फ़ाइल संख्या: **QA-11013/1/2025-QA-FSSAI**
भारतीय खाद्य सुरक्षा एवं मानक प्राधिकरण
(खाद्य सुरक्षा एवं मानक अधिनियम, 2006 के अंतर्गत स्थापित एक वैधानिक प्राधिकरण)
(गुणवत्ता आश्वासन प्रभाग)
FDA भवन, कोटला रोड, नई दिल्ली – 110002

दिनांक: 10 दिसंबर, 2025

सूचना/ Notice

Subject: Approved technical specifications of High End Equipment (HEEs) – GC-MS/MS, LC-MS/MS, ICP-MS & ICP-OES– reg.

FSSAI has finalised the technical specifications of High End Equipment (HEEs) – GC-MS/MS, LC-MS/MS, ICP-MS & ICP-OES.

2. In this regard, approved technical specifications of GC-MS/MS, LC-MS/MS, ICP-MS & ICP-OES, are placed at ***Annexure-I***, ***Annexure-II***, ***Annexure-III & Annexure-IV*** respectively.

(अभिनय शशांक)
सहायक निदेशक (तकनीकी)

Copy To -

1. **Advisor (QA) –** *for information*
2. **Joint Director (QA)** – *for information*
3. **IT Division** – *to upload on FSSAI Website, under 'Advisories/ Orders' & 'Tenders/ EOI'.*

		Annexure-I
	Technical Specifications of GC-MS/MS	
Sl. No.	**SPECIFICATION**	**REQUIREMENT**
1	**GC-MS/MS system**	(i) A bench top compact high sensitive GC-MSMS system to detected contaminants upto 10 ng/ml or below in Water, Food and Agricultural products such as Organo-chlorine pesticides, Organo-phosphorous pesticides, Synthetic Pyrethriods, PCBs, and VOCs with user friendly software to meet the requirements of FSSAI.
2	**Gas Chromatograph**	(i) Temp range: Ambient + 5°C to 450°C
		(ii) Column Oven can accommodate two columns with a maximum temperature range of up to 450 °C with a set point resolution of 0.1 ° C.
		(iii) Fast oven cooling 450°C to 50°C in less than 5 minutes
		(iv) It should support 20 Oven ramps & maximum temperature ramp rates of 120° C/min.
		(v) Intelligent features like EMF, etc. should be built into the system
		(vi) The vendors should provide a readymade method if available.
		(vii) Column replacement without venting the MS
3	**Inlet: 2 Nos**	(i) Independently temperature-controlled injection ports.
		(ii) Split / Splitless injector for capillary Columns with Septum Purge functions
		(iii) Must be able to install at least 2 independently temperature controlled injector units simultaneously
		(iv) Inlet 1: PTV or Equivalent Inlet
		(a) An Inlet providing the flexibility of a standard Split/ Splitless inlet, along with a programmable temperature vaporizer (PTV) capability/ Equivalent, enabling large- volume injections should be provided. It should be equipped with EPC with a pressure range of 0.1 to 100 psi.
		(b) The same inlet should also support cool injections for an improved signal response.
		(c) Temperature programming of up to 5 ramps or more at up to 200°C/min or higher with fully EPC /equivalent
		(d) Split ratio of 7500:1 or more.
		(e) Fast cooling facility for PTV preferably with Air
		(f) Following injection modes should be made available:
		a. Hot or cold split/ Splitless
		b. Pulsed split/ Splitless
		(v) Inlet 2: Split Splitless Inlet

		(a) An Inlet providing ability of a standard split/Split less inlet. It should be equipped with EPC with a pressure range of 0.1 to 100 psi.
		(b) Maximum temperature of 400 °C.
		(c) It should have a He Gas saver module or equivalent to reduce gas consumption without compromising performance.
		(d) Split ratio of 7500:1 or more.
		(e) Must have electronic septum purge flow control or equivalent technology to eliminate carry-over
4	**Gas flow control**	(i) Should be able to run in constant flow, ramped flow, constant pressure and ramped pressure modes.
		(ii) Pressure set points minimum increments: 0.005 psi in all ranges.
		(iii) Electronic pneumatic control for auto pressure regulation for split / Splitless operation, septum purge.
5	**Back flush Technology**	(i) Automated back flush is required and should be configurable with inlet and column, for removal of high boiling interferences to ensure column life.
6	**Auto Sampler/Auto Injector**	(i) The auto sampler control (method, sequences, etc.) must be possible with in the Chromatographic Data system in use, without any external software needs.
		(ii) Liquid sample injection range: 0.5 to 50 µL or better
		(iii) Number of samples capacity: 100 or better holding capacity 1.5/2 ml
		(iv) Cross-Contamination Free Pre- and Post-injection syringe rinsing with single or combined solvents
		(v) Sample vials: Glass construction, 1.5ml vials, set of 1000 vials to be provided.
		(vi) Rinse solvent vial: Glass construction, screw top, PTFE-coated septum
		(vii) Injection volume linearity: ±0.5 % or better
		(viii) Peak Area Repeatability ≤ 1% RSD
7	**Tandem Mass Spectrometer**	(i) High performance tandem mass spectrometer with heated inert ion source and an appropriate noise reduction system followed by electron multiplier detector/Photomultiplier detector capable of analyzing all the parameters given in other requirements
8	**Vacuum System**	(i) High efficiency low noise vacuum system suitable for mass spectrometer
9	**Mass Range**	(i) 10 to 1000 m/z or better
10	**Interface**	(i) Direct interface to capillary column and transfer line temp up to 350^0C or better
11	**Ionization**	(i) Should provide high efficiency EI ionization source or equivalent.

12	**EI MRM IDL (Instrument Detection Limit)**	(i) m/z 272 - 222 IDL for **1 fg OFN ≤ 0.3 fg** or better (Proof of Statement must be provided)
13	**Maximum MRM speed**	(i) 800 MRM transitions per second or higher
14	**Mass Stability**	(i) ±0.1 amu / **24 hours**
15	**Scan Speed**	(i) 20,000 u/sec or higher
16	**Mass resolution**	(i) 0.7 amu, Minimum (width at half height) or better
17	**Dwell Time**	(i) ≤1 m sec
18	**Ionization Voltage**	(i) 70 eV or better
19	**Ionization Current**	(i) At least up to 250µA or better
20	**Mode of operation of MS/MS**	(i) Should be able to do Scan, SIM, MRM/SRM, Parent ion scan, Product ion Scan, Neutral loss scan-time segment based.
21	**Dynamic range**	(i) 6th order of magnitude or better
22	**Columns**	(i) Low bleed suitable Capillary column for Pesticide residue analysis (30 m x 0.25 mm x 0.25 µm) - 5 Nos.
		(ii) Suitable column for ethylene oxide analysis, must be supported by application note
23	**Quantitation Software**	(i) The complete system should be supplied with a computer and a printer, with original software and with a license to control GC-MS/MS and other accessories, data handling software and integrated with it.
		(ii) Should have the capability to run the mass spectrometer in all the modes specified.
		(iii) Data acquisition, integration, calibration, quantification and QC calculations must be automated.
		(iv) Manual and Auto tune options should be provided.
		(v) Automatic MRM/SRM method Development
		(vi) Library searching facility with latest series of NIST Library.
		(vii) Pesticides / environmental pollutants MRM Database for atleast **1000 compounds,** covering applicable FSSAI Parameters.
		(viii) 21 CFR part 11 & food safety compliance.
		(ix) Software update should be provided free of cost, upto minimum 10 Years.

24	**Workstation & Accessories:**	**(i) A Workstation should be provided for controlling the mass spectrometer, GC and auto- sampler with data acquisition & for data processing and analysis with minimum following specification:**
		(a) Suitable High-End factory-fitted Compatible Computer workstation should come along with the System.
		(b) Suitable branded PC with LED monitor **24"** or better with Duplex, Black and White Laserjet printer with LAN, Network Card and Bluetooth facility.
		(c) Memory / RAM/ Hard Disk/ Processor - compatible with the system to ensure smooth operation without lag.
		(d) External Hard disk: 10 TB or better (Provided Additionally with the System)
		(e) Operating system: Latest Windows configuration, 64 - bit or better.
		(f) Wireless USB Adapter for Wi-Fi connectivity
		(g) All hardware and software including drivers, monitor, device interfaces cards/network must be preinstalled and preconfigured on the computer provided.
		(h) Original licensed software CD of Operating system and MS office 365 licensed (MS-WORD, MS- EXCEL, MS-POWERPOINT).
		(i) Should be complete with all necessary accessories with comprehensive warranty of minimum 5 years of all the electronic components as well as wear and tear consumables (PC, Hard Drive, Printer etc.)
25	**Gas Generator, Gas Cylinders, Gas Regulators, Gas tubings, Manifold and Gas purification**	(i) Pre requisite for MS:
		(a) Suitable gas cylinders required for operating the equipment including Helium, Argon, Nitrogen of UHP grade - 02 Nos (with requisite certificate) with all accessories such as dual pressure SS regulator, gas purification panel unit /Inline filters such as Oxygen trap, Moisture trap, etc. Cylinder cage or Bracket should be supplied and commissioned. The gas lining panel work should be done by the supplier for the connection of the instrument.
		(b) All the items, regulator, gas purification panel unit, cylinder cage or Bracket etc should be covered under five years' comprehensive warranty with at least one Preventive maintenance along with PM kit each year. Gas purification filters of the above gas should be refilled or replaced every year or whenever required, whichever is earlier during the warranty period.

	systems	(ii) The following documents should be supplied along with the cylinder: (a) Manufacturer Certificate; (b) Hydrostatic test certificate; (c) The Chief Controller of Explosives, Nagpur (CCOE-NAGPUR) gas filling approval certificate and (d) Purity certificate.
26	**Uninterrupted Power Supply(UPS) system**	(i) True online UPS system of 15 KVA capacity or above better suitable with power factor correction and harmonic. Three phase 440V/240V for the smooth running of GC-MS-MS with battery back-up of minimum 1 hr with 80 % load capacity with comprehensive warranty of minimum 5 years inclusive of SMF or latest. The electrical work of the UPS system should be done by the supplier for the connection of the instrument.
		(ii) All the UPS system batteries should be replaced by brand new batteries with warranty certificate two months before completion of warranty period of GC-MSMS and the performance of UPS system should be verified. Satisfactory performance certificate of UPS should submit to the laboratory by the GC-MSMS supplier and UPS supplier together.
		(iii) The maintenance of UPS system and batteries is responsibility of GC-MS-MS supplier. Any malfunction of GC-MS-MS due to UPS system and its batteries failure, the supplier of GC-MS- MS has to take whole responsibility and rectify the same during warranty period.
27	**Instrument and Software Qualification/ Performance Verification IPV (IQ,OQ,PQ)**	(i) The instrument must be "Qualified" along with the Software. Necessary reagents & accessories along with Documents must be provided. During installation and qualification, Instrument should perform as per submitted specification in presence of user.
		(ii) IQ/OQ/PQ to be performed as per OEM protocol, should be done free of cost with necessary traceable standards along with necessary performance kit standard solutions
		(iii) Documents, Kits & standards etc. as required being supply along with the instrument
		(iv) To be done free of cost with traceable calibration standards for the first 5 years' warranty period (at installation & at every maintenance visit of each year) along with PM kits.
		(v) OQ/IPV should be done free of cost with supply of PM Kits, Tuning solution, setup solution, calibration standards etc. and calibration standards at least once in a year during warranty period.
		(vi)Documents, PM Kits & calibration standards etc. to be supplied along with instrument and at every PM visit free of cost during warranty period.

