UNIVERSITY OF DELHI SOUTH CAMPUS

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Ref. No: UDSC/MicroBio/2022-23/02 **Date: 01.12.2022**

The quotations are invited under a Two-bid system (Technical & Financial) from the manufacturers or their authorized dealers for **one Unit** of **"Protein purification system with columns and other accessories". The quoted price should be through direct import (CIF air) in foreign currency or FOR destination (INR) up to UDSC** (supplying and installation included, minimum comprehensive warranty of two years). The last date for bid submission is **22nd December 2022 by 5:00 PM as per the tender specifications mentioned below.**

For any clarification please contact Prof. Rajeev Kaul, or Prof. Y.P. Khasa, Department of Microbiology of University of Delhi South Campus, New Delhi- 110021 (Email: rkaul@south.du.ac.in; or ypkhasa@south.du.ac.in)

Technical specification for "Protein purification system with columns and other accessories"

Integrated and automated software-controlled preparative liquid chromatography system with the following technical specifications. The system should be an inert biocompatible gradient system allowing purification of proteins from microgram to gram scale.

1. **High-performance dual system pumps with pressure monitoring:**
   - System flow rate should be in the range of 0.001 to 25 mL/min with two-piston pumps (up to 50 mL/min during column packing) without the addition or removal of any tubing or re-plumbing. The pump should be made of hydrophobic material.
   - The pump's Pressure should be in the range of 0 to 20 Mpa.
   - System should have piston pumps for high performance and long life and should have an accuracy of at least ± 1.2% or better. Precision: RSD < 0.5%. The system pumps should have viscous liquids handling capacity in the range of 0.35 to 10 cP.
   - System should be capable of delivering up to 50 mL/min, if needed during the process, without the need for any physical modifications.
   - A Bypass function must be available using a column valve that allows connection to at least one column
   - System should have a column valve to run the system in up-flow, downflow, or bypass mode

- System should be upgradable for Column scouting to enhance automation capabilities and resin screening for up to 10-14 columns in the future. Options to attach additional column valves must be available

2. **Sample/column inlet valve: One Quantity**
   - The system should be provided with a rotatory type valve with the option of up to 12 valve upgradation

3. **Sample Injection Valve**: **One Quantity**
   - An Inlet valve integrated with air sensors for controlled sample application and preventing pumps from running dry (empty sample/buffer reservoir) and avoidance of trapping air to protect the column.

4. **Buffer selection inlet valve: One Quantity**
   - The buffer selection inlet valve should provide at least two options for Buffer-A and two options for Buffer-B.
   - The buffer valve should also give the mixing options/ combinatorial options for any one of two buffer-A inlets with any one of two buffer-B inlets.

5. **Mixture bypass valve: One Quantity**
   - System must be provided with a dedicated valve where the sample mixture valve can be bypassed to load samples directly to the column for purification.

6. **Mixture: One Quantity**
   - System should be provided with a mixer chamber of 1.4 ml for homogeneous buffer compositions during gradient runs. The mixture should support a gradient flow rate in the range of 0.1 to 25 mL/min.
   - System should have an option for an interchangeable mixer chamber upto 12ml.
   - A flow restrictor should be present in the flow path to generate a back pressure that prevents the formation of air bubbles in the UV flow cell.

7. **Conductivity meter: One Quantity**

   - The system should allow measurement of Conductivity between the range of 0.01 mS/cm up to 999.9 mS/cm
   - Accuracy: ± 0.01 mS/cm or ± 2%, whichever is greater (within 0.3 to 300 mS/cm)
   - Operating pressure: 0 to 5 MPa; Flow cell volume 22 μL;
   - Temperature monitor range: 0°C to 99°C with a temperature monitor accuracy: ± 1.5°C within 4°C to 45°C
   - Conductivity measurement should be in the broad pH range (1 to 14 pH)

