (C) and A to C conversion factor 10. Photometric range: 0.00-100 in T 1. A 2. 0.00-1980 in C					

	11. Photometric noise: 1. Less than 0.1 % T near 100 % T i. near 0.00 A ii. near 1.00 A 12. Photometric linearity: better than 0.2 % T at display and analog output 13. Photometric accuracy: Better than 0.3 % T at digital display 14. Accessories: manual, dust cover, spares and consumables for two years of operations, lamps, fuses 15. Optional accessories: flow through cell with holder 16. Set of absorption cells- 10 mm (10 nos.) quartz 17. Optional 50 mm path length cell holder and 50 mm quartz cell (2 nos) 18. Should operate on 220 ± 10 volts 50 Hz AC power supply **19.** Operation manual and hassle free operation for at least 5 years					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Specific Ion Meter (Microprocessor Control)** 1. For measurement of pH and concentration of Nitrate, fluoride, cyanide, sulfide, ammonia, bromide, Surfactant in water and wastewater samples. 2. Meter should accept upto five standards for calibration 3. Provision for autoblank correction to auto correct 4. Detection Range: - pH : 0.00 to 14.00					

	i. Resolution : 0.001 ii. Relative accuracy ± 0.005 - Concentration range 0.000 to 19900 i. Resolution ±one least significant digit ii. Relative accuracy ±5 % of reading - Temperature range -5.0 to 105^{0}C. i. Resolution 0.1^{0}C ii. Relative accuracy ±1.0^{0}C - Millivolts i. Millivolt range (resolution) ± 1600.0 (0.1) mV ii. Relative accuracy ±0.2 mV or ±0.05% of reading, whichever is greater 5. Display : Customized LCD Display 6. Compatible to Computer through serial RS 232 interface. 7. Power requirement: 220 ± 10 volts 50 Hz AC 8. Accessories : one set each of Reference electrode with electrode filling solutions, ion specific electrodes with internal filling solutions, Ionic strength adjustment buffer solutions wherever necessary, Standard specified ion solutions **9.** Dust cover, Operation manual, troubleshooting guide					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Analytical balance** **(weighing upto 1.0 mg)** 1. Readability : 0.001 g 2. Weighing range : 400 g					

	3. Tarring facility : Entire range 4. Reproducibility : 0.001 g 5. Linearity : ± 0.002 g 6. Stabilization time : Approx. 2 seconds 7. Weighing pan diameter : Atleast 120 mm 8. Should operate on 220 ± 10 Volts 50 Hz AC power supply **9.** Should be provided with glass draft shield, calibration weights, operation manual and dust cover. **(weighing upto 0.1 mg)** 1. Readability : 0.0001 g 2. Weighing range : 100 g 3. Tarring facility : Entire range 4. Reproducibility : 0.0001 g 5. Linearity : ± 0.0002 g 6. Stabilization time : Approx. 2 seconds 7. Weighing pan diameter : Atleast 120 mm 8. Should operate on 220 ± 10 Volts 50 Hz AC power supply **9.** Should be provided with glass draft shield, calibration weights, operation manual and dust cover. **(weighing upto 0.001 mg)** 1. Readability : 0.001 mg 2. Weighing range : Upto 5 g 3. Tarring facility : Entire range 4. Reproducibility : 0.001 mg 5. Linearity : ± 0.002 mg 6. Stabilization time : Approx. 2 seconds 7. Weighing pan diameter : Atleast 120 mm 8. Calibration : Internal, fully automatic adjustment 9. Should operate on 220 ± 10 Volts 50 Hz AC power supply 10. Optional : Standard weight box of E1 class traceable to National / International Standards. 11. Should be provided with plastic draft shield. Calibration weights, Operation manual					

	and dust cover **12.** Service manual, Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Filtration assembly with vacuum pump** **1. Filtration Assembly** a. 1 L conical flask with side joint for connection with vacuum pump. Neck of the Conical flask should be grounded and fitted with a **2. Pump** a. Oil free portable vacuum pump suitable for filtration of liquids, suspended solids or other continuous or intermittent uses adaptable to all types of filter holders. b. Should provide vacuum to 585 mm/23" Hg (at mean sea level or pressure upto 4 bar/ 58 psig c. Should have Vacuum and pressure gauges with Vacuum and pressure regulating thumbscrew controls d. Motor should be permanently lubricated and provided with a thermal overload switch with automatic reset. e. Body of the vacuum pump should be Teflon coated so as to prevent corrosion due to any spillage of chemicals on it during operation f. Should operate on 220 ± 10 Volts 50 Hz AC power supply **g.** Should be supplied with a 3 pronged (grounded cord and plug for electrical connection and 1/8" BSP inlet and outlet hose connectors for filtration purpose					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Water Purification system (RO based)** 1. Bench top software controlled water purification system based on three step water purification process integrated in one unit. Secondary purification via Reverse Osmosis and final purification through electrode ionisation. 2. Capable of producing pure and ultrapure water from potable tap water, meeting ASTM Type II and Type I water quality standard respectively. 3. Product flow rate : 3 l/ hr 4. Capable of producing bacteria free water at the delivery point. 5. Provision of conductivity meters before and after RO to measure the performance of RO 6. Check valve to prevent back flow to RO 7. Permeate divert valve to ensure consistent water quality at all times. 8. Recirculation loop to save water. 9. Automatic sanitization (Alarm on display, perform rinse and flush of the system automatically 10. Alphanumeric digital display for all functions, measurements and alarms, conductivity and resistivity meters, percentage rejection and set point with alarm, inlet pressure, pressure on RO catridge, Water level in tank, flush/ rinsing/ standby / operate module 11. Alarm signals at low pressure and quality below set point					

