S.N.	Technical Specification	Qty.
1	**Isotope ratio mass spectrometer**	**01**
	1.1 The IRMS should feature an accelerating voltage of ≥ 5,000 volts or above, must exhibit highly sensitive and excellent linearity.	
	1.2 Absolute sensitivity of CO_2 should be equal to or better than 1100 molecules/ion in continuous flow mode.	
	1.3 The instrument should have a mass range of 2 to 96 AMU at the full range of accelerating voltage with an electromagnetic analyzer for the separation of masses.	
	1.4 Mass resolution of 110 or better at 10% valley definition.	
	1.5 Dynamic range (amplifier) 50 Volts or above	
	1.6 IRMS should have at least universal triple collector or higher array along with collector for Hydrogen measurement; the collector array should measure isotopic ratios of H, C, N, O and S.	
	1.7 Source Linearity must be better than 0.02 ‰/nA for CO_2.	
	1.8 For hydrogen measurements, H^{3+} correction should be less than 8 ppm/nA.	
	1.9 The system should be capable of achieving vacuum levels of 5.0×10^{-7} mbar or better without the need of bakeout.	
	1.10 Below internal precision 1σ(‰) in continuous flow mode should be guaranteed:	
	$\delta^{13}C$ (CO_2): ≤ 0.06	
	$\delta^{18}O$ (CO_2): ≤ 0.06	
	$\delta^{15}N$ (N_2): ≤ 0.06	
	$\delta^{34}S$ (SO_2): ≤ 0.10	
	$\delta^{18}O$ (CO): ≤ 0.10	
	δD (H_2): ≤ 0.20	
	1.11 Below isotope ratio linearity in continuous flow mode should be guaranteed:	
	$\delta^{13}C$ (CO_2): ≤ 0.02	
	$\delta^{18}O$ (CO_2): ≤ 0.04	
	$\delta^{15}N$ (N_2): ≤ 0.02	
	$\delta^{34}S$ (SO_2): ≤ 0.04	
	$\delta^{18}O$ (CO): ≤ 0.04	
	1.12 IRMS should, without any upgradation, be capable of accommodating EA, LC and a carbonate analysis device in continuous flow mode.	
	1.13 The IRMS, along with its data acquisition and peripheral devices, should be managed through a computer system with user-friendly software to ensure seamless and efficient user control.	
	1.14 Suitable PC for operation and data analysis of IRMS must be quoted with the configuration: **Processor-** 13th Generation Intel® Core™ i7-13700 (30 MB cache, 16 cores, 24 threads, 2.10 GHz to 5.10 GHz turbo, 65 W) Storage- 1 TB SSD, Suitable GFX Dedicated Graphic Card and Microsoft Office **Operating System-** Windows 11 Pro for business, 16 GB DDR4 RAM, USB Key board and Optical Mouse. At least 24"LED Monitor with three years onsite warranty and antivirus for 3 years **Printer-** Multifunctional Printer for office with A4 & A3 page.	

2.	**Continuous flow interface**	
	2.1 The continuous flow interface should be capable of delivering at least 5 or more reference gases without any hardware modifications.	
	2.2 The interface should have provision for Software programmed dilution of analyte gases (both sample and reference).	
	2.3 Interface must have "gas saver mode" for all reference gases, in which there is zero consumption of reference gas when it is not required in the analytical program.	
3.	**Elemental Analyzer**	
	3.1 The system must have dual furnace one for combustion and another for reduction with temperature control mechanism.	
	3.2 The furnaces should be able to achieve a temperature of 1100 ^{o}C or higher in case of combustion (CNS mode) and 1400^{o}C or higher in case of pyrolysis (OH mode).	
	3.3 The system should be offered with a zero blank auto sampler for continuous analysis of 100 samples or more.	
	3.4 It should be possible to analyze Sulphur at a higher column temperature than Carbon and Nitrogen within the same run. The temperatures of the column should be acquired by the software during sample analysis for monitoring and diagnosis purposes.	
	3.5 CNS precision should be guaranteed for all three isotopes in a single run. The external precision (1σ) should be:	
	$\delta^{13}C$ (CO_2): ≤ 0.10 ‰ or less	
	$\delta^{15}N$ (N_2): ≤ 0.15 ‰ or less	
	$\delta^{34}S$ (SO_2): ≤ 0.20 ‰ or less	
	3.6 Below external precision for OH (1σ) should be guaranteed:	
	$\delta^{18}O$ (CO): ≤ 0.3 ‰	
	δD (H_2): ≤ 2 ‰	
	3.7 EA should be capable of operating as a standalone unit for CNS elemental analysis.	
	3.8 Minimum 2 primary standards (for bulk CNSOH) required to calibrate the IRMS should be quoted.	
4.	**Liquid chromatography and Interface**	
	4.1 Automated HPLC-IRMS system for isotopic analysis of $^{13}C/^{12}C$ in compounds that are Chromatographically resolved in HPLC column.	
	4.2 Hardware options must include isocratic pump, 80 position or more place auto sampler/column oven/columns for IRMS sample analysis. It must have all necessary interfaces for the sample to convert into gaseous form/dilution of samples with minimum maintenance and highly reliable/reproducible oxidation technique to convert sample into CO_2.	
	4.3 Suitable interface to convert the sugars eluted form LC into CO_2. The interface should ensure moisture free delivery of CO_2 to the IRMS.	
	4.4 The interface should be free from crystallization due to usage of aggressive chemicals.	
	4.5 Acquisition of samples on LC-IRMS should strictly through one software only.	
	4.6 The external precision should be: $\delta\ ^{13}C$ (CO_2): 0.30 ‰ or better	
	4.7 Minimum 2 primary standards (of sugar) required to calibrate the IRMS should be quoted separately	
5.	**Consumables and spares**	
	5.1 Maintenance kits for IRMS: 5 no. must be quoted	
	5.2 Maintenance kits for EA: 2 no. must be quoted	
	5.3 Consumables for 1000 CNS and 4000 CN analysis (EA) must be quoted.	