		(vii) Satisfactory performance certificate should submit to the laboratory after calibration of GC-MSMS before one month of warranty period expired with supply and fixation of PM kits of GC and MS system.
28	**Warranty**	(i) Minimum 5 years from the date of completion of IQ, OQ and PQ of GC-MS/MS to the satisfaction of lab with UPS system batteries and all accessories.
		(ii) Tune solution: Tuning and performance solution to cover the Warranty period, **as and when required**
		(iii) Setup solution: Detector and Mass calibration Solution to cover the warranty period, **as and when required**
		(iv) The date of warranty period for GC-MSMS, UPS system with batteries, PC, Printer, Gas cylinders with its accessories and all associated supply of GC-MSMS, which will start from the date completion of IQ, OQ and PQ of GC-MSMS.
		(v) It should cover hardware, software as well as wear and tear consumables* (except column and sample preparation), Up-gradation of software to the latest version (if applicable), prompt service (within 24-48 hours on-call), training and application support during the period. Tentative list of wear and tear consumables (but not limited to): Septum - 2 Boxes per year Ferrule - 5 Boxes of each type per year Suitable Liner - Minimum 2 Packets per Year Filament: 2 Per Year or as and when required 10 µl Syringe: 10 Nos.
		(vi) In case of breakdown of the system, the servicing to be done immediately by the supplier during the warranty period and maximum down time period is 24-48 hrs, if it's not attended the warranty will extend accordingly.
		(vii) At least two preventive maintenance visit shall be carried out annually, including supply of PM Kit at every PM Visit free of cost during warranty period.
		(i) Should have a good after sales service/technical support capable of reaching at short notice the places where GC-MS/MS is proposed to be installed. Visits and unlimited breakdown calls by service/application support, engineers should attend within 48 hrs without fail for GC-MS/MS System, including Computer, Printer and UPS sytem.

29	**After sales service/ Post warranty**	(ii) Troubleshooting (Instrumentation/Application) as and when required free of cost
		(iii) Training twice in a year, free of cost
		(iii) The vendor should also assure supply of spares, accessories, consumables and service for at least 10 years.
		(iv) Both AMC & CMC Price for GC-MS/MS to be quoted separately, for 3 years after warranty. Terms and conditions for the AMC & CMC after the warranty period has to be specified.
		(v) The application and method development support must be rendered, as and when required.
		(vi) AMC price for 3 years after warranty quoted by the vendor will be considered for finalizing the L1. However it needs to be submitted separately as a price breakup document.
30	**Demonstration and Training of personnel**	(i) Demonstration and Training on system to our Lab personal at site to be incorporated, responsibility of the supplier for training of the lab personnel at supplier site/installation site
		(ii) Basic training for a period of not less than10 working days after installation of the equipment to technical personnel and further for method development whenever required during warranty and AMC period should be provided free of cost.
		(iii) One general entry-level training-cum-workshop and one advanced-level training-cum-workshop must be arranged at the user's site by the vendor on experimental and data analysis part, with no extra cost involved.
		(iv) Trouble shooting training along with Application support for developing validating at least one ***priority*** parameter or selected by the lab.
		(v) The instrument supplier shall demonstrate/ establish instrument analytical method for Pesticides residues, Ethylene oxide analysis (including its reaction product 2-chloroethylene) or as per the requirement of the User Laboratory.
		(i) The following accessories, but not limited to, should be supplied along with instrument:
		(a) PM kit for GC, Auto Sampler and MASS sufficient for trouble free operation during warranty period should be provided along with instrument.
		(b) Standard Tool kit should be provided for Instrument maintenance
		(c) Auto sampler vials with caps: 2000 Nos each (Amber & Transparent)
		(d) Injector port Septa- 200 Nos
		(e) Suitable glass inserts for 2 ml vials-1000 nos.
		(f) Injector port liners – 20 liners for each type of injectors and based on application of Pesticide residues, PCB etc.
		(g) Syringe 10 µl: 10 No each based on type of application of Pesticide residues, PCB, etc.

31	**Spares and accessories**	(h) EI Filaments: 10 No
		(i) Helium Trap: 2 Nos., **Argon Trap: 2 Nos., Nitrogen Trap: 2 Nos.**
		(j) Vacuum Pump Fluid: 4 L
		(k) Column nut and MS interface nut: 25 each
		(l) MS consumables kit
		(m) Ferrules (GVF or equivalent) suitable/compatible for both Inlet and MS interface separately - 5 pks each
		(n) Capillary Column cutter- 10 Nos
		(o) Deactivated glass wool – 1 Pack
		(p) Inlet seals & O-rings-20 Nos.
		(q) Mass Calibration Compound -2 qty
		(r) Replacement trap any other material required to make the instrument functional should be provided
		(s) QUECHERS Kit for pesticides extractions and clean up 1000 nos
		(t) Branded 20 ml Amber colour headspace vial with PTFE screw caps for Stock standard storage – 500 Nos
		(u) Branded Single Channel micro pipettes with two decimel that are perfect companion for daily, repetitive liquid handling in laboratories, of capacity 50-1000 µl- 04 nos.; 10-100 µl- 04 nos.; 1000- 5000 µl- 02 nos to be supplied along with the instrument.
		(v) Reputed Branded Single Channel pipette: 1-10 ml – 2 Nos.
		(w) Two nos. Of Portable Bench top heavy duty vortex mixer to be supplied along with instrument which is designed to facilitate hands-free mixing in tubes, flasks, vials with digital display. Speed range: 500-2500rpm or better Timer: 1 min to 99 hr 59 min or better Orbit: 3.0 mm or better. Electrical: 100-240 V, 50-60 Hz Operating temperature range: +5 deg C to +50 deg C or better. Capable of vortexing broad range of vessels, racks and applications (horizontal and vertical) Accessories tube racks required for variety of tubes :
		· 50 x 1.5/2 ml (2 no.s) or more
		· 50 x 15 ml (2 no.s) or more
		· 15 x 50 ml (6 no.s) or more
		· 9 x 50ml, Horizontal Quechers method (2 nos) or more

32	**System performance requirement**	**(i) Repeatability:** Should be able to demonstrate RSD < 5% for 1 µl injection of 1 ppb standard solution of Organochlorine pesticides without internal standard should be provided by supplier along with tender documents in Matrix- Fish, Milk, Honey and water. (Calibration data, Chromatograms, Experimental data, Injection volume, COA of standard/ column used to be provided)
33	**Experience**	(i) The supplier should have at least two successful installations or more of the model/ equivalent series of model quoted preferably operating GC-MS/MS in India.
		(ii) The Complete users list for the quoted model/ equivalent series in India, with contact addresses, emails and phone numbers should be provided.
34	**General conditions of supply**	(i) The instrument and all its sub units should operate on 240 volts 50 Hz power supply.
		(ii) All the operation and maintenance manuals, circuit diagrams, application notes and application software's to be supplied should be in English language.
35	**Note**	**(i) Bidder should refer above table of specifications and while quoting, additional column should be added to endorse <u>compliance/ non-compliance statement</u> of each point and additional features if any with part numbers and submit, if fails the quote will be summarily rejected.**
		(ii) One-point contact for all system for AMC or any other requirement for service support.
		(iii) AMC price quoted by the vendor will be considered *for finalizing the L1. However it needs to be submitted separately as a price breakup document.*

Annexure-II

Technical Specifications of LC-MS/MS

Sl. No.	SPECIFICATION	REQUIREMENT
1	**LC-MS/MS (Triple Quadrupole)**	(i) A Bench Top/ **Floor Based** High sensitive Triple/Tandem Quadrupole LC-MS/MS System for Pesticides, Mycotoxins, Antibiotics and Veterinary drug residues analysis with software to meet FSSAI requirements as well as global food regulatory requirement for organic food products. The system sensitivity should meet regulatory guidelines for contaminants in Food and Agricultural products.
2	**Mass Range**	(i) 20 to 2000m/z or better
3	**Scan speed**	(i) Should have the scan speed of 12,000 amu/sec or more in Triple Quadrupole mode
4	**Mass stability**	(i) Mass drift <0.1 Da over a 24-hour period
5	**Interface**	(i) Orthogonal off axis source or any other equally efficient technology capable of avoiding interferences from solvents and other extraneous matter, handling large batches of various matrices of food and agriculture products like fruits & vegetables, grains, cereals and milk and milk products, fish and fish products etc over a long period of time without performance degradation.
6	**Ionization source**	(i) Compatible to both ESI and APCI source, with facility of interchanging easily by the user, and auto-detection of installed probe by the instrument and softare
		(ii) Ionization ESI and APCI sources to be provided as standard, with facility of interchanging easily by the user, and auto-detection of installed source by the instrument and software. The ionization must be done both in a positive & negative mode.
		(iii) The source should be easily removable from the system to facilitate user cleaning without venting the vacuum, with automatic standby of system while the source / probe is being removed.
		(iv) The source shall have a flow rate compatibility from 10 µL/min to 1000 µL/min or better, without flow splitting in both ESI and APCI modes
		(v) Switching between positive & negative mode should be ≤ 25 ms or better.
		(vi) Desolvation temperature for ESI and APCI sources should be 500°C or better
		(vii) All source parameters to be adjustable through software.
7	**Source cleaning**	(i) The cleaning of the source should be done without venting the system and facility to Vacuum Interlock should be provided. The Vacuum must remain intact during the cleaning, Source interchange or Servicing of the system. Vendors must assure the same in writing.
8	**Infusion Device**	(i) Infusion device must be integral to the instrument for direct sample/ Tuning Solution introduction and must be controllable from the instrument software to allow tuning and calibration solutions to be infused into the probe via a selection valve.
9	**Vacuum system**	(i) A robust high efficiency oil less vacuum system with minimum maintenance and utility with low noise level and automatic vacuum lock system.
10	**Triple Quadrupole**	(i) Quadrupoles having high standards of mechanical tolerances and minimum coefficient of Thermal expansion to ensure highest mass stability to ensure excellent focusing of Ions into all the Quadrupoles for high sensitivity and resolution in both Q1 and Q3.
11	**Instrument Detection limit**	(i) ESI Positive Mode: IDL for Reserpin**e < 0.4 fg** or better for 1 fg on column (609/195)
		(ii) ESI Negative Mode: IDL for Chloramphenicol **< 0.4 fg** or better for 1 fg on column (321/152)

