



**NATIONAL CENTRE FOR EARTH SCIENCE STUDIES**  
**(An Institution under the Ministry of Earth Sciences, Govt. of India)**  
**P.B. No. 7250, Akkulam, Thiruvananthapuram-695 011, Kerala.**  
**PURCHASE & STORES DIVISION**

**Our Ref : PUR-PROC/18b/2022-PUR-NCESS**  
 (To be quoted in all correspondence)

**Dt. 04.06.2024**

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**Sub: e-Procurement Tender**

Dear Sirs,

Please send your offer along with descriptive catalogue/ pamphlet for the following items not later than **17.07.2024 at 06.00 PM (Tender Opening at 11.00 AM on 19.07.2024)**. The terms and conditions governing the tender are given at the bottom.

<i>Sl. No</i>	<i>DESCRIPTION</i>	<i>QUANTITY REQUIRED</i>
<b>1</b>	<b>X-Ray Diffractometer (XRD) with ancillary units with 5 Year Warranty</b>	<b>1 No</b>

(Detailed specification and conditions are given separately)

**INSTRUCTIONS TO THE TENDERERS AND TERMS AND CONDITIONS**

- 1 **The quotation should be submitted by e-procurement in PDF format by ‘logging on’ on the website [eprocure.gov.in/eprocure/app](http://eprocure.gov.in/eprocure/app). The total file size of the documents submitted should not exceed 20 MB.**
- 2 **The Technical and Financial Bids should be submitted separately (Two Bid System).**
- 3 **In place of a Bid security, the bidders must sign a Bid securing declaration along with the bid stating that “We accept that if we withdraw or modify our Bids during the period of validity, or if we are awarded the contract and we fail to sign the contract, or to submit a performance security before the deadline defined in the request for bids document, we will be suspended for the period of time decided by NCESS from being eligible to submit bids for contracts with NCESS”. The bids without this declaration or Udyog Aadhar Memorandum /NSIC will be rejected.**
- 4 Bidders from a country which shares a land border with India will not be eligible to participate in this tender, unless the bidder is registered with Department for Promotion of Industry and Internal Trade (DPIIT) under Order (Public procurement No. 1) issued by Ministry of Finance, Department of expenditure in line with OM No. F.No.6/18/2019-PPD dt 23rd July, 2020 and F.18/37/2020- PPD, dt. 08.02.2021 inserting Rule 144 (xi) in GFR 2017.

- 5 Preference to Make In India: Preference will be given to the eligible Make in India offered products, in accordance with the CVC letter No. 018/VGL/022-377353 dated 20.04.2018, pertaining to Department of Industrial Policy and Promotion (DIPP) in connection with Preference to Make in India, Order 2017'(PPP-MIIOrder) dated15.07.2017 pursuant to rule153(iii) of General Financial Rules 2017. (Declaration may be submitted).
- 6 Startups: To promote make in India and startups, the prior turnover and prior experience for all startups shall be relaxed subject to their meeting of quality, technical specifications and tender conditions as per tender. The bidder who intends to participate as "startup" company should enclose the certificate towards startup enterprise registration/recognition issued by Department of Industrial Policy and Promotion, Ministry of Commerce and the certificate should be certified by the Chartered Accountant or should be registered with GeM as startup. Applicable certificate should be enclosed.
- 7 Fall Clause: An undertaking has to be provided by the bidder that it has not supplied / is not supplying similar product / systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry / Department of the Government of India or PSU and if it is found at any stage that similar product / systems or sub systems was supplied by the bidder to any other Ministry/Department of the Government of India, or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the bidder to NCESS, if the contract has already been concluded.
- 8 MAF: The authorisation from the manufacturer should be tender specific, i.e., tender reference number and date should be mentioned in the certificate. A bidder shall not have conflict of interest with other bidders. In cases, where the manufacturer has submitted the bid, the bids of its authorised dealer will not be considered and in case of violations, both infringing bids will be rejected.
- 9 Bids are liable to be rejected as nonresponsive if a Bidder fails to provide and/ or comply with the required information, instructions etc., incorporated in the Tender document or gives evasive information/ reply against any such stipulations. Furnishes wrong and/ or misleading data, statements(s) etc. In such a situation, besides rejection of the bid as nonresponsive, it is liable to attract other punitive actions under relevant provisions of the Tender Document for violation of the Code of Integrity.
- 10 During the evaluation of Techno-Commercial or Financial Bids, NCESS may at its discretion, but without any obligation to do so, seek any shortfall information/documents only in case of historical documents which preexisted at the time of the tender opening and ask the Bidder to clarify its bid by a specified date. Bidder should answer the clarification with in that specified date (or, if not specified, 7 days from the date of receipt of such request). The request for clarification shall be submitted in writing or electronically. If discrepancies exist between the uploaded scanned copies and the Originals submitted by the bidder, the original copy's text, etc, shall prevail. Any substantive discrepancy shall be construed as a violation of the Code of Integrity, and the bid shall be liable to be rejected as nonresponsive in addition to other punitive actions under the Tender Document for violation of the Code of Conduct.
- 11 From the time of bid submission to awarding the contract, no Bidder shall contact NCESS on any matter relating to the submitted bid. If a Bidder needs to contact NCESS for any reason relating to this tender and/ or its bid, it should do so only in writing or electronically. Any effort by a Bidder to influence the Procuring Entity during the processing of bids, evaluation, bid comparison or award decisions shall be construed as a violation of the Code of Integrity, and bid shall be liable to be rejected as nonresponsive in addition to other punitive actions for violation of Code of Integrity as per the Tender Document.
- 12 After the award of contract, the supplier encounters conditions hindering timely delivery of the Goods, he/she shall promptly inform NCESS in writing about the same and its likely duration. NCESS shall examine the situations and, at its discretion, may agree to extend the delivery Schedule, with or without Liquidated Damages (LD). When the period of delivery is extended due to unexcused delay, the amendment extending the delivery period shall, inter alia, be subject LD to a maximum deduction of the 10% of the delayed Goods contract price (all inclusive) and with and without denial clause. Nevertheless, NCESS shall be entitled to the benefit of any decrease in price on account of reduction in or remission of GST, customs duty or foreign

exchange rate variation or any other variation clause which takes place after the expiry of the original delivery date.