	12. Autodiagnosis of electronics/ autoset for all measurements 13. RS 232 connection 14. Resistivity of product water (compensated to 25^{0}C) . 5 M -cm 15. Conductivity of product water (compensated to 25^{0}C) <0.2 S/cm 16. TOC < 30 ppb 17. Bacteria Count < 1 cfu/ml 18. Silica Content > 99.9% retention **19.** Tank polyethylene 30 ltrs with float switch, sanitary overflow, Conical Bottom, Electronic measurement of water level in the tank can be seen in the display of the system, Good reservoir design (smooth surface, no dead points, 100% drainage, basis for vent filter, low porosity)					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**TCLP Agitator** 1. The Agitator should comprise of a rotating box made up of SS 314 with a hinged lockable door 2. The box should have provision to hold atleast 4 bottles of 2 L capacity at a time for agitation 3. The box should rest on a drive shaft & coupled to the fixed speed geared box, for direct drive by motor, rotating parts mounted on a CRCA powder coated pipe section, electrical and control panel fixed on this frame for easy operation. **4.** Motor Capacity: 0.5 HP 3 face speed constant speed of Agitator 30 RPM ± 2RPM					

	5. Should operate on 220 ± 10 Volts 50 Hz AC power supply **Others** 1. Service manual. 2. Guarantee Period. 3. Sales and Service Appraisal in India 4. Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years.					
Sl No.	**Specification of Materials**	**Units**	**Rate in (Rs)**	**Cost (Rs)**	**Tax**	**Total Cost (Rs)**
1	**Zero Head Space Extractor** 1. Zero Headspace Extractor (ZHE) should meet the US EPAs Toxicity Characteristics Leaching Procedure (TCLP) requirements for volatiles as outlined d by EPA test method 1311. 2. The design feature of the Extractor should be such as to eliminate the need to introduce air into the sample, thus eliminating the loss of volatiles. 3. The vent-relief valve on the base plate should automatically open at 125 psi to prevent excessive pressure build-up. The valve should also permits manual venting of the system. 4. The body of the Extractor should be made up of Type 316 Stainless Steel . 5. Reservoir capacity 500 ml for maximum sample weight 25 g, Moulded polypropylene hand wheels, viton- A "O" rings, maximum operating temperature 204^{0}C. 6. Maximum operating pressure: 4.1 bar (60 psi),					

	7. Filter/ pre filter size: 90 mm. Effective filter area: 64 cm2. Piston break force: 0.35-0.7 bar (5-10 psi). 8. Should operate on 220 ± 10 Volts 50 Hz AC power supply 9. Supplied with a Complete Set of Spare O-rings and Polyethylene Piston Removal Tool.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**RSPM Air Sampler (With Calibration Kit)** 1. The Air sampler should be so designed to collect particles of size 10 □m and below on a filter sheet of 20 cm x 25 cm size and have separate provision for collecting particles greater than 10 □m size. 2. The instrument should operate with a flow Rate within 0.9 to 1.4 m3/ min which may be regulated through a flow controller. 3. The instrument should operate for a maximum sampling period of 28 hours. 4. Should have a 24 hour (minimum) programmable timer to automatically shut-off the system after pre set time intervals. 5. The time totaliser circuit should have provision to detect blower stoppage due to any reason. 6. Should operate with or without brushless motor at 220 ± 10 Volts 50 Hz AC power					

supply. Built in requirements are voltage stabilizer with automatic shut off beyond 170-270 V range.

7. Gaseous sampling attachments:
8. The gaseous sampling train should accommodate minimum 4 Nos. of 35 ml Borosilicate glass impingers to be kept in an ice tray: Dimension as per IS: 5182 P (V).
9. Flow rate : 0.3 to 3 LPM, ±2 % accuracy
10. Flow control : Four inlet and one outlet manifold with built in needle valves for flow control of each inlet.

Calibration Kit

The calibrator shall comprise a differential manometer and orifice flow rate calibration unit as described below.

1. The differential manometer shall have a range of 4,0 kPa graduate in 0.01 kPa divisions. To facilitate calibrations in the field, a flexible is preferred.
2. The orifice flow rate calibration unit shall be capable of temporary connection to the high volume sampler to calibrate the instrument flow measuring device. It shall consist of an orifice unit with an adaptor which connects to the inlet of the sampler, a manometer or other device to measure orifice pressure drop and a means to vary the flow through the sampler unit.
3. The internal diameter (D) of the calibrator tube shall be 75 mm to 100 mm and the length shall be between 2D and 3D. The upper end of the tube shall be sealed with a plate (of thickness less than 4 mm). In the center there shall be an orifice 0.2 D to 0.4 D in diameter. A side tapping, to connect the differential manometer, shall be located 0,5 D from the top of the tube to the center of the tapping. This tube shall be securely sealed to the metal base plate to ensure an airtight joint. This assembly shall

	then be located in the filer holder assembly using a gasket to ensure an airtight seal. 4. Internal resistances (multi-holed plates) may be used to give differing air flows for a complete calibration range. These can be located at the junction of the tube and base plate using a gasket either side of the resistance to provide an airtight seal. At least four such plates, preferably more, shall be sued to give a calibration graph. 5. The construction material shall be aluminium. **Others** 1. Service manual. 2. Guarantee Period. 3. Operational Training of Personnel. 4. Sales and Service Appraisal in India. **5.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Handy Sampler for Gaseous Monitoring** 1. Handy Air sampler for monitoring of gaseous and particulate pollutants in ambient air and in the work space environment.					