12	**MS/MS Sensitivity (SRM/MRM) Performance specification**	(i) ESI positive Ion Sensitivity: The signal/noise ratio for 1pg of reserpine should be >1500000:1 or better, in MRM mode of reserpine at the transition m/z 609–m/z 195 (Proof document /application note to be enclosed along with technical tender document)
		(ii) ESI negative Ion Sensitivity: The signal/noise ratio for 1pg of chloramphenicol should be >1500000:1 or better, in MRM mode of chloramphenicol at the transition m/z 321–m/z 152(Proof document/application note to be enclosed along with technical tender document).
		(iii) Documentary evidence in both MRM ESI +ve/ MRM ESI-ve mode to be submitted along with quotation. For ten injections, %RSD should be <5%. Chromatograms to be provided, with details of mobile phase, column and injection volume. Statistical treatment used to determine S/N ratio is to be specified along with raw data.
13	**Collision cell**	(i) Specially designed curved collision cell or suitable design to reduce the chemical back ground noise and increase effective S/N.
		(ii) Dwell time: Minimum 1 milliseconds without sacrificing sensitivity and eliminate Cross-Talk to enable Multiple MRM Transition Studies within a single run.
14	**Mass Resolution**	(i) Better than unit mass., i.e. 0.70 Da FWHM for quantitative scans.
		(ii) Must be automatically adjusted to desired resolution
15	**Mass accuracy**	(i) Mass accuracy should be +/- 0.1 Da.
16	**MRM Acquisition rate**	(i)Should be capable of minimum 500 MRM or better data points /sec in a single time period, with no loss in sensitivity for co-eluting components at any one point of time.
17	**Divert valve**	(i) Should be under fully automated data system control.
		(ii) Should enable the user to switch the solvent front, gradient end and any other portion of the HPLC run to waste.
		(iii) Allow user to define the default state of the valve and change state in time Segments
18	**Scan functions/ Operating Modes**	Tandem mass spectrometry should have following scan options
		(i) Full scan
		(ii) Selected ion monitoring/recording (SIM/SIR)
		(iii) Product ion scanning.
		(iv) Precursor ion scanning.
		(v) Neutral loss/gain scanning.
		(vi) Multiple reaction monitoring.
		(viii) Fully Automatic tuning & Mass Calibration.
19	**Dynamic range**	(i) 6 orders of magnitude or better
20	**Detector**	(i) Must have very long life, low noise, highly efficient photomultiplier, or electron multiplier detector or equivalent
		(ii) The detector should last for the lifetime of the instrument, or must be replaced free of cost in case of breakdown within 10 Years. ***(Undertaking has to be submitted by the qualified bidder, in this regard)***

21	**HPLC**	(i) Binary solvent system with degasser, Auto sampler, Column oven. (ii) The complete system and the MS should be controlled by the single software (iii) The system should have the capability to operate the column range from sub 2µm particle size (iv) Total system (including pump and auto sampler) should be capable of operation up to 15000 psi or better
		Pump: (i) Number of solvents: Up to four, in combination of two. (ii) Solvent conditioning with built in Integrated vacuum degassing (iii) Operating Flow Rate: 0.1 to 2.000 ml/min, with Gradient profiles. (iv) Gradient formation: High pressure mixing, binary gradient (v) Leak sensors as standard, and safe leak handling (vi) Plunger Seal Wash Integral, active, programmable (vii) pH range pH 2 to 12 or better
		Auto sampler: (i) Total system (including pump & Auto sampler) should be capable of operation at 15000 psi or better. (ii)The system should have an auto-sampler capable of holding at least two no. of sample plates and approximately. 90 vials (1.5 to 2ml) or more. (iii) Injection volume range: 1-100µl (iv) Sample delivery precision:< 1% RSD or better (v) Injector linearity: r2>0.999 or better (vi) Sample Temperature 4 - 40 deg. C (vii) Temperature accuracy ±2 °C
24	**Column oven**	(i) Column Temperature ambient to 85 deg. C.
		(ii) Column oven to accommodate 10-15 cm length column or higher.
		(iii) Atleast two column should be accommodated.
25	**Columns**	(i) Branded Twelve no. (12 Nos.) End capped columns as per the application notes
		(ii) Six Nos of C18 2.1 x 100 mm, (1.7-2.5) µm or equivalent (Pesticides)
		(iii) Six Nos. of C18 2.1 x 100 mm, (1.7-2.5) µm or equivalent (Antibiotics)
		(iv) Three column for fat soluble vitamins
		(v) Three column for Water soluble vitamins.
		(vi) Two Nos of Column for Analysis of multiclass polar pesticides.
		(vii) Two Nos of Hilic Column for melamine analysis.
		(Application notes shall be provided for the above all)
		(viii) Suitable guard column with connecting union for each above application should be supplied along with instrument
		Must be capable of performing the following functions and should be upgradable:

26	**Quantification Software**	(i)The HPLC, MS should be single point software control and from one source solution or same vendor. Software must be compatible with LC/MS/MS data. Data can be full scan, SIR/SIM or MRM.
		(ii) Latest version of software which full fills the requirement of 21 CFR part 11, Food safety compliance. Compatible to LIM
		(iii) Data Acquisition, Peak Integration, Calibration, Quantification and QC calculation must be fully automated.
		(iv) Application software for quantitative applications having the additional requirement of Quality Control (QC) checks to satisfy statutory or regulatory requirements must be available.
		(v) Quantification and QC parameters must be stored for each compound and individually selected and loaded into new methods.
		(vi) The quantification method editor must be viewable in page view or as a spreadsheet.
		(vii) The software must allow the monitoring of the molecular ion plus up to 4 confirmatory ions.
		(viii) Technology for system optimization and status monitoring, technology should monitor and perform the following parameter:
		(a) System parameters checking and alerts
		(b) Integrated sample/calibrant delivery system and programmable divert valve
		(c) Automated mass calibration
		(d) Automated sample tuning
		(e) Automated MRM method development
		(f) LC/MS system checks-automated on-column performance test.
		(ix) The application software must flag samples in the report when:
		(a) The ion ratios fall out-with the user-defined values
		(b) The coefficient of determination for a calibration curve falls below a user-set level
		(c) QC samples fall outside a user-defined number of standard deviations from the mean
		(d) the peak of the compound of interest falls below a user defined S/N ratio
		(x) Software should have the latest MRM library database of 1000 or more compounds viz. (Antibiotic residues, veterinary drugs residue, Pesticides, etc.)
		(xi) Pesticide database should contain Molecular formula, Mono isotopic mass, Parent ion, Product ion 1, Collision energy(eV) Product ion 2, and vendor specific compound optimisation parameters.
		(xii) Software update should be provided free of cost, upto minimum 10 Years.
27	**Workstation & Accessories:**	(i) A factory-supplied Workstation should be provided for controlling the mass spectrometer, the LC and the autosampler with data acquisition & one other PC for data processing, with the minimum following specifications:
		(a) Suitable branded PC, LED monitor 32''/24" or better, Memory / RAM: Minimum 60 GB or higher
		(b) Hard disk: 10 TB or better, CPU: Dual/i7/Processor, 3.5 GHz or better
		(ii) The quantification method editor must be viewable in page view or as a spreadsheet.
		(iii) Duplex, Black and White Laserjet printer with LAN, Network Card and Bluetooth facility.
		(iv) All hardware and software including drivers, monitor, device interfaces cards/network must be preinstalled and preconfigured on the computer provided.

		(v) Original licensed software CD of Operating system and MS office (MS-WORD, MS-EXCEL, MS-POWERPOINT).
		(vi) Should be complete with all necessary accessories with comprehensive warranty of minimum five years of all the electronic components as well as wear and tear consumables (PC, Hard Drive, Printer, etc.)
28	**Start-up Kit**	(i) LC-MS/MS start-up kit with mobile phase solvent bottles (2 sets) complete with suitable fittings / caps, solvent filters, maintenance kit should be supplied to operate the equipment at the time of installation.
29	**Nitrogen Generator with in-built compressor**	(i) A suitable noise free nitrogen gas generator with in-built compressor, filters, or any other accessory required for functioning of system, should be supplied to take care gas requirements for ionization source. The generator must have a minimum 100 psi pressure with a flow rate more than 30 L/min or higher for smooth functioning of LC-MS/MS system.
30	**Gas cylinders**	(i) **Pre requisite for MS**: If Applicable, Suitable gas cylinders of UHP grade- 3 Nos with all accessories such as dual pressure SS regulator, gas purification panel unit, cylinder cage or Bracket with automatic change over should be supplied and commissioned. The gas lining panel work should be done by the supplier for the connection of instrument.
		(ii) All the items cylinder, regulator, gas purification panel unit, cylinder cage or Bracket etc (if applicable) should be covered under five years' comprehensive warranty.
		(iii) The following documents should be supplied along with the cylinder: (a) Manufacturer Certificate; (b) Hydrostatic test certificate; (c) The Chief Controller of Explosives, Nagpur (CCOE-NAGPUR) gas filling approval certificate and (d) Purity certificate.
31	**UPS system and Pre requisite**	(i) Reputed Branded online UPS of 15 KVA capacity or above better suitable with power factor correction and harmonic. Three phase 440V/240V for the smooth running of LC-MS/MS with back-up of minimum 1 hr with 80 % load capacity for the complete system should be provided.
		(ii) The electrical work of the UPS should be done by the supplier for the connection of instrument.
		(iii) Comprehensive warranty of minimum 5 years inclusive of SMF batteries should be provided
		(iv) All the UPS batteries should be replaced by brand new batteries with warranty certificate two months before completion of warranty period of LC-MS/MS and the performance of UPS should be verified. Satisfactory performance certificate of UPS should submit to the laboratory by the LC-MSMS supplier and UPS supplier together.
		(v) The maintenance of UPS and batteries is responsibility of LC-MSMS supplier. Any malfunction of LC-MSMS due to UPS and its batteries failure, the supplier of LC-MSMS has to take whole responsibility and rectify the same during warranty period.
		(vi) Any other gas cylinder (Gas purity: ≥ 99.999% UHP grade) for the working of the system shall be provided minimum one number with all accessories such as dual pressure SS regulator, gas purification panel unit, cylinder cage or Bracket etc. should be supplied.