8. UV monitor: One Quantity

- The UV detector should detect at a minimum of three wavelengths simultaneously without changing the lamp or light source between 190 – 700nm (in steps of 1nm) using a single light source that covers the entire aforementioned wavelength range.
- The xenon flash lamp should not require any warm-up or heat-up time and should provide optical fiber-based delivery of light to the detector along with an automatic switch-off mechanism in standby mode.
- Flow cell: 2 mm Optical path length
- The Xenon UV lamp must have an operating life of more than 5000 hours with a linearity of ± 2% within 0 to 2000 mAU, which is the standard detection range for most biomolecules.
- The UV module of the system must be able to read absorbance range from -6000 to +6000 mAU in a resolution of a minimum of 0.001 mAU.
- The drift should not be more than 0.2 mAU; AU/h at 280 nm
- To save the operational life of the UV lamp, the system must have the option to switch off the UV, when desired (during system cleaning and priming).

9. pH valve and pH electrode: One Quantity

- System must be provided with an integrated pH electrode for in-line pH monitoring (range of 1-14 accuracy ± 0.1) during the run (pressure range 0 to 0.5 Mpa)
- The system should allow pH–flow through the electrode and flow restrictor to bypass or incorporated in the flow path without the need for re-plumbing and should have a separate syringe port for the calibration of the pH electrode within the system. The system should allow delay volumes during fractionation to be calculated automatically.

10. Outlet valves: One quantity

- At least 3 ports outlet valve to direct the flow to the fraction collector, waste, or other outlet ports for the main unit

11. Flexible Fraction collector: One Quantity

- Fraction collector should be capable of fixed volume fractionation, peak fractionation and both. It should be capable of reducing sample spill during fractionation using Drop Sync and accumulator property. It should be a spillage-free fractionation at any flow rate.
- Automatic peak recognition should be facilitated using software control.

- Fraction collector should be able to accommodate different volume tubes, 6 wells deep well plates (two), 96 deep well plates (two), and tubes holders for 1.5/2ml, 15ml,50ml tubes
- It should be able to handle fractions in the range of 1.0-50.0ml volume.
- It should be provided with a variety of cassettes that can hold above mentioned tubes/plates.
- The delay volume from UV to dispenser head should be less than 250 µL and should be diverted to waste during fraction collection

12. Sample loops: five quantities

- Sample loop 500 µL, Sample loop 1ml, Sample loop 2 mL, Sample loop 5ml and Sample loop 10 mL (All inclusive of connectors and other requirements)

13. Software and compliance:

- The system should be capable of being installed with software with integrated DOE (Design of experiment) functionality for method optimization (including workflows of screening, optimization and robustness testing).
- A license-based software with 21 CFR compliance
- System should come with a unit where even if there is a disconnect between the system and software the run should continue and should be able to give the backup of the complete run
- Data based software should have an intuitive user interface with an interactive process picture and simplified evaluation modules. Software should have built-in templates for all the existing columns with the option to develop a method for third-party. It should have the capability to share methods and results along with remote access capabilities to systems to save valuable time and resources.
- It should be able to support scouting of up to 99 runs with individual parameters in a single method and should have alarm for parameter change.
- Should be able to run programmed Methods in the queue in an un-monitored way after the previous run is completed
- System should have In-built Artificial Intelligence commands like watch commands for saving time and saving buffers.
- Software should be able to perform real-time control, data evaluation, watch commands, Scouting parameters, method queue, and method wizard for easy programming and have a column library with a report generation option
- The software must have a detailed evaluation segment for peak integration and evaluation, peak smoothening, peak offset adjustment, peak differentiation, peak addition and subtraction, peak overlay comparison of results, and automated quantification of peak fractions.

14. Accessories

- Flexible holder for 16/600mm size columns
- Tool Kit for the quoted machine
- Tubing kits for all inlet and outlet valves
- 10 meter peek tubing extra
- System should include all types of connectors, filters, ferrules, Teflon and peek tubing, sample loops, and all other accessories necessary to run the system for the next five years.