	2. Air sampling rate: 0.5 – 1.0 LPM. 3. Battery operated pump to draw air through suitable absorbing solutions contained in impingers. Atleast 2 impingers may be used in series to monitor 2 gaseous pollutants at a time. Suitable plastic impingers should be provided particularly for measurement of fluoride. **4.** Batteries: Ni-Cd rechargeable, 8 hrs minimum operation on fully charged batteries, recharge time 14 hours or less.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**PM2.5 Sampler** 1. Sampling Principle : Impactor based design as per EPA specifications. 2. Particle Separation : Omni-directional air inlet with PM_{10} separation through an impactor followed by $PM_{2.5}$ separation through a WINS Impactor. 3. Sampling Rate : 1 m^3/hr with a flow indicator. 4. Filter Media : Filter holder should be designed to accept any standard 47 mm diameter filter media. 5. Sampling Time : Time totaliser records the sampling duration to the nearest 0.01 hour 6. Pump : Low noise, brushless motor driven pump should be operated on Single phase AC 220 Volts, 50 Hertz supply. Sampler should be unaffected by +/- 10% fluctuation in supply voltage. 7. Others : **a.** Standard accessories for hassle free operation of minimum two years. **b.** Carrying case, mains chord, operation and trouble shooting manual. **c.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Stack Monitoring Kit** 1. Stack monitoring kit should have provision for measuring stack temperature in the range 0 to 600^{0}C, velocity from 0 to 30 m/sec and particulate sampling (particulate size upto size 0.3 micron) at 6 to 60 lpm flow. 2. Gaseous Sampling : At 1 to 2 lpm collection on a set of impingers, containing selective reagents 3. Pitot Tube : System should have facilities to connect accessories like heated probe system, cyclone separator etc. Modified S-type pitot tube shall be fabricated from SS 304 or equivalent. The construction features should be as CPCB Doc No. Emission Regulation (Dec. 1985) Part III.Calibration certification from reputed CSIR or IIT laboratories should be provided for each Pitot Tube 4. Sampling probe : Fabricated from SS 304 tube of suitable diameter (not less than 15 mm ID). The lengths of the pitot tube and the sampling probs shall be decided between the user and the manufacturer. 5. Nozzles : A set of nozzles fabricated from SS 304 or equivalent material with internal diameters suitable to cover the full range pf 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 6 mm. 6. Thimble Holder : Thimble holders fabricated from SS 304 suitable to hold cellulose / glass fibre thimbles. 7. Thermocouple : Thermocouple sensor with analog or digital gauge capable of measuring temperature from 0 to 600^{0}C covered with stainless steel or mild steel casing with acid resistant treatment. 8. Mounting Flange : A pair of male / female flanges fabricated out of mild steel with proper hole for mounting thermocouple sensor, sampling tube and pitot tube.					

	9. Panel Box Sides : Baked stove-enamel finish. It should have suitable arrangements or housing stop-watch manometer, rotameter, dry gas meter, etc. 10. Hinged door panel of mild steel to contain cold box with 5 impingers or cold box can be proved separately. Fabricated out of solid acrylic sheets / blown glass. Inlet and outlet provided at the ends for filling in gauge fluid. Spirit level attached for traveling. Velocity range: 0 to 30 m/sec. 11. Rotameter : 0 to 60 lpm particulate monitoring and 0 to 6 lpm for gaseous monitoring 12. Stop Watch : 0 to 60 minutes, one second readout with hold facility 13. Impingers : Five numbers of 120 ml and two numbers of 250 ml capacity. Facility should be there for keeping ice at the bottom of impinger box. 14. Vacuum Pump : Rotary design, with a capacity upto 120 lpm gas flow with single phase motor, 230 ± 10 V. The pump will also have a moisture trap, air inlet valve and mounted inside a pump housing and should be portable 15. Dry Gas Meter : The sampling train shall have a dry gas meter with the facility for measuring temperature and static pressure. The capacity of the meter should be adequate to record upto 100 lpm of airflow and a minimum readout of 0.001 cubic meters. Dry Gas Meter shall be suited for gaseous sampling rates also. 16. Pump Housing : Mild steel case with oven-baked stove enamel finish and ON/OFF switch with indicator lights 17. Tools : A kit containing the essential tools required for connecting various components shall be provided with the equipment. 18. Train Leakages : The sampling train after having set up will be tested for leakage by plugging the inlet. The rotameter shall not give a reading beyond 5 lpm when the flow has been set at 60 lpm also the dry gas meter should give a reading of less than 5 percent of the air flow. 19. Others :					

	a. Standard accessories for hassle free operation of minimum two years. **b.** Carrying case, mains chord, operation and trouble shooting manual. **c.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Noise level meter (Type 1)** 1. Frequency Weighing : Switchable to A, Linear, Octave and 1/3 octave 2. Accuracy : MinIEC 804 (BS 6698) Grade I or ANSI Type I 3. Resolution : 0.1 dB over full range 4. Display : Digital Leq, SPL L_{max} and L_{min} over a programmable range. 5. Time weighting : Switchable to different time intervals i.e., 1/8 sec., 10 sec. etc. or Slow, Fast, Impulse 6. Power Supply : Battery system 7. Computer interface : Data logging system with RS 232 interface 8. Calibration : Automatic calibration 9. Operating Temperature : 0^0 to 55^0C 10. Memory : Sufficient memory to store atleast 8 hrs. data for all parameters given in modes and octave band analysis.					