32	**Instrument and Software Qualification / Performance Verification IPV (IQ,OQ,PQ)**	(i) The instrument must be "Qualified" along with the Software. Necessary reagents along with Documents must be provided. During installation and qualification, Instrument should perform as per submitted specification in presence of user.
		(ii) IQ/OQ/PQ to be performed as per OEM protocol, should be done free of cost with necessary traceable standards along with necessary performance kit standard solutions
		(iii) Documents, Kits & standards etc. as required being supply along with the instrument
		(iv) To be done free of cost with traceable calibration standards for the first 5 years' warranty period (at installation & at every maintenance visit of each year) along with PM kits.
		(v) OQ/IPV should be done free of cost with supply of PM Kits and calibration standards at least once in a year during warranty period.
		(vi) Documents, PM Kits & calibration standards etc. to be supply along with instrument and at every PM visit free of cost during warranty period.
		(vii) Satisfactory performance certificate should submit to the laboratory after calibration of LC-MSMS before one month of warranty period expired with supply and fixation of PM kits of HPLC and MS system.
33	**Warranty**	(i) Minimum 5 years from the date of completion of IQ, OQ and PQ of LC-MS/MS to the satisfaction of lab including Nitrogen Generator and UPS system with batteries and all accessories.
		(ii) Tune solution: Tuning and performance solution to cover the Warranty period, as and when required
		(iii) Setup solution: Detector and Mass calibration Solution to cover the warranty period, as and when required
		(iv) The date of warranty period for LC-MSMS including Nitrogen Generator, UPS with batteries, PC, Printer, Gas cylinders with its accessories and all associated supply of LC-MSMS, which will start from the date completion of IQ, OQ and PQ of LC-MSMS.
		(v) It should cover hardware, software as well as wear and tear consumables (except column and sample preparation), Up-gradation of software to the latest version (if applicable), prompt service (within 24-48 hours on-call), training and application support during the period. Tentative list of wear and tear consumables (but not limited to): (i) UPLC/ HPLC Consumables such as Ferrules, Peak Tubing, Needle Seal, Plunger Seal or equivalent (ii) Ion Source Capillaries, Nut, etc. as per the ion source design (as applicable).
		(vi) In case of breakdown of the system, the servicing to be done immediately by the supplier during the warranty period and maximum down time period is 24-48 hrs, if it's not attended the warranty will extend accordingly.
		(vii) At least two minimum preventive maintenance visit shall be carried out annually, including supply of PM Kit at every PM Visit free of cost during warranty period.

34	**After sales service/ Post warranty**	(i) Should have a good after sales service/technical support capable of reaching at short notice the places where LC-MS/MS is proposed to be installed. Visits and unlimited breakdown calls by service/application support, engineers should attend within 48 hrs without fail for LC-MSMS including Nitrogen Generator and UPS.
		(ii) Troubleshooting (Instrumentation/Application) as and when required free of cost
		(iii) Training twice in a year, free of cost
		(iv) The application and method development support must be rendered, as and when required.
		(v) The vendor should also assure supply of spares, accessories, consumables and service for at least 10 years including Nitrogen generator.
		(vi) Both AMC & CMC Price for LC-MSMS including Nitrogen Generator to be quoted separately. Terms and conditions for the comprehensive AMC after the warranty period has to be specified.
		(vii) AMC price for 3 years after warranty quoted by the vendor will be considered for finalizing the L1. However it needs to be submitted separately as a price breakup document.
35	**Demonstration and Training of personnel**	(i) Demonstration and Training on system to our Lab personal at site to be incorporated, responsibility of the supplier for training of the lab personnel at supplier site/installation site
		(ii) Basic training for a period of not less than10 working days after installation of the equipment to technical personnel and further for method development whenever required during warranty and AMC period should be provided free of cost.
		(iii) One general entry-level training-cum-workshop and one advanced-level training-cum-workshop must be arranged at the user's site by the vendor on experimental and data analysis part, with no extra cost involved.
		(iv) Trouble shooting training along with Application support for developing validating at least one ***priority*** parameter or selected by the lab.
		(v)Should be able to demonstrate RSD < 5% for 10µl injection of 0.5µg/kg standard solution containing group of pesticides without internal standard should be provided by supplier along with tender documents in Matrix- Tea and spices for Pyridalyl, Spinosad, Dinotefuran.
		(vi) Analysis of polar pesiticides in the range of 1-5 ppb for organic certification.
		(vii) The instrument supplier shall demonstrate/ establish instrument analytical method for Pesticides residues, Antibiotic Residues or as per the requirement of the User Laboratory.
		The following accessories, but not limited to should be supplied along with instrument:
		(i) PM kit for HPLC and MS sufficient for trouble free operation during warranty period should be provided along with instrument.
		(ii) Branded Single Channel micro pipettes with two decimel that are perfect companion for daily, repetitive liquid handling in laboratories, of capacity 50-1000 µl- 04 nos. 10-100 µl- 04 nos., 1000-5000 µl- 02 nos to be supplied along with the instrument.
		(iii) Capillary Tube/Cone/Desolvation line/ other similar accessories (as applicable) – 10 Nos,
		(iv) All required standards for Mass calibration and tuning, HPLC calibration should be provided
		(v) Vials (1.5/2.0 mL) with cap and septa 1000 Nos should be provided.

36	**Spares and accessories**	(vi) Amber colour vials (1.5/2.0 mL) with cap and septa 2000 Nos should be provided. (vii) Syringe PTFE Filter, 13mm, 022µ – 1000 No. s (viii) Standard Tool kit should be provided for Instrument maintenance (ix) Reputed highly branded solvent filtration unit with pump and required accessories to be provided (x) Branded Mobile phase bottles 500 ml-12 no's and 1000 ml -12 no's with caps fixing solvent lines (xi) 12 nos. of one-litre mobile phase branded bottles should be supplied. (xii) Low volume 500 µl sintered/recovery vials with suitable caps/septa – 1000 nos. to be supplied (xiii) QUECHERS Kit for pesticides extractions-1000 no's (xiv) One no. of Portable Bench top heavy duty Multi tube vortex mixer to be supplied along with instrument which is designed to facilitate hands-free mixing in tubes, flasks, vials with digital display. Speed range: 500-2500rpm or better Timer : 1 min to 99 hr 59 min or better Orbit : 3.0 mm or better Electrical : 100-240 V, 50-60 Hz Operating temperature range: +5 deg C to +50 deg C or better Capable of vortexing broad range of vessels, racks and applications(horizontal and vertical) Accessories tube racks required for variety of tubes : (a) 50 x 1.5/2 ml (2 no.s) or more (b) 50 x 15 ml (2 no.s) or more (c) 15 x 50 ml (6 no.s) or more (d) 9 x 50ml, Horizontal Quechers method(2 no.s) or more
37	**System Performance Certificate**	(i) The requirements in this section pertain to the working requirements of the system. Any claims made in the compliance statement should be substantiated by giving suitable detailed outputs from the quoted model of the instrument generated at the applications lab of the supplier, in the form of reports for easy reference. (ii) Proof of Performance documents must be provided with the Compliance sheet. (iii) The reports should necessarily include the instrument output data, graphs and chromatograms. Using the quoted model of the instrument at the applications lab of the supplier/manufacturer. (iv) The model offered by the vendor should have capability to demonstrate the above mention parameter in presence of user. (v) All provided brochures or technical data sheet should be available in supplier's public website. (vi) Satisfactory performance certificate taken from government organization along with technical bid shall be submitted. (vii) The details of nearest service support centre with available engineer's and application specialist's name and contact details must be provided in the technical bid.

38	**Experience**	(i) The supplier should have at least two successful installations or more of the model/ equivalent series of model quoted preferably operating LC-MS/MS in India.
		(ii) The Complete users list for the quoted model/ equivalent series in India, with contact addresses, emails and phone numbers should be provided.
39	**General conditions of supply**	(i) The instrument and all its sub units should operate on 240 volts 50 Hz power supply.
		(ii) All the operation and maintenance manuals, circuit diagrams, application notes and application software's to be supplied should be in English language.
40	**Note:**	**(i) Bidder should refer above table of specifications and while quoting, additional column should be added to endorse compliance/ non-compliance statement of each point and additional features if any with part numbers and submit, if fails the quote will be summarily rejected.**
		(ii) One-point contact for all system for AMC or any other requirement for service support.
		(iii) AMC price quoted by the vendor will be considered *for finalizing the L1. However it needs to be submitted separately as a price breakup document.*