15. Chromatography columns as following:

- **Prepacked Superdex 16/600mm, 200pg high-resolution size exclusion chromatography column (One Quantity):** For the purification of recombinant proteins and therapeutic antibodies. The column should have an outer jacket to control the temperature using a water bath circulator. The column should provide stand-alone operational flexibility with a pump or chromatography machine
- **Small Prepacked 5ml columns Set (5 Quantities):** Sulfoethyl (S) strong cation exchanger for small-scale purifications
- **Small Prepacked 5ml columns Set (5 Quantities):** Q Sepharose High Performance strong quaternary ammonium anion exchange resin with bead size lesser than 35 µm to carryout small-scale purifications
- **Small Prepacked 5ml columns Set (5 Quantities):** High-performance immobilized metal affinity chromatography (IMAC) columns for the recovery of His-tagged recombinant proteins.
- **Small Prepacked 1ml columns Set (5 Quantities):** CM Sepharose Fast Flow weak cation exchanger for small-scale protein purifications and optimization
- **Small Prepacked 1ml columns Set (5 Quantities):** DEAE Sepharose Fast Flow weak anion exchanger for small-scale protein purifications and optimization

16. Computer hardware & software requirement: The system should be provided with computer for instrument control and data collection, and with appropriate software for standard chromatographic procedures. **Computer specification:** Processor 12th Gen Intel® Core™ i7-12700; Operating System: Windows 11 (Licenced); Monitor: 22 inch; Memory: *16 GB or better, Hard drive 1 TB (Dell , HP or Acer)

17. UPS: An Online UPS of 2-3KW to be supplied with the system (APC/Emerson/Fuji electric)

18. Cold cabinet to house complete purification unit (One quantity):

The cold cabinet should have atleast following features:

- **Temperature range:** Adjustable in range of 2-8 ±1 ^{o}C
- **Capacity and door design:** Minimum 1400 litres capacity with two multi-pane glass doors on an aluminium frame with magnetic gaskets for proper sealing
- **Control and display system:** Digital control system and audio/ visual display for temperatures outside the set range
- **Airflow Design:** Positive pressure airflow system for uniform temperature maintenance Switching on/off light inside linked to the door activated switch
- **Trolly of cold cabinet:** Heavy-duty wheels for trolly for the easy movement of the system
- **Shelves Design:** Retractable Shelves for adjusting heights as per requirements
- **Construction/Febrication material:** The fabrication material for the trolley should be at least SS-316 or SS-304
- **Addition power Plug:** Minimum 3-4 power plug points inside the cold cabinet
- **Safety features:** Fuse for mains Unit and compressor, safety thermostat to cut out the power supply to compressor upon failure of the controller

19. Additional technical requirements for quoted system:

- System should be able to handle small scale to method development columns.
- System should be able to handle denaturing conditions of up to 8M Urea.
- The system should have upgradable modular capability of having 2 UV monitors installed at the same time for giving flexibility and increased application capability for using small and large flow cells simultaneously to detect low-concentration and high-concentration proteins for increased application flexibility post-purchase.
- System should have the provision of normalizing the absorbance of 5 MM flow cell and must be upgradable to optical path length 10 mm and cell volume 8 µL
- The Model quoted should not be obsolete or discontinued by OEM and spare parts should be available from OEM for a minimum period of 10 years after the supply.
- The system should have an option of upgrading to column control valve which allows connection of one column or multiple columns and has an integrated bypass function, which enables washing of the system without removing the column and allows reverse flow for increased application flexibility post-purchase.
- System should have the option to attach a communication box along with multistep functionality controlled by software.
- Temperature monitor range 0°C to 99°C with ± 1.5°C within 4°C and 45°
- System should have Positions to install additional modules
- The system and the software should have features of intelligent column packing to provide an interactive step by step guide to the users and avoid any manual intervention. It should also be able to ensure that bed is packed and passes column testing.

- **Valves**: Inlet selection, mixer by-pass, loop selection, column selection, pH, outlet, All the Inlet valves should have integrated air sensors or at least 3 additional air sensors to be quoted.
- **Pressure sensors:** The system should be provided with pressure sensors to increase the life of system pumps, valves and purification columns

20. **Comprehensive Warranty (Two Years):** The quotation/bid should include atleast a Comprehensive warranty and application support for Two years with regular On-site preventive maintenance and Inspection Service (as and when required).