	11. Accessories : 1. Calibrator, 2. Microphone (Spare), 3. Tripod stand, 4. Wind screen, 5. Batteries, 6. Carrying case or kit, 7. Extension cable with pre amplifies, 8. Printer *12. Specification for Calibrator* 13. Level (dB) : Atleast two, one each in lower and higher range. 14. Frequency : 1 khz 15. Accuracy dB at 25^0C : $\pm$ 0.3 16. Adapters: 25 mm, 12.5 mm, 6.25 mm *17. Specification for Microphone* 18. Type : Premacharge aircondensor unit 19. Sensitivity : 50 mV/PA 20. Polarisation Voltage : Not required 21. Type Response: Free Field '0' degree incidence 22. Response Accuracy :Min IEC 651 Type I 23. Operating Temperature : -10 to 55^0 C 24. Range : 20 – 140 dB (A) **25.** *Specification for Data Logger* **a.** Communications with data logger should be possible using a standard RS 232 cable alongwith compatible modems in order to provide communications facilities (Radio / Telephone). The SBM compatible software supplied with the data logger shall be able to handle all communication requirement. 26. Others :					

	a. Standard accessories for hassle free operation of minimum two years. **b.** Operation and trouble shooting manual. **c.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**CO Analyser (NDIR)** 1. Principle : Cross flow modulation, Non dispersive infra red absorption spectroscopy (NDIR). 2. Measurement : Carbon Monoxide in ambient air 3. Display : Digital					

	4. Ranges : At least four ranges e.g. 0-5/10 / 20 / 50 ppm, 0-10/20/50/100 i. ppm, auto range- manual range selectable. Can be operated by remote switching 5. Lower detectable limit : 0.02 ppm 6. Repeatability : ± 1 % full scale 7. Linearity : ± 1 % full scale 8. Ambient temperature : 5 – 40 ^{0}C 9. Zero Drift : < LDL/day at lowest range i. < 0.2 PPM / week at lowest range 10. Span drift : < LDL/ day at lowest range i. ± 1 % full scale/ week 11. Response time : Within 50 sec at lowest range 12. Sample gas flow rate : Approx. 1.5 L/min. 13. Indication : Measured value, range, alarm, maintenance screen 14. Alarms : During AIC, zero calibration error, span calibration error, temperature error in catalyzer etc. 15. On screen message : English 16. Contact Input/ output : RS 232 C 17. Power : 220 V ± 10 V 50 Hz AC 18. Calibration : Calibration gas (CO) portable cylinder with known concentration has to be provided along with the instrument for calibration purpose					

	19. Others : **a.** Standard accessories for hassle free operation of minimum two years. **b.** Operation and trouble shooting manual. **c.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**CO-HC analyser** 1. Principle : Non dispersive infrared method 2. Measurable Components : Carbon Monoxides (CO) and Hydrocarbons (HC) in automobile exhaust gases 3. Measuring Range : i. CO : 0 – 5% and 0 – 10% ii. HC : 0 – 500 ppm, 0 – 2000 ppm 1. And 0 – 10,000 ppm (as normal hexane) iii. CO_2 : 0 -14% iv. O_2 : 0 – 25% 4. Reproducibility : Within 1% of full scale 5. Stability : Within 1% of full scale / hour at constant temperature 6. Instrument Deviation : Within 1% of full scale					

	7. Accuracy for range selection : 8. CO measurement : Within 1% of full scale at constant temperature 9. HC measurement : Within 2% of full scale at constant temperature 10. Response time : Within 10 second with 5 meter sampling line 11. Drift : Zero & span drift ± 3% FS (3 Hr.) or less 12. Calibration : By span gas. Built in calibration check 13. Accuracy of Span : Within 1 – 2% of the concentration stated 14. Warming up time : Within 30 minutes 15. Interference effect from other gas : Less than 0.2 unit 16. Ambient Operating Conditions : i. Temperature : $0 – 50^0C$ ii. Humidity : Less than 95% R.H 17. Leak test and Zero setting : Manual 18. Display : Bright LED/LCD 19. Printer : Built in or separate 20. Power Requirement : 230 ± 10 AC voltage, 50 Hz ± 0.5% 21. Accessories : For two years (filter paper for fine and coarse particles (2 packets of 100 each), calibration gas (2 cylinders) 22. Spares and consumables : Sampling probe, Rubber hose7.5 meter long, outward transparent filter					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Particle size analyzer** 1. Fully automated, software driven particle size measurement 2. Measurement Principle : Light scattering 3. Measurement Range : 0.02 □m – 2000 □m 4. Sample type : Wide range sample type from emulsions, suspensions to dry powders 5. Accuracy : ± 1% 6. Reproducibility : better than 1% RSD 7. Power : 220 V ± 10 V 50 Hz AC 8. Others : **9.** Standard accessories for hassle free operation of minimum two years. **10.** Operation and troubleshooting manual 11. Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Flue gas analyser** 1. Portable, microprocessor based flue gas emission analyzer to directly measure and display stack temperature, carbon monoxide, carbon dioxide, sulphur dioxide and oxygen levels Stack temperature : Atleast upto 8000C Carbon monoxide : 0-1% Oxygen : 0.1 to 23.5 % Carbon dioxide : 1 to 20 % Sulphur dioxide : 0 to 100 ppm or above 2. Optional Requirements : Hydrogen sulphide, Mercury, Fluoride 3. Accuracy a. Stack temperature $\pm$ 1 % of full scale b. Oxygen $\pm$ 0.6 % O_2 c. Carbon monoxide $\pm$ 1 % of the reading or $\pm$ 10 ppm whichever is greater 4. Calibration : 60 sec. Interval with built-in-system 5. Operating environment : 0-45^{0}C; 0 to 99 % RH 6. Sample probe : 45 cm probe should be capable to withstand higher temp., with rubber handle. 7. Sample gas flow : 0.7 to 2.5 litres/ min 8. Power : Battery operated alongwith built-in charger on mains, 230 V $\pm$ 10 V, 50 Hz 9. Accessories : HDPE carrying case and all the relevant accessories 10. Others : **a.** Standard accessories for hassle free operation of minimum two years.					