- 13 Force Majeure: On the occurrence of any unforeseen event, beyond the control of either Party, directly interfering with the delivery of Goods arising during the currency of the contract, such as ar, hostilities, acts of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions, strikes, lockouts, or acts of God, the affected Party shall, within a week from the commencement thereof, notify the same in writing to the other Party with reasonable evidence thereof. Unless otherwise directed by the NCESS in writing, the supplier shall continue to perfume its obligations under the contracts far as reasonably practicable and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event, If the force majeure condition(s) mentioned above be in force for 90 days or more at any time, either party shall have the option to terminate the contract on expiry of 90 days by giving 14 days' notice to the other party in writing. In case of such termination, no damage shall be claimed by either party against the other. None of the Party shall seek any such remedies or damages for the delay and/ or failure of the other party in fulfilling its obligations under the contract if it is the result of an event of Force Majeure.
- 14 **The bidder should enclose all relevant documents in a sequential manner as per the tender format.**
- 15 **The bid should contain the Bid securing declaration, Authorization from manufacturer, Details of service Centre, Technical details with make, model and specification of each component, Technical Compliance statement, List of Customers, Brochures etc., wherever applicable.**
- 16 Catalogue/Brochure/Manual should be submitted along with the offer wherever necessary.
- 17 Warranty / Guarantee Clause needs to be mentioned necessarily wherever applicable.
- 18 The material should be delivered at NCESS or installed at the specified location and so the quotation should include all the charges for the delivery at NCESS/installation.
- 19 **In INR orders, the Customs Duty Exemption Certificate will be given to the supplier upon request. But the entire responsibility of customs clearance and delivery at NCESS will rest with the supplier. High sea sale is not accepted and should not be quoted.**
- 20 **The offer should be valid for 180 days from the due date of opening of tender.**
- 21 NCESS reserves right to accept the tender in part or full without assigning any reasons. The enquiry is not a commitment, and the purchaser reserves the right to reject or cancel any or all offers.
- 22 **Payment Terms:**
  - If Indian Purchase Order**
    - a. 90% upon delivery and acceptance of entire system by NCESS and submission of Invoice, applicable Test Certificate, Installation Certificate, Warranty Certificate.
    - b. 10% will be paid against submission of advance bank guarantee from a nationalized bank for the like amount valid for the warranty period plus 60 days or after successful completion of warranty period
  - If Foreign Purchase Order**
    - a. LC will be established for 100% of order value against which 90% will be released on submission of Order Acceptance, Proforma Invoice, LC details and other shipping documents etc.
    - b. Balance 10% will be after submission of advance bank guarantee from a nationalized bank for the like amount valid for the warranty period plus 60 days or successful completion of warranty period or against

*Net payment will be released after statutory deductions. No advance payment will be allowed, and no other payment terms will be considered.*

- 23 **In the event of placement of order, the successful bidder shall provide a Performance Bank Guarantee from a Nationalised Bank for 3% - 10% of the order value (DoE OM No. F.1/2/2023-PPD dated 03.04.2023). The PBG shall stand valid for the warranty period + 60 days.**
- 24 Any further changes in the details, like the date of opening or specification, will be posted on our web site only.

Yours faithfully.

Sd/-

Deputy Manager (Purchase &Stores)

#### **ADDITIONAL CONDITIONS**

1. **Pre-bid meeting will be conducted on 20.06.2024 at 11.00 AM through hybrid mode.** Interested vendors may attend the pre-bid meeting after informing NCESS by e-mail to [shibu.sasi@ncess.gov.in](mailto:shibu.sasi@ncess.gov.in) with Cc to [purchase.ncess@nic.in](mailto:purchase.ncess@nic.in) on or before **19.06.2024**, confirming their pre-bid meeting participation. If no such confirmation of attending the pre-bid meeting has been received from any vendors upto this date, no pre-bid meeting will be held. Any decision/ change regarding pre-bid meeting will be informed through NCESS website. All the clarifications required regarding the tender, including the points to be discussed in pre-bid meeting, should be sent to the e-mail: [shibu.sasi@ncess.gov.in](mailto:shibu.sasi@ncess.gov.in) with copy to [purchase.ncess@nic.in](mailto:purchase.ncess@nic.in) on or before **19.06.2024**. Late submission/ e-mails will not be considered.

**ANNEXURE I**  
**TECHNICAL SPECIFICATIONS OF X-RAY DIFFRACTOMETER (XRD)**

Item	Qty.
<b>A floor standing XRD unit</b> with not less than 3KW generator, with Cu anode Ceramic X-ray tube operating in both line and point focus at the source with micro diffraction capability, all integrated with vertical theta-theta goniometer geometry. The optics should be capable to switch from Brentano para-focusing optics (BB), to parallel beam (PB) optics, with minimum changes using pre aligned units and with solid state detector having Spatial resolution at least 75 $\mu\text{m}$ and also be able to process in 0D, 1D and 2D modes, with ancillary units.	<b>1 Nos</b>

No	Item	General Details	Specification
1	<b>Type</b>	Floor model	
2	<b>Intended applications. / Obtained sample characteristics</b>	<ul style="list-style-type: none"> <li>a. Qualitative and quantitative analysis of powder, pellet, and thin films samples.</li> <li>b. Rietveld refinement-based structure solution</li> <li>c. Grazing incidence scattering</li> <li>d. Microdiffraction</li> <li>e. Phase composition, Crystal structure, Texture, Residual stress, Short-range order, Lattice parameters &amp; mismatches</li> </ul>	
3	<b>X-Ray Generator</b>	Continuous output power	3 kW or better
		Control	Fully controlled through Windows based PC software. User could able to set the voltage and current using the software loaded on the PC.
		Input Voltage	~ 230V Ac, 50 Hz.
		High voltage (Maximum value)	$\geq 50$ kV, adjustable in steps of 1 kV
		Anode Current (Maximum value)	$\geq 60$ mA, adjustable in steps of 1mA
		Stability	Less than 0.01% for high voltage and current (lesser the better), with 10% variation of main supply.
		Safety	Protection from abnormal cooling water, flow rate, water pressure, temperature detection, abnormal loads (such as over load, line current, abnormal low and high voltage, emergency stop switch, leak breaker), shutter malfunction detection. Options of X-ray power manual and auto start-up/shutdown.
		AERB approval	The Instrument should have Type approval from AERB for operation in India. Type approval certificate to be provided at the time of technical bid This certificate is a basic requirement

			for considering technical bid responsive
		The XRD system should be at standby operation at lowest voltage and ampere when the unit is idle for more than 1 hr.	
4	Radiation safety	Maximum radiation levels	Significantly below 1 micro-Sievert per hour on 10 cm distance* under measurement conditions, even with Mo or Ag X-ray tubes. *This should be demonstrated after installation
		Maximum X-ray safety should be guaranteed and ensured with maximum radiation levels significantly below 1 micro-Sievert/h under measurement conditions along with necessary failsafe safety circuits.	Radiation Safety certificate to be submitted.
5	Diffraction Cabinet and Radiation enclosure	Type and features (Note: Compliance of items numbered as a,b,c etc should be specified separately against each. The same rule to be followed for all other columns in this specification table. If any specification is not addressed or specified in technical bid, it will be treated as 'non-compliance')	<ul style="list-style-type: none"> <li>a. A complete floor standing, sufficiently illuminated, radiation enclosure which prevents exposure from either the direct or scattered x-ray beam.</li> <li>b. The enclosure must meet International and Indian X-ray radiation safety requirements</li> <li>c. Radiation leakage out of the cabinet shall not be more than <math>10^{-6}</math> Sv/hr during operation of XRD system at full power and measured at 10 cm distance.</li> <li>d. Cabinet door safety interlocking shall be provided such that x-rays can't be produced until the cabinet door is properly closed</li> <li>e. OEM to provide certificate stating the radiation dosage for the quoted model.</li> </ul>
6	Goniometer	Type/Geometry	Vertically mounted and should be Theta-Theta type only
		Reflection and Transmission mode	The system must work for both reflection and transmission geometry. Transmission mode with source top and detector below
		Scanning Radius	Minimum 240 mm or more
		Angular range (Without accessories)	360°
		Minimum usable angular range limits (with accessories)	$-100^{\circ} < 2\theta \leq 165^{\circ}$ or better