Important: For technical compliance, read the complete tender document very carefully before bidding and putting final price in BOQ.

1. Quotations are invited under two-bid system. Nothing is optional in this tender, so quote the final price, including all the above requirements**. The quoted price should be through direct import (CIF air) in foreign currency or FOR destination (INR) upto UDSC** (supplying and installation included). The last date of bid submission is **22nd December 2022 by 5:00 PM as per the tender specifications.**
2. Should carry Certification of US or European standard for the quoted equipment. Documentary proof to be submitted.
3. The vendor should have at least 10 years of track record of supply of purification systems. Documentary proof to be submitted. The certificate should also indicate about the responsibility of the OEM during the warranty period in case there is change in the authorized distributor/agent/subsidiary.
4. The vendor/manufacturer should enclose usera minimum list with the address of at **25** users **of the same model of purification system** installed throughout India in various reputed Institutes/Universities/ICAR/CSIR/ICMR/other research labs in government-funded institutions. Documentry proof required , with phone no and complete address of buyer.
5. The vendor should submit an authorized distributor certificate issued by the original manufacturer for the quoted item. Manufacturer or vendor must have post sale service provider in Delhi in case of any technical or function issue with machine. The breakdown of the equipment should be attended within 24 hours of the call (on site) and to be fixed in maximum 72 hours, beyond which, the time taken for the repair will be added to the warranty period.
6. The machine should be under **Two Years "Comprehensive warranty"** from the date of installation.
7. Bid splitting is not allowed and incomplete bids will be rejected. Only bids for the complete requirement of the instrument and the mentioned quantities with accessories and a designated warranty period will be considered.
8. For Made in India suppliers, the procurement team may visit the manufacturing facility of the quoted machine and its accessories.

Important Information:

1. Bidder should be Manufacturer/ Authorized Partner/ Reseller of the manufacturer and a Letter of Authorization from the manufacturer for the same and specific to the tender should also be

enclosed. The bidder should also be the Authorized Service Provider. (attach the required certificate)

2. Vendor should also enclose the original literature/catalogue/company brochure **and fill out a compliance sheet, with the relevant page number** and line number of the brochure mentioned against each point of the technical specifications given above. The quoted specifications/features should be available on the company website **(Please provide the original manufacturer website showing the requested technical specification).**
3. The delivery period should be within **60 days** from the date of receipt of the order. Bids offering delivery periods beyond stipulated time period may be treated as non-responsive and will be summarily rejected.
4. Please note: IThe applicable taxes/duties should be mentioned at the current prevailing rates keeping in view the current exemptions for the University of Delhi. DSIR Certificate/CDEC would be provided on request.
5. The quotations should be addressed to **Prof. Rajeev Kaul**, Department of Microbiology, University of Delhi South Campus, Benito Juarez Road, New Delhi-110021, and should be **uploaded on the e-procurement portal, latest by 5 pm on 22nd December 2022**
6. Quotations have to be submitted in a **two-bid system**. The first part, **Technical bid**, should consist of all technical details and supporting documents with terms and conditions. The second part, **Financial bid**, should contain item-wise pricing of items mentioned in the technical bid.
7. The bidder will have to quote all the required items together: partial quotes will not be accepted. For each item, make and model, have to be mentioned clearly. (Nothing is optional)
8. The bids shall remain valid for a period of 90 (ninety) days from the date of opening. Delhi University reserves the right to reject a bid valid for a period shorter than 90 days.
9. Payment will be made by wire transfer or through online system as per University rules after the installation of the instrument.

Commitment to Accept Lowest or Any Tender

- Demonstration of the equipment with all accessories (mentioned in tender document) will be required on the recommendation of the Purchase Committee at Department of Microbiology, University of Delhi South Campus, New Delhi-110021.
- The University of Delhi shall be under no obligation to accept the lowest or any other offer received in response to this tender notice and shall be entitled to reject any or all offers. The University of Delhi will not be obliged to meet and have discussions with any vendor and or to listen to any representations.

Principal Investigator
DST-SERB Project-`Center of...(CIVET)'
No. IPA/2021/000136
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