Technical Specifications of Gas Chromatography – Mass Spectrometry (GC-MS)

S. No.	Item	Description
1	**Gas Chromatograph**	• The Gas Chromatograph that provides superior performance. • Capabilities for two inlets and four detectors can be installed and operated simultaneously. • Six GC column Smart Key ports must be provided for auto column specifications detection. • Easy access to Maintenance and Service modes system interface. • Retention time repeatability <0.01 % or better • Area repeatability <0.5 % RSD or better • Hands-free leak check • Retention time locking must be present. • Capability of helium saver mode with auto switch function/method to another system preferably N_2 cylinder. • All parameters should be stored as a part of method for better analysis reproducibility.
2	**Pressure/ Flow control pneumatics**	• System must have EPC/AFC Control for all injectors & detectors. • Must have the capability to install up to eight EPC/AFC. • Pressure setpoint and control precision to 0.001 psi • Pressure/flow ramps: Minimum three. • Pressure sensors should have high accuracy of full scale. Specify the value of it.
3	**Browser interface**	• Touchscreen browser interface. Single screen monitoring for all the provided accessories like autosampler, headspace, GC and MS.
4	**Auto Sampler**	**Automated Liquid Sampler (ALS):** • Auto injector with minimum 50 vials capacity or better. • Capability to run priority samples. • Must support up to 100µL syringes. • Area reproducibility > 0.3% RSD. • Appropriate vial size, waste and wash vial size **Headspace Sampler (HSS):** • Auto injector must be with minimum 12 vials capacity or more. • GC column selection from 50 to 530µm. • Compatibility with headspace vials of 10 mL, 20 mL, and 22 mL sizes with unrestricted use of different vial sizes within a single sequence. • All temperature zones (oven, valve and loop, transfer line) have setpoint increments in 1 °C with 0.1 °C resolution for actual temperatures. • Oven temperature: up to 200 °C or higher

		• Valve and Loop temperature: up to 200 °C or higher • Transfer line temperature: up to 200 °C or higher • Vial pressurization must be fully controlled by the included EPC/AFC/PPC. • Pressure setpoints must be adjusted by increments of 0.001 psi. • Flow setpoints must be adjusted by increments of 0.01 mL/min.
5	**Oven Characteristics**	• Column Oven can accommodate two columns with a temperature range from 4 °C to 450 °C. • Set point resolution of 1 °C or better. • Must support minimum 20 ramps or more. • Maximum temperature ramp rate of 120 °C /min or better. • Cool down of Oven from 450 °C to 50 °C in 4 min or less. • Appropriate volume of the oven for easy fixing and removing different types/dimension of columns without compromising rate of heating or cooling of oven. Specify the volume in Liters or cubic in.
6	**Inlets**	**Split/Split less Injector (SSL Inlet):** • Two Split/Split less Injector (SSL) for split and split less. • Fully EPC controlled and pressure range up to 100 psi or more. • Maximum operating temperature should be 400 °C or more. • Split Ratio 12500:1 or more to avoid column overload. • Gas saver mode to reduce gas consumption without compromising performance. • Must be provided with the mounting of the liquid autosampler and headspace on the same inlet. • Capable of working with both the detectors (FID and MS) simultaneously.
7	**Detector**	**Flame Ionization Detector (FID):** • Minimum detectable quantity (for tridecane or equivalent): <1.2 pg C/s or better • Minimum temperature should be 450 °C or more. • Linear dynamic range $>10^7$ or better • Data rates up to 800 Hz or better. • Must have the Flameout detection and automatic reignition capability.
8	**Mass Spectrometry (MS)**	**Mass Spectrometry (MS)** • Ionization modes: Electron Impact (EI) • Mass range m/z: 1 to 1090 amu/u or more. • Source material: non-coated inert ion source. • Ion source temperature: up to 300 °C or better. • Transfer line temperature: up to 350 °C or better.