		Angular positioning	Stepper motors with optical encoders / High Performing DC Motors
		Minimum step size	0.0001° or better with scan speed in the range of 0.01 to 50°/min
		Slew speed	15°/sec or better
		Angular Accuracy	± 0.005° or better
		Angular reproducibility	± 0.0002 deg. or better
		2theta linearity / Instrument alignment	Equal or better than ± 0.01° throughout the angular range of goniometer with NIST traceable SRM sample.
		Data quality Guarantee	Manufacturer must submit data quality guarantee certificate with the offer on the angular position (≤0.01degree 2theta over the entire angular range) and intensity ratio to be carried out on NIST sample. One NIST sample is to be provided. Demonstration of data quality by using same NIST sample should be carried out.
		The scanning modes	The scanning modes of step scan, continuous scan and fast scan to be available
7	<b>X-Ray Tube</b>	Type	<ol style="list-style-type: none"> <li>High resolution X-ray tube with Ceramic insulation body.</li> <li>Must be having long fine focal spot with preferable focus size of 10 to 12 mm x 0.4 to 0.04 mm</li> <li>The X-ray tube voltage has to be computer controlled and shall have automatic protection for voltage fluctuations and high voltage.</li> </ol>
		Anode material	Copper (with Ni Filter that must be standardizing with the Cu-radiation)
		X-ray tube Power	Maximum operating Power of 2 kW or more with rating of 50 kV and 60 mA.
		Focus	Working for both line and point focus at the source with the facility to rotate the tube from point focus to line focus and vice versa without any need for realignment and without disconnecting any utilities like high voltage cable, water connection etc. (Point focus creation at the source through blocking X-ray's with slits is not acceptable).
		Filters for Beta Suppression	<ol style="list-style-type: none"> <li>Shall be supplied with their corresponding filters for Cu K-Beta Suppression</li> <li>Reduction of Intensity of Cu K-Beta radiation to below 0.5% of the Cu K-Alpha intensity</li> </ol>

8	<b>Optics for</b> <b>1. General B-B Geometry.</b> <b>2. Parabolic multilayer mirror based parallel beam for Thin Film Analysis</b>	Optics Geometry (Bragg-Brentano and Parallel Beam geometry)	<p>a. The optics should be for general-purpose X-ray diffractometers, switchable from Bragg-Brentano (BB) geometry to parallel beam (PB) geometry, easily.</p> <p>b. This change over should be software controlled without any intervention to the unit. Different modes shall be selected by the user, at will by click of a button on the control software.</p> <p>c. The Bragg-Brentano and Parallel beam paths need to be completely independent.</p>
		Self-detection and alignment	<p>Detection of missing, misplaced or real time error in components along the beam path (from X-ray source to detector)</p> <p>After exchanging any component, optics should retain their alignment with Automatic configuration of each components</p>
		Divergence and antiscatter slit	Basic optics should be provided with programmable divergence and programable antiscatter slit. The range of the slit width would be from minimum 0.5mm or lower to maximum 7mm or more. The slit should be independently and continuously variable.
		Incident beam divergence slit	Suitable Incident beam variable divergence slit facilitating measurement from as low as 0.5 deg onward and going up to higher angles should be provided.
		Necessary motorized variable Anti-Scatter slits & Fixed /variable Soller Slit of minimum 2 suitable size for incident beam shall be provided.	Suitable variable Slits, Variable Anti-Scatter Slit & Fixed Soller Slits for detector shall be provided.
		High Intensity monochromatic beam optics using parabolic graded curved multilayer mirror parallel beam optics must be provided and soller slit in diffracted beam for analysis of rough samples should be provided.	
		Low angle X-ray diffraction	a. Beam knife for low angle measurement should be provided.



			<ul style="list-style-type: none"> <li>b. Beam knife range of adjustment: 0.5 mm - 5 mm above sample surface.</li> </ul>
		Optics for all the measurement modes shall preferably be computer controlled. Switching between different measurements modes shall be completely automatic including alignment with minimal user intervention.	
		Micro Diffraction Optics	<ul style="list-style-type: none"> <li>a. Suitable optics for Micro diffraction analysis with a spot size of 50,100, 300 ,500 micron should be offered.</li> <li>b. For spotting the location of microdiffraction analysis and for beam attenuating alignment, dual laser alignment tool with camera and alignment module to be quoted under option.</li> </ul>
9	<b>Filter/ absorber</b>	<ul style="list-style-type: none"> <li>a. Suitable Nickel filters should be offered to keep the Cu-K<math>\beta</math>-radiation down to about 1% of Cu-K-alpha level or better.</li> <li>b. For enabling low (small) angle measurements and reduce air scattering, any special fitment / component required needs to be offered.</li> <li>c. A minimum of 2 No's Cu absorbers should be offered for attenuation purpose</li> </ul>	
10	<b>Sample Stage and Sample Holder</b>	Sample stage features	<ul style="list-style-type: none"> <li>a. Suitable for powder, pellets and thin films.</li> <li>b. Computer controlled rotating sample stage with ability to control &amp; vary the rotating speed for orientation studies with suitable motors.</li> <li>c. Stage for Thin-Films GIXRD should be provided.</li> <li>d. Sample stage should also be suitable for microdiffraction.</li> <li>e. Sample stage for solid sample should be offered.</li> </ul>
		Sample Holder features	<ul style="list-style-type: none"> <li>a. Sample holder for Powder, Thin films, small solids and clay samples (glass slides)</li> <li>b. Sample holder of PMMA/steel type/ Glass type/ Aluminium type in circular or square type</li> </ul>

