

Shiksha Mandal's
Bajaj College of Science, Wardha

Specification of the instruments/equipments

(Quotes are accepted through tender form only issued by Bajaj College of Science, Wardha
on payment of prescribed fees)

Item No.	Name of the instrument
1	High Pressure Liquid Chromatography (HPLC)
	Specifications:
	<p><u>Supply, Delivery, Installation and Commissioning of Completely Modular High Performance Liquid Chromatography System With Accessories.</u></p> <p>The HPLC system shall include the following individual stackable self-contained modules. Modules must be connected via fibre optic noise resistant high-speed transmission technology to enhance the reliability and sensitivity of the HPLC</p> <ol style="list-style-type: none"> 1. Solvent Delivery System with degasser 2. Autosampler with sample cooler 3. Column Oven with heating & cooling capacity 4. Photo Diode Array Detector 5. Chromatographic Software <p>Below are details of each of these individual modules. Vendor shall supply HPLC system with either similar or better specifications</p> <p>1. Solvent Delivery System for Analytical Flow Rates with degasser:</p> <ul style="list-style-type: none"> • It should be parallel type double plunger with automatic pulsation correction mechanism achieving pulse-free solvent delivery. Plunger capacity should be 10ul or better with increment of 0.0001 ml • The flow rate should be settable between 0.0001 to 10.0000 ml/min without any hardware changes • Flow rate accuracy should be $\pm 1\%$ or $\pm 2 \mu\text{l}/\text{min}$ of set value whichever is larger • Flow rate precision should be $\pm 0.06\%$ RSD or better • Pressure setting range should be 40 MPa or better • The gradient formation should be through quaternary low pressure gradient mixing • The precision of composition must be less than 0.1% RSD. • It should employ active check valves for stable delivery of non-polar organic solvents • Automatic rinsing of plunger must be available • It should be capable of standalone operation • It should be supplied with Reservoir tray with 4 solvent bottles complete with fittings • It must have a leak sensor as safety feature • It should incorporate membrane type degassing unit upto 5 flow lines • Internal capacity of degasser should be 400 μl or better per flow line <p>2. Autosampler with sample cooler:</p> <ul style="list-style-type: none"> • Sample injection volume should be variable between 0.1 μl to 500μl • Injection system should be variable injection volume type with zero sample loss during injection

- Number of samples to be processed automatically, random access up to 175 positions for 1ml vial volume. 192 for 2X96 wells microtitre plates, 768 for 2X384 wells microtitre plates, 192 for 2X96 wells deep-well plates
 - Flow line rinse capability both before and after sampling should be possible
 - Needle aspiration speed should be variable from 0.1 to 15µl/sec
 - It must be capable of a carry-over no more than 0.0025 %
 - Injection volume accuracy within 1%
 - The injection precision should be less than 0.3% of RSD
 - It should have a leak sensor, automatic rack and vial recognition as safety feature
 - Supply of at least 100 sample vials of 1.5ml capacity, complete with caps and septa should be included
 - The autosampler should consist inbuilt cooler, operating temperature from 4°C to 40°C
 - Both analytical and semi-prep sample injections are possible with same autosampler.
- 3. Column Oven:**
- It should be block heating type & should have electronic heating as well as cooling for uniform temperature distribution
 - The temperature setting range should be 4°C to 80°C
 - Temperature control precision should be ±0.1°C
 - It should be able to handle up to 2 columns of 25 cm length
 - It should have a leak sensor
 - Switching between analytical column to semi-prep column should be possible without changing any hardware.
- 4. Photodiode Array (PDA) Detector:**
- The wavelength range should be 190 nm - 800 nm or better
 - The photo-diode array detector should have 1024 elements.
 - The detector should have variable slit width for high resolution as well as high sensitivity
 - A standard flow cell of 12µL volume, 10 mm path length & 12 MPa should be available
 - The flow cell should be temperature controlled from 19°C to 50°C
 - Wavelength accuracy should be ± 1 nm & wavelength precision should be ± 0.1 nm
 - A deuterium lamp [D2] and a Tungsten lamp [W] should be available as Light Source for UV and visible wavelengths respectively.
 - The selection of light source should be flexible to select D2, W or both [D2 +W] the lamps for analysis
 - The Drift should be 0.4×10^{-3} AU/h or better
 - The Noise should be 4.5×10^{-6} AU or better
 - Linearity should be equal or more than 2.5 AU (ASTM method)
 - It should have a self-aligning mechanism for the light sources and cell
 - Light sources and cell should be accessible from the front for easy maintenance
- 5. Chromatography Software:**
- Genuine & compliant chromatography software should be supplied with HPLC system