		• Filament should be of best quality, designed for long life. Should not break during run / analysis. • EI Voltage: 10 to 80 eV or better. • Optimum emission current for filament. Provide certification of it. • Quadrupole: Gold-plated heated quadrupole (Q1) with mass resolution capabilities to avoid the contamination and keep the quadrupole cleaner and safer. • Mass axis stability: ±0.1 amu/ u over 48 h or better. • Dynamic Range: 10^5 or better. • Mass resolution: Unit mass or better. • Scan rate: up to 12,000 amu/sec or higher. • Dual EI filament for EI source. • Turbo molecular pumps, more than 250 L/sec or better. • EI scan for m/z 272 with 1µL of Octafluoronaphthalene (OFN) at 1pg/µL should be S/N 1500:1 or better. Provide the certification of S/N. • EI Instrument Detection Limit (IDL): 10pg or better with OFN. Provide the certification of DL. • Data collection should be possible with Full Scan and Selected Ion Monitoring (SIM). Specify if simultaneous Full-Scan and Selected Ion Monitoring modes.
9	**Software**	• Original window-based software with license • MS Software for Acquisition, data handling (quantitative/qualitative) and reporting • Full scan and SIM scan. Automated SIM setup and synchronous SIM/scan operation. • The latest original licensed NIST library must be present. • Data acquisition and data processing software must be supplied with a perpetual license and should be updated/upgraded for 5 years as and when new updates/upgrades are released by the vendor.
10	**Computers**	**Computer 1 – Acquisition and control** • Compatible Computer for software. • Windows: Windows 11 Professional, 64-bit or better • Processor: Intel core i5, 3.1GHz. • RAM 16 GB or better • Internal hard drive (SSD): 512 GB or better • 21.5-inch monitor **Computer 2 – Data Processing**

		An additional PC should be supplied for data processing, reporting, and user use, but not to be connected with the instrument for data acquisition.
11	**Printer**	• Black & White Laser Jet duplex Printer, 43ppm / 36ipm, up to 1200 x 1200 dpi, 512MB standard (expandable to 1.5GB), 1.2GHz, Hi-Speed USB 2.0 port. Or better. • Built-in Fast Ethernet10Base-T/100Base-Tx, Gigabit Ethernet 1000Base-T; Optional: 2 internal USB ports. Or better.
12	**Consumables ((to be supplied extra and mentioned with Part nos. along with quantity as well).**	• Liquid autosampler syringe 10µL- 6 Quantity • Liquid Vials with caps 2 ml- 1000 Quantity • Vial Insert, 150ul, Glass with Polymer Feet for Screw top Vial – 1000 Quantity • Headspace Vials with caps 20 ml- 500 Quantity • Loop 1mL- 1 Quantity • Headspace vial crimper- 1 Quantity • Headspace vial decapper- 1 Quantity • Inlet Septa- 100 Quantity • Liner O ring- 10 Quantity • Split Liners- 5 Quantity • Split less Liners- 5 Quantity • Glass wool- 10gm • Ferrules for GC and MS 0.25 mm column ID- 20 Quantity each • Ferrules for GC and MS 0.32 mm column ID- 20 Quantity each • Ferrules for 0.53 mm column ID- 4 Quantity • Column nut- 8 Quantity • EI Filament - 2 Quantity • MS nut- 2 Quantity • MS cleaning and maintenance tool kit- 1 Quantity • Vacuum pump oil- 1L • GC installation kit-1 • Big helium trap inline filter-1 • Sufficient tuning solutions for tuning the mass spectrometer **Columns:** • GC Capillary Column dimethyl (95%)/diphenyl polysiloxane (5%) RTX-5MS or equivalent with 30m x 0.25 mm x 0.25 µm (1 Quantity) • HP-5MS or equivalent capillary column 30m x 0.32mm x 0.25µm (1 Quantity) • DB-5MS or equivalent capillary column 30m x0.25mm x 0.25µm (1 Quantity) • DB-624 or equivalent capillary column 30m x 0.25mm x 0.25µm (1 Quantity)