			<p>for both spinning and non-spinning stage sample holder.</p> <ul style="list-style-type: none"> <li>c. At least 25 Nos sample holders must be provided for spinning and non-spinning type sample holder for powder and thin film samples.</li> <li>d. All the accessories for sample preparation shall be provided.</li> <li>e. Silicon zero background sample holders to hold small sample amount with and without cavity (2 no. each) should be supplied.</li> </ul>
		Auto-sample changer/Auto-sampler	<ul style="list-style-type: none"> <li>a. Auto-Sampler for analysis of minimum 15 samples at a time, which can be operated in both reflection and transmission mode, along with necessary holders should be provided.</li> <li>b. Should be completely automatic. The switching between applications between different application stages should be without any re configuration and realignment.</li> <li>c. This provision is for both powders and thin films.</li> <li>d. Should have the facility for creating batch analysis of different samples with different analysing parameters automatically.</li> </ul>
<b>11</b>	<b>Detector</b>	Detector features (The quotation should contain all technical details for the quoted detector)	<ul style="list-style-type: none"> <li>a. Solid State technology-based detector for diffraction and scattering application</li> <li>b. with capability of working in 0D, 1D and 2D mode</li> <li>c. Should have highest count rate capabilities, best angular resolution and perfect profile shapes.</li> <li>d. High speed of more than 150 times faster than a conventional point detector system or better</li> <li>e. Should possess the built-in facility for suppression of sample fluorescence for improving without using any secondary monochromator. If such facility is not available, secondary monochromator must be included in quote.</li> </ul>

			<ul style="list-style-type: none"> <li>f. Detector should be maintenance and calibration free and should NOT require any type of gas, water or liquid nitrogen during operation</li> <li>g. Detector should have linearity of 97% at <math>1 \times 10^8</math> CPS or better</li> <li>h. The best achievable resolution (FWHM) produced by offered detector with NIST SRM should be less than 0.030 deg. or better &amp; to be mentioned with documentary proof.</li> </ul>
		Pixel based detector	<ul style="list-style-type: none"> <li>a. Number of Pixels should be minimum 190 or more.</li> <li>b. Active area of the detector should be 14 mm x 14 mm or better.</li> <li>c. All pixel should remain active for a minimum 3 years from date of acceptance. In case if any of pixel/channel found dead within this period supplier has to replace with a new detector free of cost.</li> </ul>
		Spatial Resolution of detector	<u>75 <math>\mu</math>m or better</u>
		Maximum global count rate	$1 \times 10^8$ CPS or better
		Detector Energy resolution	<ul style="list-style-type: none"> <li>a. It should offer excellent energy resolution alone or along with the offered optics, making K-Beta filters redundant and help high speed data collection compared to the conventional point detector with Ni K-Beta Filter.</li> <li>b. Minimum Energy resolution of the Detector should be &lt; 1000 eV for Cu radiation at normal laboratory temperature i.e. approx. 25°C without using any secondary monochromator</li> </ul>
		Background noise	< 1.0 c/s for the whole detector
		2Theta angular coverage in snapshot mode of 2.5° or better at the minimum measuring circle diameter designed /specified. Detector opening should be electronically controlled	
12	Software	General specs	<ul style="list-style-type: none"> <li>a. The system should have provision for interfacing with computer and data analysis software should be capable of simultaneous data collection</li> </ul>

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|  |  |  | <ul style="list-style-type: none"><li>b. Software should have facility for remote operation and diagnostics of the instrument.</li><li>c. The software should be compatible with the ICDD and COD</li><li>d. Highly integrated software with options to do back ground subtraction, smoothing, <math>K\alpha_1</math> - <math>K\alpha_2</math> separation/elimination, multiple peak separation. multiple plotting, custom report generation and peak and line profile analysis It should be capable of doing Rietveld based quantitative phase analysis employing various profile fitting techniques, Single Line Fitting up to Whole Powder Pattern Fitting, indexing for working on below applications should be offered.</li><li>e. This shall include phase analysis (qualitative and quantitative), crystallite size determination, % crystallinity, lattice strain determination, FWHM, particle size determination, 3D crystal structure display, indexing, lattice parameter calculation, Rietveld refinement, standard less quantitative analysis, Reference Intensity Ration (RIR), Phase mapping etc</li><li>f. The diffraction data may be output as colour-coded diffraction profiles, reflection lists, or as raw data files, or in ASCII/ CSV forms, and exportable to popular platforms like MS Excel. The offered data acquisition software should run on Windows platform format for additional user manipulation</li><li>g. Manufacturer must offer their licensed software developed by them with certificates along with media and exhaustive operating manual(s).</li><li>h. Minimum 2 free licenses should be presented for all the analysis</li></ul> |
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			<p>softwares considering the academic usage of the softwares, with minimum 5 years validity.</p> <p>i. Upgradation of software free of cost for at least 5 years.</p>
		Database	<p>a. Diffraction data to be processed by automated 'search-match' software which makes use of the International Centre for Diffraction (ICDD)Data Base</p> <p>b. Latest versions of ICDD PDF-2 2021 database (latest release available at the time of dispatch of the XRD system) in the name of NCESS and free Crystallography Open Database (COD) for peak search and peak fitting with 5 years validity from the date of registration. Rate concession provided by ICDD for academic institutions to be included.</p> <p>c. All database should be integrated into OEM analysis software.</p> <p>d. ICDD PDF 4+ 2021 and ICSD databases for 5 years to be quoted under option.</p>
		Rietveld Software	<p>The following facilities should be included</p> <p>Should be proprietary</p> <p>a) Capable for single line fitting up to whole powder pattern fitting</p> <p>b) Overall XRD pattern decomposition facility</p> <p>c) Facility of Indexing</p> <p>d) Lattice parameter determination and refinement</p> <p>e) Quantitative phase analysis</p> <p>f) Minimum 2 license should be provided.</p> <p>g) Relevant software/hardware updating should be provided at free of cost.</p>
13	<b>Calibration and Standard Reference material (SRM)</b>	a. Necessary NIST traceable standard samples should be supplied along with the system to check system calibration/instrument	

		<p>alignment, 2theta position accuracy&amp; performance.</p> <p>b. The 2theta peak position accuracy of <math>\pm 0.01</math> deg 2theta over the entire angular range will be treated as the acceptance criteria during installation.</p>	
14	<b>External Chiller unit (X-ray Tube cooling system)</b>	Type	<p>a. Compatible with quoted XRD machine</p> <p>b. High quality Branded indoor type chiller.</p> <p>a. Should be small in size with low noise and vibration free operation</p> <p>b. Digital setting, display and control</p>
		Heat Dissipation and Water Pressure	Compatible for the XRD machine
		Water Temp	15-22 Deg. C. (adjustable).
		Noise level	<p>Very Low noise.</p> <p>Specific noise reduction method should be there to reduce the operating noise levels to almost imperceptible levels while maintaining optimal cooling performance. Since the lab is in office premise, noise making chillers are not acceptable.</p>
		Volume	Should be small in size having volume (foot print) less than 1 m <sup>3</sup> volume.
		Warranty	Minimum 5 years warranty
15	<b>Online UPS</b>	<p>a. A suitable branded and reputed make 3 phase input, 1 phase output online 15/20 KVA UPS system with inbuilt isolation transfer for supporting XRD instrument, and a 3 phase input, 1 phase output online 10 KVA UPS system with inbuilt isolation transfer for supporting chiller, compressor and pump and other accessories of XRD with 1-hour backup time with sufficient batteries for both.</p> <p>b. The brand of UPS should have local service support available (Trivandrum).</p>	
16	<b>Other Requirements Remote Diagnostic support</b>	<p>a. Remote diagnostics with internet connectivity with the manufacturer to solve hardware and software issues</p>	