	b. Operation and troubleshooting manual **c.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Smoke Density Meter** 1. Measurement parameter : Smoke density in Hartridge Smoke Unit (HSU)/Bosch Unit / light absorption coefficient (m^{-1}) from Diesel engine exhaust 2. Accuracy : ± 1% full scale 3. Display : Digital (with holding facility) / analog 4. Range : 0 to 100% units or 0 – 1.7m^{-1} or 0 – 100% Bosch – and measurement to absolute unit of light absorption 5. Smoke Inlet : Smoke inlet through a by pass valve and moisture trap arrangement 6. Probes / hoses : Set of probes to take the measurement with necessary rubber synthetic hoses. Set of atleast three stainless steel probes with 90^0 bend 200 mm by 425 mm long with 25 mm, 16 mm and 10 mm bore and suitable end fitting for rubber hose 7. Hose pipes: Synthetic rubber hose with 25 mm bore, 3 m long with 1" BSP fittings to connect the probes and by pass valve assembly 8. Lamp: Halogen lamp 12 V, (55 W with operating temp. 2800^0 to 3250^0K 9. Temperature Indicator for exhaust gas temperature in the range 0-120^0C 10. Measuring Chamber temperature: 80^0C 11. Operating temperature 0 – 50^0C 12. Printer Built in or separate 13. Power supply 230 ± 10V, 50 Hz ± 0.5%					

	14. Battery supply 12 Volt DC 15. Cabinet Epoxy painted MS enclosure 16. Calibration Calibration discs of known smoke intensity to be provided with the instrument. This should be certified by reputed laboratories like CSIR / IIT etc. 17. Accessories : The instrument to be supplied with all accessories, probes, connecting hoses, spare sources, battery, trolley etc. required for 2 years use Others : **a.** Operation and trouble shooting manual **b.** Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Elemental CHNS analyser** **1. Analysis Mode Options** Option 1, CHN Mode Option 2, CHNS Mode Option 3, Oxygen Mode **2. Upgradeability** The user may choose any or all modes. May be freely upgraded at any time to add additional mode capability to suit the needs of the laboratory. **3. Mode Switching Accessory** 4. **Column Switching Accessory:** Column Switching Accessory (CSA) be available to					

conveniently switch columns from CHN or CHNS mode to the Oxygen mode.

5. **Performance**

Helium Carrier Gas

Mode	Accuracy (%)	Precision (%)
CHN	< 0.3	< 0.2
CHNS	< 0.3	< 0.2
Oxygen	< 0.3	< 0.2

Argon Carrier Gas

Mode	Accuracy (%)	Precision (%)
CHN	< 0.4	< 0.3
CHNS	< 0.5	< 0.4
Oxygen	< 0.4	< 0.3

6. **Analysis Time**

Mode	Analysis Time
CHN	6
CHNS	8
Oxygen	4

7. **Analytical Range**

Element	Range (mgs)
C	0.001-3.6
H	0.001-1.0
N	0.001-6.0
S	0.001-2.0
O	0.001-2.0

8. **Furnace Temperature**

Zone	Temperature (^{0}C)

	Combustion 100 – 1100 Reduction 100-1000 Pyrolysis 100-1100 Sample > 1800 **9. Sample Information** Sample Size: 0 to500 mgs. Depending on sample type. Sample Type: Solids and Liquids Sample Capsule: Tin, Aluminum and Silver Single Sample Injection Mode: Auto-injector included as standard for automatic injection of single sample capsules. Automatic Sample Injection Mode: Upto 60 samples injected automatically when optional auto-sampler is used. Additional samples may be added during automatic sequencing. **10. Special Features** Self contained design with built in diagnostics, run counters and Helium or Argon carrier gases with automatic instrument start up, equilibration and calibration, reduction of operating temperature, built in valve for reduction of carrier gas flow rate, reduction of Copper reagent for reuse, etc. at operator selected time and date. **11. Operating Modes** Single / Multiple Sample (s) Model (s) with direct auto-injection system / minimum 10 – position circular magazine and automatic insertion of samples.					

	12. Data Handling Integral Keypad Controller Integral, colour-coded keypad for easy parameter entry and instrument control **13. Display** Bright, alphanumeric, fluorescent display for easy readability. **14. Communications** Provided with three industry-standard RS-232C /USB port communication ports. **15. Accessories** Auto-sampler AD-6 Ultra Microbalance Liquid Sample Handling Kit Volatile Sample Sealer Filter Analysis Kit Power requirements 230 VAC ± 10% **16. Others** Service manual Guarantee Period Sales and Service Appraisal in India Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)

1	**FTIR Spectrometer** 1. Computer operated FTIR spectrometer comprising of interoferometer for fast scanning and self compensating for dynamic alignment changes due to tilt and shear, hot spot stabilized source, sealed and desiccated GE- coated KBR optics, High linearity $LiTaO_3$ detector. Computer should be separate from the main unit of the instrument 2. Sample compartment should automatically detect and optimize performance of accessories and sample shuttle 3. Sample compartment should be provided with a quick release lid with sample viewing window 4. Scan range : 7800-350 cm^{-1} 5. Spectral Resolution : 0.5 cm^{-1} 6. Wavelength precision :≤ 0.008 cm^{-1} at 2000 cm^{-1} 7. Signal-to-noise ration : 10,500:1 peak-peak 8. Instrument compatible PC supported by Internet Key Board and Mouse, SVGA Colour Monitor and Deskjet Colour Printer. 9. Computer should operate with a fully validated window operated software comprising of instrument control, import and export of files, scan, background scan, file control, spectra display, monitoring, calculation and comparison 10. Should operate on (230 ± 10) volts, 50 Hz AC power supply. 11. Accessories for analysis of oil and grease in water samples with minimum detection limit of 0.01 mg/l a. Spectrum procedure and kit b. NIR Quartz cell with stopper, 10 mm-5 Nos. c. Rectangular cell holder d. Oil in water analysis software					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**High pressure Liquid Chromatograph** **Specification** 1. Modular type and computer controlled HPLC system usable with analytical columns. The whole system will consist of the pumping system, injector, column oven, computer and detectors. 2. **Pumping system:**Dual system pumping system. It should provide gradient mode upto atleast two solvents and also usable in isocratic mode. The system should operate on (230 ± 10) volts, 50 Hz, AC power supply. 3. Should be binary gradient system upgradable to quaternary, and permitting the mobile phase to be composed of one or two solvents under computer control. 4. The system design should be of constant flow modes, with inbuilt facility for degassing of the solvents. Flow range should be up to at least 10 ml, programmable in the 0.01 ml or smaller increments, with a flow accuracy of ±1.0 % or better of the setting, and a flow precision of ±0.3 % RSD or better. 5. Should provide automatic compressibility correction and automatic compensation for changes in operating pressure to ensure flow rates. The solvents mixture composition should range from 0 to 100% in 0.1 % increments. Pressure range should cover normal to 6000 psi pressure with selectable upper and lower limits.					