Annexure-III

Technical Specifications of ICP-MS

SI. No.	SPECIFICATION	REQUIREMENT
1	**Inductively Coupled Plasma Mass spectrometer**	(i) Latest and advanced technology bench-top ICP-MS with cell collision & reaction cell technologies. The system should be complete in all respects with built in features of hardware & software.
		(ii) Analysis of trace metals to ppb/ppt level in diverse kind of samples like Food, Sea food, Water, etc.
		(iii) Capable of analyzing all the metals precisely and accurately in ppm, ppb and ppt levels.
		(iv) The system should be a space saving, compact bench-top model that can fit into allocated lab space with all the sub-systems and accessories.
		(v) All internal and external parts should be made of corrosion-resistant material.
		(vi) Open architecture design for sample introduction system for ease of operation in switching between GC/LC/IC.
2	**Sample Introduction**	(i) Integrated computer controlled minimum 4-channel peristaltic pump with 10/12 roller suitable arrangements.
		(ii) Integrated Peltier cooled spray chamber (below 10 or better) for effectively improving signal stability and reducing oxide interferences
		(iii) Concentric Micro mist or similar system with low sample flow rate
		(iv) Quartz low volume Scott-type double pass spray or equivalent suitable for different sample environments
		(v) System should have integrated and software controlled accessories for 100 fold or more dilution capabilities to handle total dissolved solids (TDS)
		(vi) Online Internal Standard Kit to be offered along with splitter & tubing set.
		(vii) High matrix introduction system (HMI)using argon gas dilution or similar acessories should be able to analyze samples with percentage level TDS. All necessary accessories required for running high matrix high TDS samples should be included as standard supply.
3	**Plasma and Torch Setup**	(i) RF power range: 600-1500W or better.
		(ii) RF Generator: 27/34 Mhz.
		(iii) Easy mountable single piece quartz torch.
		(iv) Torch Alignment: X,Y,Z automatic and computer controlled.
		(v) Provision for Auto-alignment of the torch after routine maintenance with a reproducibility better than 0.1 mm in x-y-z directions.
		(vi) Should have at least software controller variable 04 Active Mass Flow Controllers (AMFC) to control plasma, auxiliary makeup, carrier gases and makeup/dilution gas.
4	**Interface**	(i) Cone Interface: ICPMS system must have Single interface to achieve all guaranteed performance specifications of ICP-MS instrument without any manual intervention or changeover for high matrixes, high sensitivity, and high TDS samples. Platinum tipped cones (additionally 02 sets of platinum cones must be supplied).
		(ii) Skimmer Cone: Ni or Pt tipped Skimmer cone (additionally, 02 Sets of Skimmer Cone must be supplied)

		(iii) Ion Lens: off-axis ion lens or suitable design to provide high ion transmission and low backgrounds to deliver superior detection limits, sensitivity, and oxide ratio.
5	**Collision Reaction Cell technologies**	(i) System equipped with best in line technology: Capable of operating in Standard (No gas), Collision modes and Reaction mode (Pure or Premix gas form) should be able to remove polyatomic interferences as per all national and international regulations.
		(ii) Fully automated and software-controlled changeover between No gas, Collision and Reaction mode without any manual intervention with dedicated MFC/EFC for collision and reaction Gas Cell gas must be automatically changed with switching time of 10- 15 sec or better.
		(iii) There should be Separate gas lines with dedicated MFC/EFC for Collision and Reaction gas as per system requirement.
6	**Mass Analyzer and Detector**	(i) A quadrupole mass analyzer to provide effective ion transmission, superior resolution and abundance sensitivity, Quadrupole based, 2.0 MHz or more.
		(ii) Mass Range: 5- 260 amu or better to analyze all elements.
		a. Low Mass Side: ≤ 5 x 10-7
		b. High Mass side: ≤ 1 x 10-7
		(iii) True Linear Dynamic:10 orders ≤0.3cps to ≥10^9cps or better without any hardware interchange or software adjustment.
		(iv) Dwell time: ≤1ms or better.
		(v) Scan speed: ≥3000 amu/s or more.
7	**Performance Specifications**	**Guaranteed/factory specifications will be considered and Not the Typical performance**
		Detection Limit ng/L (ppt)
		(i) Low mass (Be^9/Li): ≤0.5
		(ii) mid mass Y/In/Co59 ≤0.1
		(iii) High Mass U/Tl/Bi : ≤0.1
		(iv) Sensitivity (M cps/mg/L)
		(v) Low mass (Be^9 / Li) :≥50 or better
		(vi) Mid Mass In/Y : ≥160 or better;
		(vii) High Mass U/TI/Bi : ≥80
		(viii) Oxide ratio: CeO^+/Ce^+ <2.5%;
		(ix) Isotope-ratio Precision: Ag107/109 : 0.3% RSD
		(x) Background noise (no gas mode) @ 4/9 amu or suitable : <1cps
		(xi) Mass resolution (5-260 amu) : Variable ≤0.4 to ≤1 amu or better & should be definable in mass range 5-260amu
8	**Detector**	(i) The ion detector should be a discrete Dynode electron multiplier unit or equivalent. Detector should be able to analyze high and low concentration simultaneously
		(ii) It should have true Linear Dynamic range of 10 orders of magnitude.
		(iii) Both the analog and pulse counting modes should be protected against overload. Integration time 100µs in both pulse count and analog modes as per system hardware requirement.

9	**Vacuum system**	(i) Should have rotary pump and turbo molecular pump with split flow for extremely high gas throughput. Vacuum should be 5 x 10-6 mbar or suitable range in open valve condition and shall be 1x10-6 mbar or suitable range in closed valve condition or suitable specifications as per system design requirement.
10	**Software**	(i) User-friendly that guide users through method and sequence development and method templates for rapid development of commonly used methods. The software must be 21 CFR Part 11 compliant.
		(ii) Software should control plasma, MS and other accessories like auto sampler.
		(iii) Software control for automatic data acquisition and processing mass spectrometer tuning and calibration auto and manual.
		(iv) Data Validation
		(v) Self-diagnostics
		(vi) Multi element analysis capability
		(vii) Isotope ratio and dilution
		(viii) Cool Plasma or other facility to eliminate polyatomic interferences
		(ix) Remote diagnostics
		(x) The system software shall support the following calibration curve fit modes for Quantitative analysis:
		a. Linear least squares.
		b. Weighted linear least Squares
		c. Linear forced-through-zero least squares.
		(xi) Real time graphics with ability to display transient and continuous signal profiles.
		(xii) Quantitative analysis including external calibration, additions calibrations, method of standard additions, isotope ratios and isotope dilution's and semi quantitative analysis.
		(xiii) On-line help with quick steps to reference entire instrument user manual.
		(xiv) Data reprocessing on stored data without re-running samples for changes of calibration points, internal standard points or curve fit mode.
		(xv) Software update should be provided free of cost, upto minimum 10 Years.
11	**Auto Sampler cum auto dilutor**	(i) An auto sampler should be provided with a sample vial capacity (≤15 ml and 50ml) of minimum 60 with 15 ml, 50ml and ≤15 ml capacity tube racks for different volume with online internal standard addition. Integerated Software controlled inline autodilution facility.
12	**Chiller**	(i)Efficient thermal management refrigerated recirculating water chiller along with all necessary accessories required for running the ICPMS
13	**Workstation & Accessories:**	(i) A Workstation should be provided for controlling the ICPMS and the auto-sampler with data acquisition & for data processing and analysis with minimum following specification:
		(ii) Suitable branded PC, LED monitor 24'' or better, Memory / RAM: Minimum 60 GB or higher.
		(iii) Hard disk: 10 TB or better, CPU: Dual/i7-Processor, 3.5 GHz or better.
		(iv) Operating system: Latest Windows configuration, 64 - bit or better.
		(v) Duplex, Black and White Laserjet printer with LAN, Network Card and Bluetooth facility.
		(vi) All hardware and software including drivers monitor, device interfaces cards/network must be preinstalled and preconfigured on the computer provided.

		(vii) Original licensed software Operating system and MS office (MS-WORD, MS- EXCEL, MS-POWERPOINT).
		(viii) Should be complete with all necessary accessories with comprehensive warranty of minimum 5 years of all the electronic components as well as wear and tear consumables (PC, Hard Drive, Printer, etc.).
14	**Gas Lines and Cylinders**	(i) **Pre requisite for ICP-MS**: Suitable gas cylinders of UHP grade- Argon - 4 nos.; Others - 02 Nos. each (with requisite certificate) with all accessories such as dual pressure SS regulator, gas purification panel unit /Inline filters such as Oxygen trap, Moisture trap, etc. Cylinder cage or Bracket should be supplied and commissioned. The supplier for the connection of instrument should do the gas lining panel work.
		(ii) Branded Automatic gas manifold for gas changeover (2 sets) to be supplied and commissioned by the supplier at their own at the lab All the items cylinder, regulator, gas purification panel unit, cylinder cage or Bracket etc. should be covered under five years' comprehensive warranty with at least one Preventive maintenance along with PM kit each year. PM kit should cover Tuning solution, Sampler cone, Skimmer cone, Torch etc.
		(iii) The following documents should be supplied along with the cylinder: (a) Manufacturer Certificate; (b) Hydrostatic test certificate; (c) The Chief Controller of Explosives, Nagpur (CCOE-NAGPUR) gas filling approval certificate and (d) Purity certificate.
15	**Exhaust unit for the ICP-MS**	(i) Reputed Exhaust unit for the ICP-MS has to be supplied along with the System and commissioned by the supplier at their own at lab premises.
16	**Uninterrupted Power Supply(UPS) system**	(i) Reputed True online Branded UPS system of 20 KVA capacity or above better suitable with power factor correction and harmonic. Three phase 440V/240V for the smooth running of ICP-MS with battery back-up of minimum 1 hr with 80 % load capacity with comprehensive warranty of minimum 5 years inclusive of SMF or latest. The electrical work of the UPS system should be done by the supplier for the connection of instrument.
		(ii) All the UPS system batteries should be replaced by brand new batteries with warranty certificate two months before completion of warranty period of ICP-MS and the performance of UPS system should be verified. Satisfactory performance certificate of UPS should submit to the laboratory by the ICP-MS supplier and UPS system supplier together.
		(iii) The maintenance of UPS system and batteries is responsibility of ICP-MS supplier. Any malfunction of ICP-MS due to UPS and its batteries failure, the supplier of ICP-MS has to take whole responsibility and rectify the same during warranty period.
		(i) The instrument must be "Qualified" along with the Software. Necessary reagents along with Documents must be provided. During installation and qualification, Instrument should perform as per submitted specification in presence of user.
		(ii) IQ/OQ/PQ to be performed as per OEM protocol, should be done free of cost with necessary traceable standards along with necessary performance kit standard solutions.
		(iii) Documents, Kits & standards etc. as required being supply along with the instrument

