

**Request for Quote for the procurement of
a static and dynamic electrical measurement system. (Last date: 2 March 2022)**

This is a Request for Quote (RFQ) for the procurement of a static and dynamic electrical measurement system, for the Centre for Nano Science and Engineering (CeNSE) at the Indian Institute of Science (IISc), Bangalore. IISc is India's best institution on higher learning and the Center for Nano Science and Engineering (CeNSE) is home to one of the best academic fabs in the world.

CeNSE is a multidisciplinary research department at IISc that houses a 14,000 sq. ft. cleanroom and characterization facility used by 50 faculty members from various disciplines at IISc. CeNSE is also a user- facility which has hosted over 6000 participants from more than 700 universities and institutes all over the world. Consequently, any tool in CeNSE receives significant exposure to scientific community in India and beyond. The vendors are requested to factor in the value of this exposure in their quotes.

Being a user-facility puts additional technical burden on the tool. We need a tool that can tolerate heavy usage (40 hours/week), has a high uptime, can be serviced, and maintained for the foreseeable future (at least 5 years), and has a track record of reliability at comparable facilities in India and abroad. Details of existing facilities and the user program can be gleaned from:

<http://nnfc.cense.iisc.ac.in>

<http://www.mncf.cense.iisc.ac.in/>

<https://www.inup.cense.iisc.ac.in/>

Procedure:

1. Vendors will be required to submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. The technical bid should contain all commercial terms and conditions, except the price. **Only vendors who will be adjudged by the committee to meet the technical requirements will be considered for the commercial negotiation.**
2. **The deadline for submission of proposals is the March 2, 2022, 5:00 pm Indian Standard Time.** Proposals should arrive at the Main office, GF-15, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, on or before the above deadline.
3. C.I.P. Bangalore basis (by Air Freight only). The quotation should mention the terms of delivery, delivery schedule, estimated delivery date, and payment terms.
4. The decision made by the purchase committee is final.
5. **The technical bid** must contain a point-by-point technical compliance document.
 - a. The technical proposal should contain a compliance table with 5 columns.
 - First column must list the technical requirements, in the order that they are given in the technical requirements below.

- The second column must provide specification of the instrument against the requirement (please provide quantitative responses wherever possible)
 - The third column should describe the compliance with a “YES” or “NO” only. Ensure that the entries in the column 2 and column 3 are consistent.
 - The fourth column should clearly state the **reasons/explanations/context** for deviations if any. Without clear explanation, just stating YES” or “NO” will not be considered.
 - The fifth column may contain additional remarks. It can be used to highlight the technical features, qualify response of previous columns, or provide additional details.
- b. Technical capabilities of any *suggested* accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
 - c. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors
 - d. Relevant technical datasheets should be provided. The committee reserves the right to cross-check the information in these datasheets with publicly available information.
 - e. Items in addition to that listed in the technical table that the vendor would like to bring to the attention, such as data sheets, technical plots etc. can be listed at the end of the compliance table. Vendors are also encouraged to highlight the advantage of their tools over comparable tools from the competitors.
 - f. If multiple systems can fulfil the requirements, vendors can submit multiple bids.
6. The technical proposal will be evaluated against the technical requirement. Deviations from the technical specifications requested are allowed. Such deviations must be highlighted and justified. Their acceptance or rejection will be left to the discretion of the technical committee. Only the vendors, adjudged by the committee to be suitable to meet the technical requirements, will be considered for the commercial negotiation.
7. The commercial bid must contain:
- a. Itemized cost of the system and *required* accessories, such as software, power supply, etc.
 - b. All accessories needed for the instrument to function as per the technical specification must be listed.
 - c. itemized cost, as an option, for any *suggested* accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
 - d. The cost of shipping plus insurance up to IISc has to be included. IISc will help the shipping company to take care of the customs clearance at Bangalore Airport.
 - e. Please indicate the warranty provided with the tool. Warranty of 3 years or more is preferred.
 - f. Provide itemized cost for *required/expected* spares for 3 years of operation. For sake of this calculation, the vendor may assume active tool usage of 40

- hours/week. This number will be used to estimate the life cycle cost of the tool.
- g. The cost of annual maintenance contract (AMC). The details of AMC are given below. This number will be used to estimate the life cycle cost of the tool.
 - h. Length of time that the tools will be supported with service and spares from the date of installation. Our requirement is that the tools be supported for at least 5 years from the date of installation. To quote lowest price, vendors often quote for obsolete or soon-to-be obsolete equipment. This is NOT acceptable. For a user-facility like CeNSE, it is vital that the equipment be serviceable and supported for the foreseeable future. The length of guaranteed support will be used to estimate the life cycles cost of the tool.
 - i. The commercial bid should indicate the following separately: (a) equipment price (b) optional items (c) Freight and insurance cost (d) Shipping cost and (e) the Total cost.
8. As an additional option, provide cost of an annual maintenance contract (AMC) for 3 years, post warranty. The AMC must
- a. cover 1 scheduled and 1 emergency visit per year.
 - b. The emergency visit should be supported with a 48-hour response window.
 - c. clarify if maintenance will be done by a trained onsite engineer (CeNSE employee) or a specialist from the OEM.
 - d. in case the OEM is foreign, clarify if maintenance will be done by a trained engineer from India (local representative or Indian subsidiary) or by a trained engineer from abroad.
 - e. include an itemized list of spares (e.g., maintenance kits) that are essential for scheduled visits.
9. The commercial bids will be evaluated based on life-cycle cost of the tool. This includes the cost of purchase, maintenance, spares, etc. The final decision will be me made by the committee.
10. The RFQ must include references of 5 previous installations with similar requirements, preferably in India. Please provide the names and contact addresses of the referees, so that the committee can contact them independently. Details of such systems with model numbers and users should be provided.