	6. Should have a fluorescent display of operating parameters and pressure. The pressure should cover flow rate, gradient curve, stroke volume, upper and lower pressure limits and % A and % B of the solvents in gradient mode. Battery backed storage facility for up to at least 8 methods including time programming should be available, along with automatic start-up and start down methods. Editing of the stored methods be possible during a run. 7. **Injector** : The system should be Rheodyne design with auto start switch. It should be provided with sample loops (one each) of 10 □l capacity and macro-syringe (two each) of 10 □l and 100 □l capacity. 8. **Column Oven** : Thermostatically controlled with an adjustable temperature range of at least up to 80^0C. 9. **Columns** : The under mentioned columns of length and diameter suitable for the analysis of pesticides, PAHs and phenols alongwith scavenger columns and guard columns. 10. **Reverse phase** C8 and C18 with a particle size of less than or equal to 5 □□or equivalent columns (two each). 11. Amino bonded silica with a particle size of less than or equal to 10 □□or equivalent columns (two numbers). 12. **Fluorescence Detector** : Should be a programmable detector covering an excitation range of 230-650 nm and emission range of 230 -650 nm, with a wavelength repeatability of ± 1 nm or better					

	and accuracy of ± 2 nm or better. Should have a flow cell of at least 5 □l capacity. 13. **Diode** –Array Detector : 14. Should cover 190-600 wavelength range, adjustable in 1nm or smaller increments, spectra band with 5 nm or less, accuracy ± 1 nm or better. Noise ± 2.5 x 10^{-5} AU peak to peak or less, drift 2 x 10^{-4} AU per hour or less, flow cell volume capacity should be anywhere between 8-15 □l and 10 mm path length. 15. **Computer and software** : Should have basic programme facility for method development and simulation concerning analysis of PAH, phenols, and pesticides in environmental samples and capable of providing accurate and reproducible integration/ reintegration/ report and multi level calibration, base lien correction, area calculation, data subtraction and report formats. Should have ingrained provision for statistical analysis. 16. Operation, control and monitoring of the instrument and all necessary modules performed by means of compatible PC with latest software version, Windows Operating System, Internet Key Board and Mouse, SVGA Colour Monitor and DeskJet Printer. **17. Other Accessories** a. Operation and maintenance manual and dust cover. b. Spare and consumables essential for two years operation of each of the followings: c. Pumping system d. Injector e. Column oven					

	f. Detectors g. Computer h. Analytical manual including application notes for the analysis of PAH compounds, Pesticides and phenols. i. Service manual with one set of required tools j. Trouble shooting chart – 1 set k. Parts catalogue – 1 l. Guarantee Period. m. Operational Training of Personnel. n. Sales and Service Appraisal in India. o. Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Rotary Evaporator** 1. Rotary Evaporator suitable for processing of samples for analysis of organics. Should have a diagonal design, a reproducible and digital display of RPM with a Buchi type or equivalent movable and high vacuum proof sealing. Should be provided with, ball servolifter; water bath, sealings for the RE system, spare clamps for the evaporation and receiving flasks, a self contained & chemical resistance 'Vacobox' capable of producing vacuum down to 10 m bar (digital display) to be used for rotary evaporator, and 1 litre capacity flasks. 2. The vacobox as well as the RE system should operate on 230± 10 volts / 50 Hz AC					

	power supply. **3. Others** a. Service manual b. Guarantee Period c. Sales and Service Appraisal in India d. Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Total Organic Carbon Analyser** 1. Computer controlled Analyzer with facility for measurement of Total carbon (TC), Total Organic Carbon (TOC), Total Inorganic carbon in aqueous samples, suspensions and solids. 2. The mode of sample entry should include manual entry through a sample boat, syringe injection as well as automatic capillary suction. Use of autosampler should be					

	optional. 3. System should operate on 230±10 volts, 50 Hz, AC power supply. 4. System should have high temperature catalytic combustion with adjustable temperature range atl east upto 900^0C with drift $\pm 2^0$C or less. 5. System should have a non-dispersive IR detector with wide measurement range providing a carbon detection limit providing a carbon detection limit of atleast 200 ppb and detector linearlity of atleast upto 1000 ppm carbon 6. Precision ±2% or better 7. LCD display for data, integrated signal (ppm C), detector baseline (mv or equivalent) and temperature read out (^{0}C) 8. Should have facility for Computer connection and printer option. 9. Nitrogen gas regulator (two stage) with necessary tubing and connections					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Bomb Calorimeter** 1. Determination of combustion heat or calorific values of the fuel or other organic					

	material. Water jacket made of Brass Sheet nickel Chromium plated with bakelite lids, S. Steel bomb, bomb jacket, water calorimeter vessel, motorized stirrer, briquette press, firing unit with illuminator vibrator and buzzer, pressure gauge, proper pipe fitting with final adjustment valves, spanners, magnifying glass, nicrome wire and cotton reel gas releasing valve S. S. crucible, water jacket thermometer, operated on 220 Volts Ac, with digital temperature display and printer facilities. **2. Others** a. Service manual. b. Guarantee Period. c. Sales and Service Appraisal in India d. Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years.					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)