17	**Instrument and Software Qualification/ Performance**	(iv) To be done free of cost with traceable calibration standards for the first 5 years' warranty period (at installation & at every maintenance visit of each year) along with PM kits.
		(v) OQ/IPV should be done free of cost with supply of PM Kits and calibration standards at least once in a year during warranty period.
		(vi) Documents, PM Kits, Tuning solution, setup solution, calibration standards, Plasma Torch,Sampler and skimmer cones etc. to be supplied along with instrument and at every PM visit free of cost during warranty period.
		(vii) Satisfactory performance certificate should submit to the laboratory after calibration of ICP-MS before one month of warranty period expired with supply and fixation of PM kits of ICP MS system along with Chiller.
18	**Warranty for ICP including MDS**	(i) Minimum 5 years from the date of completion of IQ, OQ and PQ of the equipment to the satisfaction of lab including Chiller, UPS system with batteries, Microwave Digestion system and all accessories. (with free replacement of any part).
		(ii) Tune solution: Tuning and performance solution to cover the Warranty period.
		(iii) Setup solution: Detector and Mass calibration Solution to cover the warranty period.
		(iv) NIST calibration standards 21 elements 100ppm (250ml) to cover the warranty period.
		(v) The date of warranty period for ICP-MS including Chiller, UPS system with batteries, PC, Printer, Gas cylinders with its accessories and all associated supply of ICP-MS, which will start from the date completion of IQ, OQ and PQ of ICP-MS.
		(vi) It should cover hardware, software as well as wear and tear consumables (except column and sample preparation), Up-gradation of software to the latest version (if applicable), prompt service (within 24 hours on-call), training and application support during the period.
		(vii) In case of breakdown of the system, the query has to be attended immediately within 24 hrs & servicing to be done within 48 hrs by the supplier during the warranty period and incase of major breakdown, maximum down time period is 1 Week, if it's not attended the warranty will extend accordingly.
		(viii) At least two minimum preventive maintenance visit shall be carried out annually, including supply of PM Kit at every PM Visit free of cost during warranty period.
19	**After sales service/ Post warranty**	(i) Should have a good after sales service/technical support capable of reaching at short notice the places where ICP-MS is proposed to be installed. Visits and unlimited breakdown calls by service/application support, engineers should attend within 48 hours without fail for ICP-MS including Chiller and UPS system.
		(ii) Troubleshooting (Instrumentation/Application) as and when required free of cost.
		(iii) Training twice in a year free of cost.
		(iv) The vendor should also assure supply of spares, accessories, consumables and service for at least 10 years.
		(v) Both AMC & CMC for ICP-MS including Chiller to be quoted separately, for 3years after warranty. Terms and conditions for the AMC & CMC after the warranty period has to be specified.
		(vi) The application and method development support must be rendered, as and when required.

		(vii) AMC price for 3 years after warranty quoted by the vendor will be considered for finalizing the L1. However it needs to be submitted separately as a price breakup document.
20	**Demonstration and Training of personnel**	(i) Demonstration and Training on system to the Lab personnel at site to be incorporated, responsibility of the supplier for training of the lab personnel at supplier site/installation site.
		(ii) Basic training for a period of not less than ten working days after installation of the equipment to technical personnel and further for method development whenever required during warranty and AMC period should be provided free of cost.
		(iii) One general entry-level training-cum-workshop and one advanced-level training-cum-workshop must be arranged at the user's site by the vendor on experimental and data analysis part, with no extra cost involved.
		(iv) Trouble shooting training along with Application support for developing & validating at least one ***priority*** parameter or selected by the lab.
		(v) The instrument supplier has to demonstrate on site validation as per the laboratory /regulatory requirements / protocols for at least four matrices multi element parameters as selected preferred by the lab.
21	**Spares and accessories**	(i) Single element standards as per FSSAI regulatory requirements (including Arsenic, Mercury & Selenium) of 100 ml of 100ppm, traceable to ISO 17034.
		(ii) Standard Tool kit should be provided for Instrument maintenance.
		(iii) Tubing – Auto Sampler to Peristaltic Pump- 25 no.s
		(iv) Auto sampler Tubes/Vials or equivalent 15ml and 50 ml -2000 Nos each along with suitable tray/ stand.
		(v) Mist/ Concentric/ Standard or equivalent nebulizer, as required - 15 nos.
		(vi) Plasma Torch- 5 nos.
		(vii) Plasma shield/Guard electrode: 05 nos.
		(viii) Bonnet: 05 nos.
		(ix) Suitable Injectors- 15 nos.
		(x) Auto sampler probe with tubing – 10 nos.
		(xi) Trace Metal Grade Acids (HNO3)- I L : 10 nos.
		(xii) Tune/Calibration Solutions 1 Each
		(xiii) Chiller coolant – 20 L
		(xiv) Chiller filter- 05 nos.
		(xv)Nickle tipped sampler, Skimmer cones with O-rings – 10 set
		(xvi) Platinum sampler, Skimmer cones with O-rings: 10 set
		(xvii) Standard spray chamber -10 Set
		(xviii) Standard Peristaltic pump tubing for drain -120 nos.
		(xix) Standard Peristaltic pump tubing for samples 120 nos.
		(xx) Peristaltic pump tubing for ISTD: 120 nos.
		(xxi) Oil Element/Mist Filter -05 set
		(xxii) Vacuum Pump oil – 20 litre
		(xxiii) Swab-cotton tipped both ends (pk/100) –50 pack

		(xxiv) Cone cleaning reagents (if required)
		(xxv) Alumina powder- 2 Pk
		(xxvi)Polishing paper Kit: 5 pk
		(xxvii) Cone/ Lens cleaning solvent/solution- 4 Nos.
		(xxviii) Air filter-15 nos
		(xxix) Argon Filter:-15 nos.
		(xxx) Instrument filter: 10 no.s
		(xxxi) Branded Single Channel micro pipettes with two decimel that are perfect companion for daily, repetitive liquid handling in laboratories, of capacity 50-1000 µl- 04 nos; 10-100 µl- 04 nos.; 1000-5000 µl- 02 nos to be supplied along with the instrument.
		(xxxii) Reputed Branded Single Channel pipette: 1-10 ml – 2 Nos. with suitable microptips-100 no's.
		(xxxiii) Branded Bottle top Acid Dispenser: 1-10 ml capacity: 10 no's.
		(xxxiv) Branded Table top Ultrasonicator (5L capacity) -1 no.
22	**System performance requirement**	(i) Should be provided by supplier along with tender (Calibration data, Spectra, Experimental data, COA of standard/ column used to be provided).
		(ii) Should be able to analyze Heavy Metals (Pb, Cu, As, Sn, Cd, Hg, Cr, Ni, Se, Sb & Methyl Mercury) at a concentration of 0.5ppb with RSD of <5% (n≥6) at standard conditions.
		(iii) A calibration curves of above elements in the 5-level concentration range with r^2 of 0.99 should be possible .
		(iv) Copy of calibration curve of above elements should be submitted along with the tender.
23	**System Performance Certificate**	(i) The requirements in this section pertain to the working requirements of the system. Any claims made in the compliance statement should be substantiated by giving suitable detailed outputs from the quoted model of the instrument generated at the applications lab of the supplier, in the form of reports for easy reference.
		(ii) Proof of Performance documents must be provided with the Compliance sheet.
24	**Experience**	(i) The supplier should have at least two successful installations or more of the model/ equivalent series of model quoted preferably operating ICPMS in reputed Government & Private Facilities in India.
		(ii) The Complete users list for the quoted model/ equivalent series in India, with contact addresses, emails and phone numbers should be provided.
25	**General conditions of supply**	(i) The instrument and all its sub units should operate on 240 volts 50 Hz power supply.
		(ii) All the operation and maintenance manuals, circuit diagrams, application notes and application software's to be supplied should be in English language.
26	**Note**	**(i) Bidder should refer above table of specifications and while quoting, additional column should be added to endorse <u>compliance/ non-compliance statement</u> of each point and additional features if any with part numbers and submit, if fails the quote will be summarily rejected.**
		(ii) One-point contact for all system for AMC or any other requirement for service support.
		(iii) AMC price quoted by the vendor will be considered *for finalizing the L1. However it needs to be submitted separately as a price breakup document.*
Microwave Digestion System		
	Requirement	**Specification**

27	**General**	(i) The instrument should have a superior pressure venting which is not temperature dependent so as to prevent any loss of volatile metals and should have homogeneous microwave field to avoid sample burning
28	**System**	(i) Microwave digestion system should have temperature and pressure control mechanism.
		(ii) The system should be software controlled.
		(iii) Necessary consumables and maintenance parts should also be quoted to run instrument trouble free
29	**Instrument Design**	(i) The system should be a standalone work station and should have:
		(a) The System should have the feature of simply choose a method and it automatically recognizes the vessel type, counts the vessels and determines all of the parameters necessary for a fast, complete digestion
		(b) Should have provision that user can set the desired parameters for digestion
		(c) Should have Automatic Microwave power application depending on the load
		(d) Auto sensing of temperature and pressure inside the vessel
		(e) Be capable of processing different amounts of samples (from 0.3 g up to 1 g per vessel/) in the same run assuring the same conditions of temperature and pressure
30	**Display**	(i) The Instrument should have the high-resolution, colour touch screen, acid resistant, LED/LCD screen should serve as controller and display
		(ii) Should provide training videos for sample preparation vessel assembly, system use, and maintenance
		(iii) Should have Data management – Easy access to stored methods, real- time data and results of past runs
		(iv) Should be able to display the detailed methods, graphs of temperature and power against time and temperature of individual vessels.
31	**Interlocks**	(i) The system should have good interlocking system for safety and cavity door.
32	**Rotor & Vessel Assembly**	(i) High pressure and high temperature rotor with at least 20 PTFE vessels, work station & with/ without torque wrench.
		(ii) Vessels on the rotor should be segmented for easy use.
		(iii) Maximum Temperature capacity of vessel up to 300 °C.
		(iv) Working Pressure capacity of vessel up to 35 bar or more. The maximum pressure capacity of vessel shall be 80 bar or better
		(v) Vessel volume: The capacity of vessel shall be 80 ml or more. Offered vessels to be provided should be able to handle volumes as minimum as 3 ml, 10 ml, 15 ml & 25ml
		(vi) Vessel ,Rotor & vent-reseal material- PTFE-TFM.
		(vii) Every vessel must have a vent-and-reseal spring to safely release the pressure in case of overpressure.
		(viii) Burst-disk membrane or self-releasing / continuous venting device are not suitable due to very low performance.
		(ix) Additionally, twelve number of vessels as specified above should be supplied with the system.
		(i) Dual Magnetron system with rotating microwave diffuser for homogenous microwave power distribution in the cavity.