	<ul style="list-style-type: none"> • It should cover full one-point digital instrument control, qualitative and quantitative processing, report creation and self-diagnosis • Sample schedule wizard function should be standard with on-line help function • The reporting format should be flexible and easy to use in any desired format • The data should be convertible to other formats • The software should allow automatic execution of system checks, auto-purge and baseline checks etc. <p><u>Service, Warranty and Training</u></p> <ol style="list-style-type: none"> 1. Tendered price should include delivery, installation, commissioning and training (at least 4 users) at supplier's location 2. Warranty for complete equipment for a period of 24 months from date of supply should be provided. This shall include the following at no extra cost: <ul style="list-style-type: none"> • Travel and Labour expenses of Customer Engineer • Service Parts used for repairs 3. Vendor to provide service guarantee: should the system require service during the warranty period, vendor must guarantee turn-around-time within 24 hours 4. Vendor to provide a copy of Site-Preparation checklist 5. Vendor must demonstrate that it has a proven appropriate set-up and capability to provide after-sales service efficiently and effectively. The supplier should have in his facility a similar system to that proposed in this tender for training purpose 6. One Analytical C-18 Column (5µm, 4.6 x 250mm) And One Semi-Prep C-18 Column (5µm, 10mm) should be supplied along with this HPLC system 7. All required kits, tubings, joints, tool kit etc. essential for running & maintenance of the system shall be supplied along with the system <p>The vendor must be reputed one having experience of at least 20 Years for supply of HPLC & Preparative LC systems. They must have more than 10000 installations of HPLC, UHPLC & Preparative LC systems in India. Also, vendor should have at least 350 installations of LCMS & LCMSMS systems in India. They should have their own facility within Mumbai for demo / training purpose having similar instrument which has been quoted here. Vendor must have service as well as application engineers based within Aurangabad region.</p> <ol style="list-style-type: none"> 1. Please include the list of minimum 10 users in India.
2	Gas Chromatography
	Specifications
	<p>We require a Gas Chromatograph with following specifications.</p> <p>Gas Chromatograph, Microprocessor based modular GC system with Capillary column Injection Port with single Flow Line Advance Flow Controller (AFC) and High Sensitivity single FID Detector system for operation on 220V /50Hz</p> <ul style="list-style-type: none"> ▪ System should have large column oven with 15.8 ltr capacity and temperature range up to 400⁰C. ▪ System should have 20 step column oven temp. programming with rate setting of -250⁰C to +250⁰C. ▪ System should have fast column oven cooling with microprocessor rear vent control. ▪ System should have Capillary Column Injection port with flow line Advanced Flow Controller (AFC) for digital setting and control of carrier gas flow up to 100 ml/min. ▪ System should have 7-step flow programming capability with programming rate of up to +400 ml/min.