1	**Flash Point apparatus** 1. Pensky-Martens Closed Cup type 2. Fully automatic 3. No open flame, Easy cleaning, No waste almost 4. Temp. Range : 10 to 400^{0}C 5. Automatic barometric correction 6. Large viewing screen for observing test status at a distance from the unit 7. Gas or electric ignition 8. Dual flash point detection system (thermal and ionization) for measurement of samples containing water and/or silicone 9. Power: 220 – 240 V AC, 50/60 Hz 10. **Accessories:** PC & Printer RS 232 interface for immediate print out of measured data **11. Others** Service manual, Guarantee Period, Sales and Service Appraisal in India, Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years					

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**Karl Fischer Titrator** 1. End Point Detection : Voltametric-By Dual Platinum Electrode 2. Measuring Range : 10 µg to 500 mg Water 3. KF delivery : Stepper Motor driven Piston Burette 4. End Point Potential : Adjustable 5. End Point Time : 1 to 99 Sec. 6. Dosing : Kinetic controlled selectable volumes & Delay Times 7. Programmability : 1 Default Method. 5 user programmable methods. 8. Results Units : %W/W, % W/V, ppm or mg/l 9. Drift : Manual & Automatic Compensation 10. Stirrer : Built in Motor less Magnetic Stirrer with key board speed control 11. Display :20 characters, Dual line, Backlighted, Alpha Numeric					

	12. Key Board : Soft touch Membrane with 30 keys one single shift key for Alpha characters. 13. Reporting :Brief report, Parameter report, report in document Format & last 3 results in Titer Mode & 10 in sample Mode in Tabular Format. 14. Interface :RS232C for PC & parallel port for printer 15. Others a. Service manual b. Guarantee Period c. Sales and Service Appraisal in India d. Commitment for maintenance service of the instruments and supply of its spares for minimum 5 years.					

Gas Distribution System

Purpose	• To supply laboratory useable gases from gas cylinders kept in the gas cylinder storage room. • Gas cylinder storage room Is to be located in ground floor. • Supply has to be made to 4 rooms in first floor of the laboratory building. • Actual installation parameters may be determined by site inspection.	
Composition	Cylinder bracket	Set
	Cylinder carrying device	Set
	Manifold (dual typr)	Set
	Pigtail	Set
	SS Tubing (1/4”)	Meter
	SS Tuning (1/8”)	Meter
	Casing (for 6 lines)	Meter
	Gas Purification System (6 gases)	Set
	On-line micro particulate filter	Set
Specifications	Cylinder Bracket	To hold cylinder in PS Powder coated wall mounted with clamps, nuts and MS chain
	Cylinder Carrying Device	To carry and transport cylinder in-house. Built in MS Powder coated with easy and smooth rollers below. The cylinder when mounted, should be firmly held with the frame with adjustable MS chain and bolt. The assembly should be able to stand on two fixed supports

		and the wheel when necessary.
	Manifold (Dual type)	Should have MS Powder coated brackets, wall mounted. MOC of manifold is SS 316. MOC of valve is brass chrome plated & SS316 needle with 200 Kg/cm^2 working pressure and 250 Kg/cm^2 test pressure. Connectors : For regulator- 5/8" BSP female & for pigtail-1/4" BSP male
	Pigtail	MOC of outer braiding is SS & inner core is Teflon having 1 meter length with 200 Kg/cm^2 working pressure and 250 Kg/cm^2 test pressure & SS end fittings. One end should fit to cylinder as supplied and other end should fit to manifold as specified above.
	SS Tubings (1/4")	Imported, Dead annealed, pretreated (free from oil & grease, rust and other foreign materials & capillary grade SS 316 with international colour coded PVC sleeves having 1.5 mm wall thickness which can withstand pressure upto 200 Kg/cm^2
	SS Tubings (1/8")	Indian, Dead annealed, pretreated (free from oil & grease, rust and other foreign materials & capillary grade SS 304 with international colour coded PVC sleeves having 0.5 mm wall thickness which can withstand pressure upto 40 Kg/cm^2 maximum. Pressure test certificate to be provided from the competent authority.
	Casing (for 6 lines)	MS powder coated with cover for ¼" tubings upto purification panel. Thickness 18 gauges having SS screw for cover. It should accommodate ¼" union connections whenever required.
	Casing (for 4 lines)	MS powder coated with cover for ¼" tubings upto purification panel. Thickness 18 gauges having SS screw for cover. It should accommodate ¼" union connections whenever required.
	Gas Purification System (6 gases)	1. MS powder coated panel body and frame (powder coating -9 Tank Process) 2. Polycarbonate safety cover for panel 3. Pressure gauge SS 316 (range 0-15 Kg/cm^2) 4. Pressure regulator SS 316 with locking system 5. Stainless steel 316 needle valve to be provided