		• DB-Wax or equivalent capillary column 30m x 0.25mm x 0.25µm (1 Quantity) • HP-88 or equivalent capillary column 100m x 0.25mm x 0.20µm (1 Quantity)
13	**Accessories**	**Gas Cylinders:** • Helium gas cylinder with Gas Purification Panel and double stage regulator- 2 Quantity • Nitrogen gas cylinder with Gas Purification Panel and double stage regulator- 2 Quantity • Hydrogen gas cylinder with Gas Purification Panel and double stage regulator- 1 Quantity • Zero Air gas cylinder with Gas Purification Panel and double stage regulator- 1 Quantity • All cylinders must be provided with Gas filled completely. • Sufficient tubing, clips, regulators, and other required accessories must be supplied for installation of all gas cylinders with Gas Purification Panels. All must be installed properly wherever required on GC-MS system. • Gas Purification Panel and double stage regulator must be supplied with 5 years of warranty. **UPS with batteries:** Compatible online UPS of 10 KVA with 1 hour or better backup with five-years of warranty and standard warranty with batteries. **Anti-vibration Table:** Antivibration table with sufficient space for keeping the GC-MS including PC and must have plugs for UPS and instrument and associated accessories. **Nitrogen Generator:** Nitrogen generator for generating N_2 gas. Zero Air – Nitrogen Combination Gas Generator with 250mL/min flow rate. N_2 purity: 99.9%.

Additional Terms and conditions (ATC)

for the procurement of Gas Chromatography – Mass Spectrometry (GC-MS)

Warranty

Five (05) years of comprehensive warranty with unconditional preventive maintenance on the full GC-MS instrument including Vacuum pump, PC, printer, Gas Purification Panel and double stage regulator, UPS, and Nitrogen Gas Generator. The vendor or principal must mention it in the quotation including labor, insurance and transportation, custom clearance charges of items. All parts including spares should be covered under the warranty and this fact should be clearly and explicitly specified in the tender document. The comprehensive Warranty should cover:

- Complete GC-MS system including all accessories, spares and labor on site
- Free maintenance and service on site or at factory with no cost, and
- Regular up-gradation of software
- All third-party items such as PC, printer, pump, Nitrogen generator, Gas purification panel & regulator and UPS.
- No Purchase Order will be raised for any parts of the quoted GC-MS system during the warranty period.

Single Vendor Solution

The complete system and accessories must be supplied, and installed by a single/same vendor to provide seamless integration.

Service & Support

The supplier must fully support GC-MS for at least 05 years after the warranty period. Services and spare support need to be provided as and when required.

Specification Sheet

A detailed specification sheet highlighting all the above specifications and all supportive documents need to be attached for all the claims in the specification mentioned.

User Reference List

Vendors should provide a list of recent installations (in the past 5 years), model details, and modules supplied. They should also provide the performance certificates from the users (at least 3).

Tool kit and Calibration/Tuning solutions

Tool kit must be included with all required accessories during installation and post-installation.

Calibration/Tuning solution must be supplied for the instrument.

Training

At least one week (6 days) of training after successful installation of the instrument and online/offline support must be provided as per the user requirements for proper functioning of the instrument.

Refresher training every year for new user if any and free users' registration for online/offline workshops/seminars/symposia conducted by the vendor.

Spares

The supplier should confirm the availability of spares for next 10 years from the date of installation.

Custom Clearance and Delivery

The supplier must ensure the custom clearance and delivery of equipment at the premises (or installation site) of HNBGU. The HNBGU shall provide the bank release order and GST charges details.

Non-blacklisting Certificate

The bidder must submit a Non-Blacklisting Certificate on a stamp paper, dated with the current date, declaring that the firm has not been blacklisted by any government or private entity.

Turnover Certificate

The vendor must provide the turnover of the last three financial years to verify the financial standing.