	5.4 Consumables for 4500 OH analysis (EA) must be quoted.	
	5.5 Consumables for 1000 LC analysis must be quoted.	
	5.6 Two high-purity Helium gas cylinders (99.999% purity) should be supplied.	
	5.7 Two high-purity Oxygen gas cylinders (99.995% purity) should be supplied.	
	5.8 Two high-purity Nitrogen gas cylinders (99.999% purity) should be supplied.	
	5.9 Two high-purity Carbon Dioxide gas cylinders (99.995% purity) should be supplied.	
	5.10 Two high-purity Sulphur Dioxide gas cylinders- small (99.5% purity) should be supplied.	
	5.11 Two high-purity Hydrogen gas cylinders- small (99.999% purity) should be supplied.	
	5.12 Two high-purity Carbon Mono-oxide gas cylinders- small (99.99% purity) should be supplied.	
	5.13 Seven double stage SS diaphragm gas regulators should be supplied (1 for each gas species).	
	5.14 Scope includes SITC of all required accessories and associated parts for the above-mentioned gas cylinders/system (gas purifiers / control panel, gas line fittings, plumbing and installation etc.)	
	5.15 15 KVA UPS with minimum 1 hour backup must be quoted.	
	5.16 Three tables for installation of a complete instrument must be quoted.	
6.	**Other conditions**	
	6.1 The technical compliance should be supported by certificates, published brochures, manuals, datasheets, and other supporting documents all of which are to be supplied along with the quote.	
	6.2 Complete users list in India who are using similar instruments along with their contact details including email id should be submitted along with the tender.	
	6.3 The bidder/OEM should have mandatorily successfully executed one contract for supply of similar category equipment during the last 3 financial years (i.e. 2022-23, 2023-24 & 2024-25) before the bid opening date to any Central/ State Govt. Organization /PSU. Purchase order with contract value & invoice copies of relevant contracts (proving supply of required quantity any one financial year) and performance certificate from concerned user to be submitted along with bid in support of quantity supplied in the relevant financial year along with the technical bid.	
	6.4 The mentioned precisions of IRMS and associated devices must be demonstrated at the time of installation	
	6.5 The Technical Committee reserves the right to conduct site visits to verify the quoted specifications on an existing installation of the instrument nearby locations at any point during the tendering process or prior to the placement of the purchase order. The vendor must arrange such a demonstration within 15 days of receiving the communication. Failure to comply within the stipulated time will be construed as non-compliance by the manufacturer with the claimed specifications. Consequently, the committee may disqualify the product during the technical evaluation process.	
	6.6 The supplier must have a technical and application support team based in India.	
	6.7 The supplier must provide proper demonstration and training after successful installation. The supplier must provide onsite application training in every four months or as and when required till the warranty period.	
	6.8 Vendors must provide pre-installation requisites along with tender clearly citing the space requirement/dimension of the individual modules.	

	6.9 The delivery of the instruments should be completed within 5 months after the confirmation of the order. The installation should be completed within two months of delivery of instruments at site.	
	6.10 Vendor must have local isotope service organization in India – provide documentary proof.	
7.	Regulatory Standards: CE, IEC, EN and other international standards (as applicable)	
8.	Provision of on-site technical support for equipment operation for a duration of three years	
9.	L1 will be selected based on the cost of the system with all accessories with **3 years** of **comprehensive warranty** including all the **spares and software updates** with a written undertaking on stamp paper of **availability of spare parts for another 10 years**. No charges of spare parts will be paid during the warranty period.	
10.	Manufacturer should mention the year of introducing the particular model in the market and confirm the availability of spare parts for another 10 years.	
11.	Vendor must submit the OEM for the instruments and the accessories and Manufacturer's Authorization Certification along with the quotation.	
12.	Vendor should allow 3 installations (only service and application part) in addition to the initial installation in case of relocation within the same premises or nearby buildings. IQ/ OQ/ PQ is required during every new installation.	
	Warranty	**03**