33	**Magnetron**	(ii) Microwave frequency should be 2450 MHz and installed power should be 1900W minimum (two magnetrons minimum 950 W each) and should provide the temperature needed (300 °C) for difficult samples
34	**Microwave Cavity**	(i) The cavity should be made of non-magnetic Rugged high-grade 316 solid steel cavity/ stainless-steel housing with PTFE plasma coating applied at 350°C for corrosion resistance.
		(ii) Also, all hardware should have 5-layer protective coating for the resistance from acid, alkali and corrosive gases.
		(iii) The vessel assembly during a run should be visible from outside.
35	**Hardware & Safety**	(i) Instrument should have adequate safety coatings on housing to prevent any corrosion in the cavity. Additional multiple ports on the side walls of the microwave cavity
		(ii) Protected against acids and solvents with polymer coating on both inner and outer surfaces
		(iii) Self-resealing pressure responsive and explosion resistant door to ensure
		(iv) maximum safety even in case of overpressure release
		(v) Door completely made of 18/8 stainless steel with *glass window or sighting provision.*
		(vi) Independent door safety interlocks to prevent microwave emission
		(vii) Built-in exhaust system located above the microwave cavity and separated from the electronics to prevent corrosion
		(viii) Magnetron protection from reflected microwave power
		(ix) Continuous and software-controlled microwave emission at all power levels
36	**Sensors**	(i) Temp sensor should be integrated in the system for monitoring & controlling each vessel and cavity temp. Temperature of each vessel should be displayed.
		(ii) The software should automatically reduce the microwave power in case of over temperature avoiding sample loss.
		(iii) Automatic Pressure control: should have a pressure sensor/ mechanical pressure control/ pressure monitoring on the control panel which has a total capability of up to 500psi automatically control the pressure. It should be possible to remove the pressure device at a high pressure. The
37	**Control: User interface**	(i) Software must allow the user to edit, save and run multistep unlimited number of methods (minimum 2000) with atleast 20GB on board / built in memory for storage of data.
		(ii) The software must control all parameter online and display temperature, time and power directly on the terminal/computer.
		(iii) The control terminal should have high resolution LED/LCD Acid Resistant display (minimum 4 inch Touch screen).
		(iv) Should have provision for manual programming storage apart from pre- installed program. Continuous display of temperature and power inside the reaction vessels is required
38	**Output**	**(i) Suitable ports & upgradation options** may be provided for connecting PC/Tablet ,balance ,service check,**acid leaching, microwave solvent extraction, evaporation & sample drying.**
39	**Operating manuals, service manuals, other manuals**	Should provide: -
		(i) User, technical and maintenance manuals in English language
		(ii) List of equipment and procedures required for local calibration and routine maintenance

		(iii) Service and operation manuals to be provided advanced maintenance tasks documentation, if any.
40	**Supplier/ Manufacturer of ICP including Microwave Digestion System**	(i) Should be FDA/CE/BIS approved product. Qualification documents/ IQOQ must be included.
		(ii) Electrical safety conforms to the standards for electrical safety IEC 60601- General requirements (or equivalent IS/ International Standard)
		(iii) All suppliers must submit a copy of catalogue showing technical specifications.

Annexure-IV

Technical Specifications of ICP-OES

ICP-OES for simultaneous multi-elemental analysis at higher concentration and trace levels along with spray chamber, sample introduction system, RF generator and auto

Sl. No.	Instrument Component	Required Specifications
1	Technology	(i) System must be Simultaneous polychromator based dual view ICP-OES Spectrometer. Dual view (Axial & radial) along with rapid/fast switching.
		(ii) The instrument must include appropriate ICP torch and Concentric Quartz nebulizer (Acid Resistive) spray chamber system.
2	Peristatic Pump	(i) 3 or more channel. Pump speed with 70 rpm or better.
3	RF Generator	(i) Should have software-controlled RF generator with frequency of 25-50 MHz. The RF must be variable & adjustable from 1000 to 1300 watts or wider on both sides, along with suitable increment step.
4	Software controlled Flow Controller with ≤1 L/min increments	(i) Three Nos. or more variable & software-controlled gas flow controllers (MFC/EFC) with ≤ 1 L/min or **suitable** increment step for precise control of Plasma, Nebulizer, Aux & makeup/additional gas for gas.
		(ii) The instrument must monitor all gas pressure through mass flow control or electronic flow control.
		(iii) Plasma ignition and shut down must be computer controlled and totally automated.
		(iv) All gas requirements for plasma gas, nebulizer gas, auxiliary gas, purge gas, & sheer gas must be clearly mentioned.
5	Auto Sampler	(i) System should be equipped with auto sampler with minimum 180 samples positions or more.
		(ii) The autosampler should have LED status light for real-time operating status.
		(iii) The autosampler should have movement in three axes (X-Y-Z) to acceleration and deceleration speed.
		(iv) System should include all accessories, racks, bottles, tubing, water container, etc.
6	Optics	(i) Must have Echelle-based polychromator.
		(ii) Resolution: 7pm @ 200/202 nm or better.
		(iii) Radial viewing height automatic adjustment should be upto 18mm or more.
7	Detector	(i) The system should be a true simultaneous with two detector system or synchronous technology with CCD/ CID/ SCD detector system or charge injection device detector system.
		(ii) CID or CCD or SCD with Integration/readout time must be ≤ 15 sec.
		(iii) Wavelength range: of 165–750nm or wider suitable range to cover elements as per ICP-OES technology.
		(iv) Peltier device with cooling at -30 Deg C or Below for reducing or optimizing Dark current /Photometric Noise.
		(v) The actual resolution (not the pixel resolution) of the system should be ≤ 0.009 nm at 200nm.
		(vi) The entire optical system must be closed in an argon/nitrogen purged and thermo stated optical enclosure. Nitrogen purge facility should be there to achieve low level detection.
		(vii) Viewing of the plasma must be computer controlled (Dual View).

		(viii) The system should have option of selecting any wavelength in any mode (axial/radial).
8	**Software**	(i) Latest licensed software to control all the modules of ICP-OES.
		(ii) Software update should be provided free of cost, upto minimum 10 Years.
		(iii) Instrument control, acquire, store, process and reproduce the data, report generation, self-diagnosis and auto-tuning.
		(iv) Auto Start-up and shutdown of the instrument or it should be possible using a single key operation.
		(v) Software must be 21 CFR part 11 compliant and minimum 2 offline licences must be offered as a standard supply.
		(vi) Compatible with windows 10 or latest version.
		(vii) Software should also have comprehensive wavelength library with indication of preferred line for each element.
		(viii)It should feature automatic identification of possible spectral interferences when selecting wave lengths for analysis and should have search mode for identification of unknown wave lengths.
9	**Standard Items**	(i) Exhaust hood for ICP-OES & autosampler.
		(ii) 20 KVA online UPS with 60 min backup along with 02 MCB (in & Out) & 80 meter cable.
		(iii) Six (06) Argon cylinders and 02nos. of any additional gas cylinders required for specific vendor equipment for smooth operation of the equipment with 02 stage brass double stage regulator & four stage Manifold along with manufacturer/ test certificates for the cylinder such as Hydro-test certificate etc.
		(iv) The following documents should be supplied along with the cylinder: (a) Manufacturer Certificate; (b) Hydrostatic test certificate; (c) The Chief Controller of Explosives, Nagpur (CCOE-NAGPUR) gas filling approval certificate and (d) Purity certificate
		(v) Gas panel & exhaust Hood for ICP-OES and Autosampler.
		(vi) Factory fitted Branded i7 PC ,1TB SDD,32 GB RAM, 21 inch Monitor, Color Laser multifunctional duplex Printer & MS office.
		(vii) Reputed brand, diretly from the OEM supplied, scroll noise & oil free Air compressor (if required).
		(viii) Multielement Aqueous Standards (21-22 Elements) of 250 ml of 1000 ppm, traceable to ISO 17034.
		(ix) Single element standards (including Arsenic, Mercury & Selenium) of 100 ml of 100ppm) traceable to ISO 17034.
		(x) Wavelength calibration solution 500ml, 5ppm (13-14 element mix) : Qty - 021 Nos
		(xi) Internal mix standard aqueous (traceable to ISO 17034) :- 125ml
		(xii) Calibration blank solution ASTM Type 1 Water (500ml) : Qty -02 No
		(xiii) Latest version of 21 CFR Compliance Software must be provided with the system.

		(xiv) ICPOES /ICPMS grade suprapure Acids for trace analysis: Nitric acid (HNO_3) & Hydrochloric acid (HCL) - 15 L each.
		(xv) 02 Nos PP waste container (15 L each)
		(xvi) Reputed Brand chiller for instrument.
10	**Standard Accessories**	(i) 180 Vial or more position Autosampler with enclosers & to remove toxic fumes. 1200 vial for Autosampler should be included.
		(ii) Semi volatile organic dedicated kit for edible oil analysis. Along with nebulizer, torch, injector spray chamber, tubings, oxygen variable MFC, Organics standard 21 element mix/single element standard (100gm), internal standard (100 gm), solvent for mixing /makeup (3L), all standards traceable to ISO 17034.
		(iii) Internal standard kit
		(iv) Hydride generating accessories kit along with Separate & dedicated spray chamber & tubing set (Reductant & Waste -pk/12 each) should be offered for low ppb As, Se, Sn & Hg.
11	**Consumables (Must be quoted with OEM P/N.)**	(i) Standard Peristatic Pump Tubing set for sample intake Pk/12 (04 Set each)
		(ii) Standard Peristatic Pump Tubing set for rinse /Drainage: Pk/12 (04 Set each)
		(iii) Standard Peristatic Pump Tubing set for Internal standard . Pk/12 (04 Set each)
		(iv) Organic solvent Tubing set for sample intake Pk/12 (04 Set each)
		(v) Organic solvent Peristatic Pump Tubing set for rinse /Drainage: Pk/12 (04 Set each)
		(vi) Standard spray chamber (01 Nos)
		(vii) Standard Nebulizer -02 Set.
		(viii) Standard Torch & injector: (02 Set)
		(ix) Standard Spray chamber drain tubing (02 each)
		(x) Autosampler tubing set Pk/12 (02 set)
		(xi) Nebulizer capillary tubing - 01 Meter (04 Set)
		(xii) PFA tubing for gas supplies to nebulizer- 1 Meter- (03 Set)
		(xiii) Drain tubing for spray chamber waste -03 Sets
		(xiv) Hydride kit peristatic pump tubing for reductant & Waste -pk/12 (02 sets each)
		(xv) Autosampler vessel -1000 Nos
		(xvi) Branded Single Channel micro pipettes with two decimel that are perfect companion for daily, repetitive liquid handling in laboratories, of capacity 50-1000 µl- 04 nos. 10-100 µl- 04 nos., 1000-5000 µl- 02 nos to be supplied along with the instrument.
		(i) Minimum 5 years from the date of completion of IQ, OQ and PQ of the equipment to the satisfaction of lab including ICP-OES, Chiller, UPS, PC, Microwave Digestion System, Printer, exhaust, regulators, Exhaust etc and all accessories. (with free replacement of any part). IQOQ for hardware & CFR software must be offered with system.
		(ii) Per year Operational Qualification (OQ) per Year 2^{nd} to 5^{th} Year.