All the proposals should be addressed to:

The Chairperson,
Attn: Dr. Sreetosh Goswami
Centre for Nano Science and Engineering
Indian Institute of Science
Bangalore – 560012, India

The Proposals should arrive at the Main office, GF-15, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, on or before the deadline of March 2, 2022, 5:00 pm Indian Standard Time. The parcels should be delivered between 9 am to 5 pm.

Questions regarding this tender should be addressed to Dr. Sreetosh Goswami at the email address sreetosh@iisc.ac.in with the subject line “Query _Tool name_Bidder’s name”.

Post such submission all vendors should send an email to sreetosh@iisc.ac.in with the subject line: “Submitted bid_Bidder’s name_Tool Name” to intimate him of the submission within one day.

II. General terms and conditions:

1. The institute reserves the right to accept or reject any bid, or to annul the bidding process and reject all bids, at any time prior to the award of contract without thereby incurring any liability of the affected bidder or bidders.
2. Previous installations can be used by the committee to disqualify vendors with poor track record of service, build quality, system performance or poor availability of spares.
3. The bidder must not be blacklisted/banned/suspended or have a record of any service-related dispute with any organization in India or elsewhere. A declaration to this effect should be provided.
4. The vendor should be able to repair and maintain the equipment once it is installed. Clarify if periodic (preventive) maintenance can be done by a trained on-site engineer (i.e. IISc employee) or requires a specialist from the OEM. The bidder should have qualified technical service personnel for the equipment based in India and must assure a response time if <24 hours after receiving a service request.
5. All the quotations must be valid for at least 120 days at the time of submission.
6. The quotations should clearly indicate the terms of delivery, delivery schedule, tax, and payment terms.
7. In case of the award of purchase order, the vendor must provide an Order Acknowledgement within 30 days from the receipt of the Purchase Order.
8. The lead-time for the delivery of the equipment should not be more than 3 months from the date of receipt of our purchase order.
9. The bidder is responsible for the installation of the equipment in the IISc campus.
10. Necessary training to operate the procured setup and required literature support (in English language) should be provided without additional cost.
11. Bidders should undertake to support the system with spares and software bugfixes, if any, at least for the next 5 years.
12. Data must be supplied along with the technical compliance documents. Technical bids without supporting data can be deemed as technically non-compliant.
13. Printed literature and published papers in support of all compliance to the prescribed specifications are encouraged.

14. All guaranteed specifications will have to be demonstrated, upon request, in an active installation. Failure to demonstrate any promised specifications will be deemed as technical non-compliance.
15. Technical evaluation by the institute must include demonstration to verify functionalities and capabilities of the system quoted. Any discrepancy between the promised specifications and demonstrated specifications will be deemed as technical non-compliance. If need arises, the vendor must be ready to physically visit IISc for a techno commercial discussion.
16. The intender reserves the right to withhold the placement of the final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all the above conditions without assigning any reason.

III. Technical specifications of the electrical measurement system (static and dynamic):

A set up capable of performing the listed characterizations are preferred. Both consolidated and an assembly of discrete instruments are acceptable. The committee will decide on the suitability of the proposed setups to meet our requirements.

SN	Parameters	Specifications
Waveform Generator – (Qty 1)		
The system should be capable to generating arbitrary user defined waveform of the following specifications. The waveform generator must be compatible with the other components specified here.		
1	Number of Channels	2 channels. Phase & Time synchronized
2	Analog output connector type	SMA female
3	Analog output impedance	50 Ω
4	Analog Bandwidth (-3dB)	1 GHz or better
5	DAC resolution	16 Bits
6	Maximum Sample Rate (Without Interpolation)	2.5 GSa/s on each Channel or better
7	Waveform memory per channel	2 G Samples per channel
8	Coupling of Channels	DC and AC
9	Amplitude range (DC)	25 mVp-p to 1.5 Vp-p (single-ended, 50 Ω terminated) or better 50 mVp-p to 3 Vp-p (Differential mode, 100 Ω terminated) or better