	<b>Accessories and Tool kit</b>	<p>at site (NCESS TRIVANDRUM).</p> <ul style="list-style-type: none"> <li>b. Necessary hardware and software licence for 5 years should be quoted.</li> <li>c. Complete set of tool-kits for the maintenance of XRD System and its accessories.</li> <li>d. All consumables and possible replacements for all accessories and peripherals to run for 2 years should be quoted.</li> <li>e. Accessories with lesser shelf life to be replaced on its expiry.</li> <li>f. A comprehensive list of accessories, spares and consumables with catalogue/part number and cost must be provided and updated according to changes made by OEM.</li> </ul>	
17	<b>Data collecting and processing system</b>	<p>A data collection system (work station desktop) and a data processing system (laptop) of branded latest configurations of i5 core, with high capacity (1TB) Hard disk with 7200rpm; with Intel integrated Graphics card; DVD +/-RW;, 8 GB RAM 4.0GHz clock speed, 8MB cache. Desktop should have CD/DVD writer drive, 24" LED Color monitor, Key board, mouse. Both systems should be equipped with latest licensed windows operating system with compatible with latest version of Microsoft Office Professional license.</p>	
18	<b>Warranty and Service Support</b>	<ul style="list-style-type: none"> <li>a. Five years on-site comprehensive warranty should be offered for entire offered configuration of Advanced X-ray Diffraction, all attachments and accessories. (After successful commissioning and installation of the equipment). Warranty must include free replacement of faulty/defective parts.</li> </ul>	

		<ul style="list-style-type: none"> <li>b. 5 years warranty includes for both parts and labour (not including the down time) for advanced X-ray Diffraction and all attachments and accessories also.</li> <li>c. Warranty applicable to chiller compressor, and UPS for 5 years (not including the down time) for both parts and labour. There should be no financial impact on the buyer during the total warranty period.</li> <li>d. Down time caused by error in instrument, delay in service should not to be included in the time calculation of three years comprehensive warranty.</li> <li>e. Extended comprehensive warranty or comprehensive AMC for subsequent Five-year period (6<sup>th</sup> year to 10<sup>th</sup> year), ie after first 5 years warranty, should be quoted.</li> <li>f. Warranty should start from date of installation.</li> <li>g. Service response time, turn-around time &amp; up-time of the equipment should be clearly specified.</li> <li>h. Service response time must be less than 72 hours.</li> </ul>	
19	After sales support and spares	<ul style="list-style-type: none"> <li>a. The vendor must have an Indian sales and service provider, for which the documentation should be submitted (A signed document from the OEM) along with bids.</li> <li>b. Availability of telephonic support, including telephone numbers and e mail addresses must be detailed.</li> <li>c. Any issues related to change in authorized agency /service engineer should not affect the smooth running of XRD lab.</li> <li>d. The vendor should undertake the availability of the spares for the next 10 years, at least, from the date of the</li> </ul>	



		<p>installation of the instrument. An undertaking in this regard should be submitted with the quotation.</p> <p>e. Relevant software/hardware information in case of updating of the model of the supplied system should be provided at free of cost.</p> <p>f. Details of service support structure to be provided along with the quotation. The manufacturer and/or their Indian representative must have qualified, and factory trained service engineer in India to be able to attend to service on submitting a complaint.</p> <p>g. Only factory trained, and certified engineers are acceptable to attend the service.</p> <p>h. Spare parts for the whole equipment including X-ray tube to last for 5 years to be included and specified in separate list with prices separately for each spare.</p>	
<b>20</b>	<b>Installation criteria</b>	Criteria	The firm must have at least 20 installations of Advance X-ray Diffraction in leading educational and R&D institutions in India. The installation/performance certificate should be included in the technical bid.

21	<b>Site Installation and Commissioning</b>	<ul style="list-style-type: none"> <li>a. Vendor is responsible for setting up the laboratory and training within 6 months from date of delivery, with factory trained engineers and application specialist.</li> <li>b. Lab furnishing charges to be quoted under option.</li> <li>c. <b>Electrical Connection:</b> 220 to 240V, 50/60 Hz single phase/three phase operation as per Indian Electrical standards</li> <li>d. The alignment guarantee must be validated at site by using NIST or standard reference sample for peak position accuracy. The 2theta peak position accuracy of <math>\pm 0.02^\circ</math> 2theta over the entire angular range will be treated as the acceptance criteria during installation.</li> <li>e. Complete service and user's manual for the diffractometer and attachments should be provided.</li> <li>f. All technical documentation and Operational Manual shall be in English language. In addition to the hard copies, soft copies of the manuals shall be submitted.</li> <li>g. Acceptance of the installation will be after observing the instrument for first seven days after installation. Any error during these seven days will be treated as installation error.</li> </ul>	
22	<b>User Training</b>	<ul style="list-style-type: none"> <li>a. The supplier/manufacturer must provide training to designated 4 users, for the operation, troubleshooting and maintenance of the complete system by a highly skilled full time Engineer &amp; application scientist who should complete the training within a period of 6 months from the date of acceptance of the system by NCESS, at the Site.</li> <li>b. The theoretical training shall include at minimum the</li> </ul>	

		<p>following topics: 1) The diffractometer, use and purpose of optical accessories (divergent slits, Soller, filters, masks, detectors, spinner ...). Theoretical and practical part; 2) Preparation of samples (the influence of preparation conditions on the outcome). Theoretical and practical part; 3) Collection diffractogram; 4) Treatment diffractograms; 5) Qualitative and semi quantitative analysis by RIR (Reference Intensity Ratio); 6) Quantitative analysis by the Rietveld method - principles of the method.</p> <p>c. In case the user is changed, the vendor should give training at NCESS, Trivandrum, according to the requirement. This should be free of cost during the warranty period.</p>	
23	<b>Terms and conditions</b>	<p>a. Order will be processed for the entire XRD unit along with all accessories including chiller, UPS and all related softwares.</p> <p>b. Vendor is responsible for unloading the items from shipping vehicle and shifting it to the to the room specified by NCESS. Unloading the XRD unit and shifting the item to lab should under the supervision of a qualified engineer or specialist appointed by vendor.</p> <p>c. Any unforeseen error occurred due to improper unloading of the items (XRD unit and its accessories) or improper handling during shifting the same to lab, will be under the responsibility of vendor. If any such damage happens, that product should be replaced</p> <p>d. The firm has to guarantee support for both system and spares for a minimum period of 10 years.</p>	