	<ul style="list-style-type: none"> ▪ System should have correction function to maintain constant column flow rate during temp programmed analysis. ▪ System should have large interactive Graphical User Interface (GUI) LCD display for easy setting of GC parameters and monitoring functions including chromatograms. ▪ System should have intelligent self-diagnostics functions validate the instrument before every sample injection. ▪ System should have Capability for installing simultaneously 3 injections ports and 4 detectors on single GC. ▪ Flame Ionization Detector: ▪ High Sensitivity Differential Dual FID Detector System with temperature range up to 400⁰C. ▪ Minimum detection limit for FID of 3 pgC/s for Dodecane with dynamic range of 10⁷ ▪ Inert Quartz nozzle for FID reduces detector contamination. ▪ Max acquisition rate: 4 ms (250 Hz). ▪ System should have capability for automatic ignition and re-ignition of FID flame through keyboard & software. ▪ Split / Splitless Injection Port, SPL: ▪ Split / Splitless Injection Port should be with built-in Advanced Flow Controller (AFC) for digital setting and control of carrier gas pressure up 970 kPa and total carrier flow up to 1200 ml/min. ▪ System should have a capacity to carry out fast GC application with help of carrier gas pressure upto 970 kPa/ 142 psi and Nanobore ID column. ▪ Digital split ratio setting should be up to 9999.9. ▪ System should have a correction function to maintain carrier gas average linear velocity during temp programmed analysis for capillary columns. ▪ System should have compatibility to complete range of capillary columns 50 µm to 530 µm I.D. ▪ One Auto liquid injector with 12 Vial capacity should be provided by vendor. ▪ Gas purification panel with filled gas cylinder required for GC operation should be provided by vendor. ▪ Two general purpose capillary column (Mid and non-polar capillary L × I.D./ 30 m × 0.25 mm) should be provided by vendor. <p>✓ Please include the list of minimum 10 users in India.</p>
3	CHNS-analyzer
	<p>Specifications</p> <p>Fully Automated PC controlled Elemental Analyser for Solids, liquid and semi solid samples.</p> <p>Operating modes for measurement of CHNS, CHN, CNS, and S</p> <p>Sample weight Range : up to 1000 mg</p> <p>Detection range : 0 to 100% for all elements (C, H, N, S)</p> <p>LOD : 50 ppm or better(lower)</p> <p>Standard deviation : ≤0.1% of absolute.</p> <p>Fully digital electronics that should be fully integrated in unit, no external control panels required</p> <p>Should have mass flow controller/electronic flow controller for constant flow of carrier gas.</p> <p>Quick swap clamp connections for fast maintenance.</p> <p>Accessory for Liquid and solid sample preparation should be a part of the quotation.</p> <p>Spares for regular maintenance should be quoted. All the required tools and accessories should be quoted.</p> <p><u>Furnace System</u></p>

- Should have two zone furnace system, separate for combustion and reduction with independent temperature control for each furnace. It should be possible to set difference temperature for combustion and reduction in CHNS mode.
- Controlled furnace maximum Temperature should be 1200° C or more
- Furnace working on low voltage for safety and long life with 10 years warranty.
- Should have possibility to use ceramic/quartz ash finger to handle high halogen or fluorine contents sample.

Separation System

- Advanced Chromatographic separation of gases.
- Complete instrument control over elution process with provision of auto zero of baseline after each element elution.
- Full separation of all analytes and there should be no peak tailing or peak overlap
- Sulphur being a crucial element, should be analysed with higher column temperature (separation column) than Nitrogen, Carbon, and Hydrogen. All necessary accessories/ options in this regard should be quoted as mandatory items.

Detector System

- Oxygen intrusion free thermistor technology based Temperature stabilized TCD detector for measurement of C-H-N-S
- There should be a provision to attach IR detector in the future for lower range of Sulphur and Oxygen.
- There should be a provision to attach detector for Chlorine in the future
- 10 year or more warranty on TCD.

Autosampler System

- Electromechanical auto sampler system with 100 positions or more. The Autosampler should hold at least 300 mg of Soil Sample. Pneumatic autosampler is not acceptable.
- The autosampler should be zero blank and ensure complete removal of atmospheric gases before sample injection into the high temperature reactor/ furnace. It is a crucial scientific requirement and must be met.

Carrier gas: Possibility of using Argon gas and Helium gas both as a carrier gas in CHNS mode.

Software

- should be Windows 11 professional based and should have display of set and actual pressures, flow rates, temperatures, number of samples analysed with provision for setting maintenance interval with warning when maintenance needed
- Should have **segmented** leak check through software to enable identification of exact position of leak.

Consumables: To be supplied with consumables sufficient for 1000 sample analysis in CHNS/CNS mode,

Gas Cylinders: Helium and Oxygen gas cylinder with double stage regulator should be quoted.

- ✓ Please include the list of minimum 10 users in India.