10	High Voltage Mode (DC)	Amplitude: 10 mVp-p to 5 Vp-p or better Offset: ± 2 V or better
11	Amplitude range (AC)	-85 dBm to +10 dBm (10MHz-1GHz) or better
12	Markers	4 Markers per Channel preferred
13	Operating Modes	Continuous and Triggered
14	Number of Trigger input	≥ 2
15	Inbuilt Display	Built in 6.5 inch display with XGA resolution with touchscreen
16	Operating Temperature	0 C to 50 C
17	Mains Input Voltage	230V AC, 50Hz (nominal)
19	Interfaces & Operating System	USB 2.0, USB 3.0, LAN, VGA, Windows 10
20	Pulse Generator SW	<p>A. Capable of creating multiple pulses and frames.</p> <p>B. Customize pulses with different pulse shapes like rectangular and trapezoidal with varying rise/fall times, pulse widths and pulse repetition rate .</p> <p>C. Allows insertion of varying dead time between frames</p> <p>D. Create multiple Pulse trains and assign each train to different channels to simulate multi lane signals</p>
<p>Source Measure Unit – (Qty 3)</p> <p>The system should comprise at least 3 SMUs for performing three independent measurements that can source voltage or current and measure both with the following specifications. These SMUs must be compatible with each other and also with the other components specified here.</p>		
1	Voltage Source and measure ranges	20mV to 200V or better
2	Voltage resolution	Measure : 10 nV or better
		Source: 500nV or better
3	Current Source and measure range	10nA to 1A or better
4	Current resolution	Measure : 10 fA or better
		Source: 500 fA or better
5	Voltage Accuracy	0.100% + 150 μ V @ 20 mV or better
		0.015% + 10 mV @200V or better

6	Current accuracy	0.10% + 50 pA @ 10 nA or better 0.030% + 500 μ A @ 1 A or better
7	Sweep types	Linear, log, Dual Linear, Dual Log, Custom, Source Memory mode. Time based measurement mode.
8	Internal buffer	250000 point reading buffer
9	Programming interfaces supported	USB, GPIB, Ethernet (LXI), TSP
10	Expansion Interface for Multichannel operation	TSP link –used for Trigger and communication with each other supporting Master Slave mode
11	Signal supported connectors	Front Panel Banana Jacks/ rear panel 3 lug Triax
12	Measurement speed	3000 readings / sec
13	Source and measure resolution	At least 6 ½ digit or more.
14	Measurement mode	Voltage , current, Resistance, power
15	Display and control	5 inch Built-in capacitive Touch screen display. Icon based control to setup measurement , source and graph display
16	Storage of setups and export measurement data	Through front panel USB pen drive slot

Pico ammeter with built-in Voltage Source – (Qty 1)

The system should comprise at least 1 SMUs for performing capable of measuring picoampere current. This must be compatible with the other components specified here.

1	System should be capable of current measurement upto 20 mA.	
2	Current measurement ranges:	2 nA to 20 mA or better
3	Typical RMS noise:	20 fA or better
4	Current resolution:	10 fA or better
5	Input impedance :	>200T Ω
6	Resistance measurement up to :	1 E12 Ω
7	System should have alternating polarity method for resistance measurement	
8	System should have alternating voltage capability to measure the resistance up to: 10 E15 Ω	
9	System should have built in voltage source up to 500V.	

10	Voltage source step size:	200 μ V or better
11	System should be able to have GPIB, RS 232 communication.	

8.5 Digit Voltmeter – (Qty 1)

The system should comprise at least 1 digital voltmeter with at least 8.5 digits of accuracy, and it must be compatible with the other components specified here.

1	Resolution	8 ½ digits
2	Measurement capability	V, I, R, T and F
3	DC voltage range:	200mV to 1000V or better
4	AC voltage range:	200mV to 750V or better
5	DC current range:	200 μ A to 2A with resolution of 10 pA or better
6	Resistance range:	20 to 1G Ω with resolution of 100 n Ω or better
7	Built-in spike detection	Up to 1 μ S
8	Crest factor measurement capability:	20 Hz to 1 MHz or better
9	System should have slot for 10 channel scanner card.	

Oscilloscope - Qty 1 No.

The system should have a scope with the following specifications:

1	Measurement Channels:	6 or more Analog Channels
2	Bandwidth:	At least 2 GHz Analog on all channels
3	Sample Rate :	>6 GSa/s on all channels
4	Record Length per channel:	> 60 M points on all channels
5	Vertical Resolution:	12 bit ADC (HW resolution), 16 bits with high resolution mode
6	Input Impedance:	1 M Ω , 50 Ω
7	Input Sensitivity (1M Ω):	500 μ V/div to 10 V/div or better
8	Time base range:	200 ps/div to 1,000 s/div or better
9	Maximum input voltage:	1 M Ω : 300 VRMS
10	Analysis:	Histogram, Spectrum, Time Trend, TIE and Phase Noise
11	Trigger:	Edge, Pulse Width, Runt, Logic, Rise/ Fall Time

12	Connectivity:	USB, LAN (LXI Compliant), Display Port
13	Probes:	1GHz passive or active probe, one probe for each channel (total 6 probes)
14	Display:	> 15 inch HD capacitive touch screen
15	Operating System:	Embedded OS (Non-Windows)
16	Input voltage:	100 - 240 V, 50 Hz

Thanking you,

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