		<ul style="list-style-type: none"> <li>e. Provision should be there for on-line remote diagnosis of faults</li> <li>f. The firm must have at least 20 installations of Advance X-ray Diffraction within India for desired experience of maintenance.</li> <li>g. Free training on different applications to selected users on site.</li> <li>h. Compliance of all listed specifications/terms and conditions sheet should be indicated by the vendors in tabular form.</li> <li>i. Year of manufacturing of the equipment should not be earlier than 6 months to the placement of order.</li> </ul>	
24	<p><b>Note to the bidders regarding technical bid</b></p>	<ul style="list-style-type: none"> <li>a. Price related information to be given only in price bid cover, not in the technical bid cover.</li> <li>b. If any feature not mentioned/left over in the technical bid by the bidder, the same will be presumed to be absent without any further references to the bidder/vendor. No further discussion with the bidder can be entertained.</li> <li>c. The firm should submit the technical bid in full description and nomenclature and there shouldn't be any ambiguity. Brochure of all the products quoting should be provided with the technical bid. During technical evaluation, if required clarification may be sought from the firm. This clarification must be provided in official letter head of the firm.</li> <li>d. Mention clearly the service, installation and personnel training. Provide sufficient information about your after-sale service capabilities/man power and a list of customers</li> </ul>	

		<p>possessing similar equipment, preferably in south India.</p> <p>e. Equipment Model and make to be mentioned; brochures must be provided along with the technical bid.</p> <p>f. All technical features must be equal to the given NCESS specification or higher and better than the given specifications.</p> <p>g. The decision of NCESS Technical Evaluation Committee, constituted by order of Director NCESS, will be final for technical specifications.</p>	
25	<b>Required Documents along with technical specifications</b>	<p>For the equipment quoted, the supplier must provide:</p> <p>List of at least 20 users in India, with similar systems installed preferably in last 5 years.</p> <p>The name(s) of the service engineer(s) employed by them who is/are competent to service the equipment being quoted with their locations in India.</p> <p>The supplier should provide calibration/traceability certificate of the equipment as per National institute of Standards &amp; Technology (NIST) / National Physical Laboratory (NPL) UK / United Kingdom Accreditation System (UKAS) preferably</p>	
26	<b>Scope of work done in Comprehensive Warranty period (CWP) and Comprehensive AMC period (CAMCP)</b>	<p>a. The CWP and CAMCP should take care of the maintenance and service for trouble free operation. This should include telephonic support; two planned maintenance visits and 2 emergency breaks down visits in a year. Response time within 48 hours. Guaranteed service visit with spares within 15 days</p> <p>b. Maintenance should include thorough Lubrication of the Goniometer gear wheels, Lubrication of the mechanical assemblies which are subject</p>	

		<p>to continuous movements. Cleaning of the certain assemblies, checking &amp; alignment of precision parts/assemblies. Complete performance checking/operational qualification after the maintenance. Replacement of all faulty and wearable parts.</p> <p>c. Service should be offered for entire offered configuration of Advanced X-ray Diffraction, all attachments and accessories, which includes for both parts and labour (not including the down time).</p> <p>d. Service response time, turn-around time &amp; up-time of the equipment should be clearly specified Service response time must be less than 72 hours.</p> <p>e. During the 5 yrs CWP and CAMCP, in case of XRD tube failure, the XRD tube should be replaced at free of charge/cost.</p>	
27	<b>Demonstration</b>	Demonstration of Offered Instrument	<p>During technical evaluation of the Technical bid, the purchaser (NCESS) may like to see demonstration (if required) of the offered instrument in India only. It shall be the responsibility of the supplier to arrange for showing demonstration of their offered instrument to the buyer (NCESS) properly in India. Failing in showing demonstration as per the purchaser's requirement shall be considered as disqualification (in respect of technical bid). However, demonstration of offered instrument (Model &amp; Make) should be arranged within 30 days of such intimation from the buyer, failing of which may lead to disqualification of your Bid.</p>

ANNEXURE II

Checklist for submission of documents for Techno-Commercial Bid

1. Technical Specification Compliance Statement (On the letter head of the Company)
2. Manufacturer's Authorization Form
3. Price Reasonability Certificate
4. Declaration Certificate (Acceptance of terms & conditions of the tender)
5. Non-Blacklisting Declaration - As on date of submission of the proposal, the Bidder is neither blacklisted by Central Government/ State Government or Instrumentalities thereof nor is any criminal case against the Bidder/ its Partners/ Directors/ Agents pending before any court of law.
6. Copy of Firm Registration
7. Bidder should have 3 years' experience in the selling and providing service (related Equipment) to reputed Central Government Institutes/Petroleum Engineering Colleges/ Universities/ Oil Companies/ Research Institutes (Self Declaration) – List of Clients & Purchase Orders of X-Ray Diffractometer (XRD)
8. The Bidder or their OEM should possess any valid standard certification like ISO 9001:2008 & 14001:2004.
9. MOST IMPORTANT: Document related to prior installation and service – At least 20 Academic and R&D National Organizations in India
10. Certificate of AERB compliance
11. NIST standard compliance certificate
12. Certificate stating the radiation dosage for the quoted model.
13. Certificate undertaking the availability of the spares for the next 10 years.



**NATIONAL CENTRE FOR EARTH SCIENCE STUDIES**

P.B. No. 7250, MEDICAL COLLEGE P.O., AKKULAM, THIRUVANANTHAPURAM-695 011, INDIA

Tel: 91-471-2511531

Fax: 91-471-2442280

e-mail: purchase@ncess.gov.in

**TENDER FORM**

Tender No. & Date : **PUR-PROC/18b/2022-PUR-NCESS Dt.04.06.2024.**  
Due Date : **17.07.2024 (06.00 PM).**  
Date of Opening : **19.07.2024 (11.00 AM).**  
Venue of Opening : National Centre for Earth Science Studies, P.B.No.7250,  
Medical College P.O., Thiruvananthapuram – 695 011.  
Description of stores : **X-Ray Diffractometer (XRD) with ancillary units with 5 year warranty**  
Quantity : 1 Nos.

Sirs,

The Senior Manager on behalf of the Director, National Centre for Earth Science Studies (NCESS), invites bids for the supply of stores mentioned above. The tender documents are classified as Annexure-A and Annexure-B. Annexure-A is a specimen tender form meant for suppliers and the bid should contain all the details specified therein. The instructions to the tenderers and the general terms and conditions applicable to the Purchase Orders placed by NCESS are given under Annexure-B. Those who are able to quote for the stores in accordance with the above requirements, may please furnish their offer through eprocurement, on or before the last date and time specified in the tender.

Any deviations from the terms and conditions of the Annexure-B must be clearly indicated in the offer.