12	**Warranty & IQ/OQ/PQ**	(iii) Per Year two PM visit with comprehensive PM Kit for ICP-OES and Microwave Digestion System at every PM visit, free of cost during warranty period. ICP-OES PM kit must include Radial & Axial Pre-Optic Window, chiller fluid, ICPOES purge gas instrument filter, Air inlet filter elements ,connector tubing's etc. OEM Document for Scope of comprehensive PM kit must be enclosed.
		(iv) On site IQ, OQ of instrument along with document to be provided.
		(v) Supplier to assist till satisfactory PQ of instrument.
		(vi) It should cover hardware, software as well as wear and tear consumables (except column and sample preparation), Up-gradation of software to the latest version (if applicable), prompt service (within 24 hours on-call), training and application support during the period.
		(vii) In case of breakdown of the system, the query has to be attended immediately within 24 hrs & servicing to be done within 48 hrs by the supplier during the warranty period and incase of major breakdown, maximum down time period is 1 Week, if it's not attended the warranty will extend accordingly.
13	**After sales service/ Post warranty**	(i) Should have a good after sales service/technical support capable of reaching at short notice the places where ICP-OES is proposed to be installed. Visits and unlimited breakdown calls by service/application support, engineers should attend within 48 hours without fail for ICP-OES including Chiller and UPS system.
		(ii) Troubleshooting (Instrumentation/Application) as and when required free of cost.
		(iii) Training twice in a year free of cost.
		(iv) The vendor should also assure supply of spares, accessories, consumables and service for at least 10 years.
		(v) Both AMC & CMC for ICP-OES including Chiller to be quoted separately, for 3years after warranty. Terms and conditions for the AMC & CMC after the warranty period has to be specified.
		(vi) The application and method development support must be rendered, as and when required.
		(vii) AMC price for 3 years after warranty quoted by the vendor will be considered for finalizing the L1. However it needs to be submitted separately as a price breakup document.
14	**Compliance Statement**	(i) All the technical specifications given in the tender document must be supported by printed leaflets / brochures and must comply the working performance of the equipment at the time of installation and demonstration.
		(ii)The quote should also include a compliance statement vis-à- vis, specifications in a "tabular form" clearly stating the compliance and giving justification, if any supported by technical literature.
		(iii) This statement must be signed, with the company seal, for its authenticity and acceptance that any incorrect or ambiguous information found submitted will result in disqualification.
15	**Printer**	(i) Duplex, Black and White Laserjet printer with LAN, Network Card and Bluetooth facility.
16	**Experience:**	(i) The supplier should have at least two successful installations or more of the model/ equivalent series of model quoted preferably operating ICP-OES in reputed Government & Private Facilities in India.
		(ii) The Complete users list for the quoted model/ equivalent series in India, with contact addresses, emails and phone numbers should be provided.

17	**Demonstration and Training of personnel**	(i) Demonstration and Training on system to the Lab personnel at site to be incorporated, responsibility of the supplier for training of the lab personnel at supplier site/installation site.
		(ii) Basic training for a period of not less than ten working days after installation of the equipment to technical personnel and further for method development whenever required during warranty and AMC period should be provided free of cost.
		(iii) One general entry-level training-cum-workshop and one advanced-level training-cum-workshop must be arranged at the user's site by the vendor on experimental and data analysis part, with no extra cost involved.
		(iv) Trouble shooting training along with Application support for developing & validating at least one ***priority*** parameter or selected by the lab.
		(v) The instrument supplier has to demonstrate on site validation as per the laboratory /regulatory requirements / protocols for at least four matrices multi element parameters as selected preferred by the lab.
18	**System Performance Certificate**	(i) The requirements in this section pertain to the working requirements of the system. Any claims made in the compliance statement should be substantiated by giving suitable detailed outputs from the quoted model of the instrument generated at the applications lab of the supplier, in the form of reports for easy reference.
		(ii) Proof of Performance documents must be provided with the Compliance sheet.
19	**General conditions of supply**	(i) The instrument and all its sub units should operate on 240 volts 50 Hz power supply.
		(ii) All the operation and maintenance manuals, circuit diagrams, application notes and application software's to be supplied should be in English language.
20	**Note**	**(i) Bidder should refer above table of specifications and while quoting, additional column should be added to endorse compliance/ non-compliance statement of each point and additional features if any with part numbers and submit, if fails the quote will be summarily rejected.**
		(ii) One-point contact for all system for AMC or any other requirement for service support.
		(iii) AMC price quoted by the vendor will be considered *for finalizing the L1. However it needs to be submitted separately as a price breakup document.*
21	**General**	(i) The instrument should have a superior pressure venting which is not temperature dependent so as to prevent any loss of volatile metals and should have homogeneous microwave field to avoid sample burning.
22	**System**	(i) Microwave digestion system should have temperature and pressure control mechanism.
		(ii) The system should be software controlled.
		(iii) Necessary consumables and maintenance parts should also be quoted to run instrument trouble free.
23	**Instrument Design**	(i) The system should be a standalone work station and should have:
		(a) The System should have the feature of simply choose a method and it automatically recognizes the vessel type, counts the vessels and determines all of the parameters necessary for a fast, complete digestion.
		(b) Should have provision that user can set the desired parameters for digestion.

		(c) Should have Automatic Microwave power application depending on the load.
		(d) Auto sensing of temperature and pressure inside the vessel.
		(e) Be capable of processing different amounts of samples (from 0.3 g up to 1 g per vessel/) in the same run assuring the same conditions of temperature and pressure.
24	**Display**	(i) The Instrument should have the high-resolution, colour touch screen, acid resistant, LED/LCD screen should serve as controller and display.
		(ii) Should provide training videos for sample preparation vessel assembly, system use, and maintenance.
		(iii) Should have Data management – Easy access to stored methods, real- time data and results of past runs.
		(iv) Should be able to display the detailed methods, graphs of temperature and power against time and temperature of individual vessels.
25	**Interlocks**	(i) The system should have good interlocking system for safety and cavity door.
26	**Rotor & Vessel Assembly**	(i) High pressure and high temperature rotor with at least 20 PTFE vessels, work station & with/ without torque wrench.
		(ii) Vessels on the rotor should be segmented for easy use.
		(iii) Maximum Temperature capacity of vessel up to 300 °C.
		(iv) Working Pressure capacity of vessel up to 35 bar or more. The maximum pressure capacity of vessel shall be 80 bar or better.
		(v) Vessel volume: The capacity of vessel shall be 80 ml or more. Offered vessels to be provided should be able to handle volumes as minimum as 3 ml, 10 ml, 15 ml & 25ml.
		(vi) Vessel ,Rotor & vent-reseal material- PTFE-TFM.
		(vii) Every vessel must have a vent-and-reseal spring to safely release the pressure in case of overpressure.
		(viii) Burst-disk membrane or self-releasing / continuous venting device are not suitable due to very low performance.
		(ix) Additionally, twelve number of vessels as specified above should be supplied with the system.
27	**Magnetron**	(i) Dual Magnetron system with rotating microwave diffuser for homogenous microwave power distribution in the cavity.
		(ii) Microwave frequency should be 2450 MHz and installed power should be 1900W minimum (two magnetrons minimum 950 W each) and should provide the temperature needed (300 °C) for difficult samples.
28	**Microwave Cavity**	(i) The cavity should be made of non-magnetic Rugged high-grade 316 solid steel cavity/ stainless-steel housing with PTFE plasma coating applied at 350°C for corrosion resistance.
		(ii) Also, all hardware should have 5-layer protective coating for the resistance from acid, alkali and corrosive gases.
		(iii) The vessel assembly during a run should be visible from outside.
		(i) Instrument should have adequate safety coatings on housing to prevent any corrosion in the cavity. Additional multiple ports on the side walls of the microwave cavity.

29	**Hardware & Safety**	(ii) Protected against acids and solvents with polymer coating on both inner and outer surfaces.
		(iii) Self-resealing pressure responsive and explosion resistant door to ensure.
		(iv) Maximum safety even in case of overpressure release.
		(v) Door completely made of 18/8 stainless steel with *glass window or sighting provision.*
		(vi) Independent door safety interlocks to prevent microwave emission.
		(vii) Built-in exhaust system located above the microwave cavity and separated from the electronics to prevent corrosion.
		(viii) Magnetron protection from reflected microwave power.
		(ix) Continuous and software-controlled microwave emission at all power levels.
30	**Sensors**	(i) Temp sensor should be integrated in the system for monitoring & controlling each vessel and cavity temp. Temperature of each vessel should be displayed.
		(ii) The software should automatically reduce the microwave power in case of over temperature avoiding sample loss.
		(iii) Automatic Pressure control: should have a pressure sensor/ mechanical pressure control/ pressure monitoring on the control panel which has a total capability of up to 500psi automatically control the pressure. It should be possible to remove the pressure device at a high pressure.
31	**Control: User interface**	(i) Software must allow the user to edit, save and run multistep unlimited number of methods (minimum 2000) with atleast 20GB on board / built in memory for storage of data.
		(ii) The software must control all parameter online and display temperature, time and power directly on the terminal/computer.
		(iii) The control terminal should have high resolution LED/LCD Acid Resistant display (minimum 4 inch Touch screen).
		(iv) Should have provision for manual programming storage apart from pre- installed program. Continuous display of temperature and power inside the reaction vessels is required.
32	**Output**	**(i) Suitable ports & upgradation options** may be provided for connecting PC/Tablet ,balance ,service check,**acid leaching, microwave solvent extraction, evaporation & sample drying.**
33	**Operating manuals, service manuals, other manuals**	Should provide: -
		(i) User, technical and maintenance manuals in English language.
		(ii) List of equipment and procedures required for local calibration and routine maintenance.
		(iii) Service and operation manuals to be provided advanced maintenance tasks documentation, if any.
34	**Supplier/ Manufacturer of ICP including Microwave Digestion System**	(i) Should be FDA/CE/BIS approved product. Qualification documents/ IQOQ must be included
		(ii) Electrical safety conforms to the standards for electrical safety IEC 60601- General requirements (or equivalent IS/ International Standard).
		(iii) All suppliers must submit a copy of catalogue showing technical specifications.