		6. Stainless steel needle valve(toggle valve not acceptable) 7. Inlet connection will be SS ¼" swg. And outlet connections SS316 1/8: swg. 8. By-pass loop system for each gas line to be provided separately (Each gas line consisting of 3 nos. of SS 316 needle valve and 1 no. of non-return valve). 9. Working pressure = 15 Kg/cm^2
	Purification unit	**a. For N_2O, H_2, N_2 and Ar** i) **Regenerable moisture trap with molecular sieve 13 X** (make : Supelco/Altech) + Color indicating blue gel (make Supelco/Altech), imported poy-acrylic MOC, 250 cc volume, 250 mm length, end fitting SS 316. **Impurity removal specification** : If the incoming moisture concentration is 10 ppm then the moisture concentration in the outlet should be reduced to less than 0.5 ppm. **Regeneration process** : By passing air at 60^0C continuously for four hours. The bidder should mention the flow rate. ii) **Regenerable hydrocarbon trap** with activated charcoal (Make : Supelco/Altech) imported poy-acrylic MOC, 200 cc volume, 250 mm length, end fitting SS 316. **Impurity removal specification**: It removes organic compounds from feed gas streams to the extent that if the normal compresses air contains 600 ppm hydrocarbons, concentration in the outlet air should be less than 10 pp,. **Regeneration process** : : By passing hydrogen at 60^0C continuously for six hours. The bidder should mention the flow rate. (iii) **Regenerable oxygen trap** with 0.5% palladium on carbon crystals. Make OXICLEAR (Model PEC 100 CC SH), Type : Regenerable, Capacity 100 cc length : 215 mm, MOC : ss316, Filling material : 0.5% palladium, make BDH (USA), end fitting SS316. **Impurity removal specification** : If the incoming gas contains 10 ppm oxygen, the oxygen concentration at the output should be less than 0.1 ppm. The capacity of the trap should be such that it should have a life of 18 months when subjected to a continuous stream of 40 ml/min gas containing 10 ppm of oxygen.

		Regeneration Process: By passing hydrogen and nitrogen at 50^{0}C continuously for four hours. The bidder should mention the flow rate. **b. For Acetylene** i) **Regenerable moisture trap with molecular sieve 13 X** (make : Supelco/Altech) + Color indicating blue gel (make Supelco/Altech), imported poy-acrylic MOC, 250 cc volume, 250 mm length, end fitting SS 316. **Impurity removal specification:** If the incoming moisture concentration is 10 ppm then the moisture concentration in the outlet should be reduced to less than 0.5 ppm. **Regeneration process**: By passing air at 60^{0}C continuously for four hours. The bidder should mention the flow rate. **c. For air** i) **Regenerable moisture trap with molecular sieve 13 X** (make : Supelco/Altech) + Color indicating blue gel (make Supelco/Altech), imported poy-acrylic MOC, 250 cc volume, 250 mm length, end fitting SS 316. **Impurity removal specification**: If the incoming moisture concentration is 10 ppm then the moisture concentration in the outlet should be reduced to less than 0.5 ppm. **Regeneration process** : By passing air at 60^{0}C continuously for four hours. The bidder should mention the flow rate. ii) **Regenerable hydrocarbon trap with activated charcoal** (make : Supelco/Altech), imported poy-acrylic MOC, 200 cc volume, 250 mm length, end fitting SS 316. **Impurity removal specification**: It removes organic compounds from feed gas streams to the extent that if the normal compressed air contains 600 ppm hydrocarbons, concentration in the output air should be less than 10 ppm. **Regeneration process**: By passing hydrogen at 60^{0}C continuously for six hours. The bidder should mention the flow rate.
	Online microparticulate filter	SS 316 filter having 0.5 micron mesh size with SS 316 end fittings.

	Mini station	MS powder coated body with pressure regulator and valve having following specifications. a) SS 316 gauge : 0 to 20 Kg/cm^2 pressure range & 50 to 65 mm dia. b) SS 316 pressure regulator with SS diaphragm & SS internal trim. c) Internal tubing should be of 1/8" capillary grade SS material d) SS 316 needle valve.
	Accessories	Manufacturer's standard accessories : 1 set

Helium carrier gas (CHN analyzer), 99.995 mole percent minimum purity, Size 1A Cylinder, 6 cubic meters (200 cubic feet), Helium / Hydrogen mixture, pyrolysis gas for Oxygen mode or to regenerate copper reagent in CHN analyzer), 99.995 mole percent minimum purity of 5-8% hydrogen in helium, Size 1A Cylinder, 6 cubic meters (200 cubic feet)

Sl No.	Specification of Materials	Units	Rate in (Rs)	Cost (Rs)	Tax	Total Cost (Rs)
1	**UV Visible spectrophotometer** 1. Double beam optics 2. Light source : Tungsten-halogen lamp & Deuterium lamp 3. Gratings : minimum 1200 groves/mm 4. Wavelength range : 190-1100 nm 5. Wavelength accuracy : Better than 2 nm at 365 nm and 546 nm 6. Wavelength readability : Better than 0.2 nm 7. Wavelength repeatability : Better than ± 0.5 nm 8. Spectral slit width : provisions should include atleast 2.0 nm SBW 9. Photometric readout : Should atleast provide Digital display of ABS (four digit), % T					

	and Concentration modes 10. Photometric range : 0.000-3.000 in A 11. Photometric noise : Not more than 0.0005 at 0 A 12. Photometric linearity : Better than 0.2 % T at display and analog output 13. Photometric accuracy : Better than or equal to 0.005A at 1 A. 14. Stray light : less than 0.01 % 15. Drift : Less than 0.0004 Abs/ hr after warm up. 16. Scan speed : Should be wide range and should provide a maximum limit of at least up to 800 nm/ minute 17. Accessories : manual, dust cover, spares and consumables for two years of operations, lamps, fuses 18. Optional accessories : flow through cell with holder 19. Set of absorption cells : 10 mm (10 nos.) quartz 20. Optional : 50 mm path length cell holder and 50 mm (2 nos) quartz absorption cells 21. The system should provide facility for the storage of spectra/ methods, multi wavelength mode, baseline correction, peak area and other statistical calculations. Software should be provided for water & environmental analysis according to DIN/ISO/USEPA. 22. Power requirement : 220 ± 10 volts 50 Hz AC 23. Others : **a.** Operation and trouble shooting manual b. Commitment for maintenance service of the instruments and supply of its spares for minimum 10 years.					