Yours sincerely,  
Sd/-

Senior Manager



**ANNEXURE A**

**The Senior Manager,  
National Centre for Earth Science Studies,  
P.B.No.7250, Akkulam, Medical College PO,  
Thiruvananthapuram – 695 011.  
Kerala, India**

Sir,

Sub: Your Tender No .....Dated.....

I/We hereby offer you to supply the stores detailed below at the price hereunder quoted and agree to hold this offer open till .....I/We shall bind to supply the stores hereby offered, upon the issue of the purchase order communicating the acceptance thereof on or before the expiry of the delivery date therein. You are at the liberty to accept any one or more of the items of such stores. I/We, notwithstanding that the offer in this tender has not been accepted in whole shall be bound to supply to you such items and such portion or portions of one or more of the items as may be specified in the purchase order communicating the acceptance.

## 1. Technical Compliance Statement.

Required Specification		Spec offered (with make and model)	Whether complied
<b><u>ANNEXURE I</u></b> <b><u>TECHNICAL SPECIFICATIONS OF X-RAY DIFFRACTOMETER (XRD)</u></b>			
<b>Item</b>		<b>Qty.</b>	
<b><u>A floor standing XRD unit</u></b> with not less than 3KW generator, with Cu anode Ceramic X-ray tube operating in both line and point focus at the source with micro diffraction capability, all integrated with vertical theta-theta goniometer geometry. The optics should be capable to switch from Brentano para-focusing optics (BB), to parallel beam (PB) optics, with minimum changes using pre aligned units and with solid state detector having Spatial resolution at least 75 $\mu\text{m}$ and also be able to process in 0D, 1D and 2D modes, with ancillary units.		<b>1 Nos</b>	
No.	Item	General Details	Specification
1	Type	Floor model	
2	Intended applications. / Obtained sample characteristics	f. Qualitative and quantitative analysis of powder, pellet, and thin films samples. g. Rietveld refinement-based structure solution h. Grazing incidence scattering i. Microdiffraction j. Phase composition, Crystal structure, Texture, Residual stress, Short-range order, Lattice parameters & mismatches	
3	X-Ray Generator	Continuous output power	3 kW or better
		Control	Fully controlled through Windows based PC software. User could able to set the voltage and current using the software loaded on the PC.
		Input Voltage	~ 230V Ac, 50 Hz.

		High voltage (Maximum value)	$\geq 50$ kV, adjustable in steps of 1 kV		
		Anode Current (Maximum value)	$\geq 60$ mA, adjustable in steps of 1mA		
		Stability	Less than 0.01% for high voltage and current (lesser the better), with 10% variation of main supply.		
		Safety	Protection from abnormal cooling water, flow rate, water pressure, temperature detection, abnormal loads (such as over load, line current, abnormal low and high voltage, emergency stop switch, leak breaker), shutter malfunction detection. Options of X-ray power manual and auto start-up/shutdown.		
		AERB approval	The Instrument should have Type approval from AERB for operation in India. Type approval certificate to be provided at the time of technical bid This certificate is a basic requirement for considering technical bid responsive		
		The XRD system should be at standby operation at lowest voltage and ampere when the unit is idle for more than 1 hr.			
<b>4</b>	<b>Radiation safety</b>	Maximum radiation levels	Significantly below 1 micro-Sievert per hour on 10 cm distance* under measurement conditions, even with Mo or Ag X-ray tubes. *This should be demonstrated after installation		
		Maximum X-ray safety should be guaranteed and ensured with maximum radiation levels significantly below 1 micro-Sievert/h under measurement conditions along with necessary failsafe safety circuits.	Radiation Safety certificate to be submitted.		
<b>5</b>	<b>Diffraction Cabinet and</b>	Type and features (Note: Compliance of items numbered as a,b,c etc should	f. A complete floor standing, sufficiently illuminated, radiation		

	<b>Radiation enclosure</b>	be specified separately against each. The same rule to be followed for all other columns in this specification table. If any specification is not addressed or specified in technical bid, it will be treated as ‘non-compliance’)	<p>enclosure which prevents exposure from either the direct or scattered x-ray beam.</p> <p>g. The enclosure must meet International and Indian X-ray radiation safety requirements</p> <p>h. Radiation leakage out of the cabinet shall not be more than <math>10^{-6}</math> Sv/hr during operation of XRD system at full power and measured at 10 cm distance.</p> <p>i. Cabinet door safety interlocking shall be provided such that x-rays can't be produced until the cabinet door is properly closed</p> <p>j. OEM to provide certificate stating the radiation dosage for the quoted model.</p>	
6	<b>Goniometer</b>	<p>Type/Geometry</p> <p>Reflection and Transmission mode</p> <p>Scanning Radius</p> <p>Angular range (Without accessories)</p> <p>Minimum usable angular range limits (with accessories)</p> <p>Angular positioning</p> <p>Minimum step size</p> <p>Slew speed</p> <p>Angular Accuracy</p> <p>Angular reproducibility</p> <p>2theta linearity / Instrument alignment</p>	<p>Vertically mounted and should be Theta-Theta type only</p> <p>The system must work for both reflection and transmission geometry. Transmission mode with source top and detector below</p> <p>Minimum 240 mm or more</p> <p><math>360^{\circ}</math></p> <p><math>-100^{\circ} &lt; 2\theta \leq 165^{\circ}</math> or better</p> <p>Stepper motors with optical encoders / High Performing DC Motors</p> <p><math>0.0001^{\circ}</math> or better with scan speed in the range of 0.01 to <math>50^{\circ}/\text{min}</math></p> <p><math>15^{\circ}/\text{sec}</math> or better</p> <p><math>\pm 0.005^{\circ}</math> or better</p> <p><math>\pm 0.0002</math> deg. or better</p> <p>Equal or better than <math>\pm 0.01^{\circ}</math> throughout the angular range</p>	

			of goniometer with NIST traceable SRM sample.		
		Data quality Guarantee	Manufacturer must submit data quality guarantee certificate with the offer on the angular position ( $\leq 0.01$ degree $2\theta$ over the entire angular range) and intensity ratio to be carried out on NIST sample. One NIST sample is to be provided. Demonstration of data quality by using same NIST sample should be carried out.		
		The scanning modes	The scanning modes of step scan, continuous scan and fast scan to be available		
7	<b>X-Ray Tube</b>	Type	<ul style="list-style-type: none"> <li>d. High resolution X-ray tube with Ceramic insulation body.</li> <li>e. Must be having long fine focal spot with preferable focus size of 10 to 12 mm x 0.4 to 0.04 mm</li> <li>f. The X-ray tube voltage has to be computer controlled and shall have automatic protection for voltage fluctuations and high voltage.</li> </ul>		
		Anode material	Copper (with Ni Filter that must be standardizing with the Cu-radiation)		
		X-ray tube Power	Maximum operating Power of 2 kW or more with rating of 50 kV and 60 mA.		
		Focus	Working for both line and point focus at the source with the facility to rotate the tube from point focus to line focus and vice versa without any need for realignment and without disconnecting any utilities like high voltage cable, water connection etc. (Point focus creation at the source through blocking X-ray's with slits is not acceptable).		

		Filters for Beta Suppression	<ul style="list-style-type: none"> <li>c. Shall be supplied with their corresponding filters for Cu K-Beta Suppression</li> <li>d. Reduction of Intensity of Cu K-Beta radiation to below 0.5% of the Cu K-Alpha intensity</li> </ul>		
8	<b>Optics for</b> <b>1. General B-B Geometry.</b> <b>2. Parabolic multilayer mirror based parallel beam for Thin Film Analysis</b>	Optics Geometry (Bragg-Brentano and Parallel Beam geometry)	<ul style="list-style-type: none"> <li>d. The optics should be for general-purpose X-ray diffractometers, switchable from Bragg-Brentano (BB) geometry to parallel beam (PB) geometry, easily.</li> <li>e. This change over should be software controlled without any intervention to the unit. Different modes shall be selected by the user, at will by click of a button on the control software.</li> <li>f. The Bragg-Brentano and Parallel beam paths need to be completely independent.</li> </ul>		
		Self-detection and alignment	<p>Detection of missing, misplaced or real time error in components along the beam path (from X-ray source to detector)</p> <p>After exchanging any component, optics should retain their alignment with Automatic configuration of each components</p>		
		Divergence and antiscatter slit	Basic optics should be provided with programmable divergence and programable antiscatter slit. The range of the slit width would be from minimum 0.5mm or lower to maximum 7mm or more. The slit should be independently and continuously variable.		
		Incident beam divergence slit	Suitable Incident beam variable divergence slit facilitating measurement from		

			as low as 0.5 deg onward and going up to higher angles should be provided.		
		Necessary motorized variable Anti-Scatter slits & Fixed /variable Soller Slit of minimum 2 suitable size for incident beam shall be provided.	Suitable variable Slits, Variable Anti-Scatter Slit & Fixed Soller Slits for detector shall be provided.		
		High Intensity monochromatic beam optics using parabolic graded curved multilayer mirror parallel beam optics must be provided and soller slit in diffracted beam for analysis of rough samples should be provided.			
		Low angle X-ray diffraction	<ul style="list-style-type: none"> <li>c. Beam knife for low angle measurement should be provided.</li> <li>d. Beam knife range of adjustment: 0.5 mm - 5 mm above sample surface.</li> </ul>		
		Optics for all the measurement modes shall preferably be computer controlled. Switching between different measurements modes shall be completely automatic including alignment with minimal user intervention.			
		Micro Diffraction Optics	<ul style="list-style-type: none"> <li>c. Suitable optics for Micro diffraction analysis with a spot size of 50,100, 300 ,500 micron should be offered.</li> <li>d. For spotting the location of microdiffraction analysis and for beam attenuating alignment, dual laser alignment tool with camera and alignment module to be quoted under option.</li> </ul>		

9	Filter/ absorber	<p>d. Suitable Nickel filters should be offered to keep the Cu-K<math>\beta</math>-radiation down to about 1% of Cu-K-alpha level or better.</p> <p>e. For enabling low (small) angle measurements and reduce air scattering, any special fitment / component required needs to be offered.</p> <p>f. A minimum of 2 No's Cu absorbers should be offered for attenuation purpose</p>			
10	Sample Stage and Sample Holder	Sample stage features	<p>f. Suitable for powder, pellets and thin films.</p> <p>g. Computer controlled rotating sample stage with ability to control &amp; vary the rotating speed for orientation studies with suitable motors.</p> <p>h. Stage for Thin-Films GIXRD should be provided.</p> <p>i. Sample stage should also be suitable for microdiffraction.</p> <p>j. Sample stage for solid sample should be offered.</p>		
		Sample Holder features	<p>f. Sample holder for Powder, Thin films, small solids and clay samples (glass slides)</p> <p>g. Sample holder of PMMA/steel type/ Glass type/ Aluminium type in circular or square type for both spinning and non-spinning stage sample holder.</p> <p>h. At least 25 Nos sample holders must be provided for spinning and non-spinning type sample holder for</p>		



			<p>powder and thin film samples.</p> <p>i. All the accessories for sample preparation shall be provided.</p> <p>j. Silicon zero background sample holders to hold small sample amount with and without cavity (2 no. each) should be supplied.</p>		
		Auto-sample changer/Auto-sampler	<p>e. Auto-Sampler for analysis of minimum 15 samples at a time, which can be operated in both reflection and transmission mode, along with necessary holders should be provided.</p> <p>f. Should be completely automatic. The switching between applications between different application stages should be without any re configuration and realignment.</p> <p>g. This provision is for both powders and thin films.</p> <p>h. Should have the facility for creating batch analysis of different samples with different analysing parameters automatically.</p>		
<b>11</b>	<b>Detector</b>	Detector features (The quotation should contain all technical details for the quoted detector)	<p>i. Solid State technology-based detector for diffraction and scattering application</p> <p>j. with capability of working in 0D, 1D and 2D mode</p> <p>k. Should have highest count rate capabilities, best angular resolution and perfect profile shapes.</p>		

			<p>l. High speed of more than 150 times faster than a conventional point detector system or better</p> <p>m. Should possess the built-in facility for suppression of sample fluorescence for improving without using any secondary monochromator. If such facility is not available, secondary monochromator must be included in quote.</p> <p>n. Detector should be maintenance and calibration free and should NOT require any type of gas, water or liquid nitrogen during operation</p> <p>o. Detector should have linearity of 97% at <math>1 \times 10^8</math> CPS or better</p> <p>p. The best achievable resolution (FWHM) produced by offered detector with NIST SRM should be less than 0.030 deg. or better &amp; to be mentioned with documentary proof.</p>		
		Pixel based detector	<p>d. Number of Pixels should be minimum 190 or more.</p> <p>e. Active area of the detector should be 14 mm x 14 mm or better.</p> <p>f. All pixel should remain active for a minimum 3 years from date of acceptance. In case if any of pixel/channel found dead within this period supplier has to replace with a new detector free of cost.</p>		
		Spatial Resolution of detector	<u>75 <math>\mu</math>m or better</u>		
		Maximum global count rate	$1 \times 10^8$ CPS or better		

		Detector Energy resolution	<p>c. It should offer excellent energy resolution alone or along with the offered optics, making K-Beta filters redundant and help high speed data collection compared to the conventional point detector with Ni K-Beta Filter.</p> <p>d. Minimum Energy resolution of the Detector should be &lt; 1000 eV for Cu radiation at normal laboratory temperature i.e. approx. 25°C without using any secondary monochromator</p>		
		Background noise	< 1.0 c/s for the whole detector		
		2Theta angular coverage in snapshot mode of 2.5° or better at the minimum measuring circle diameter designed /specified. Detector opening should be electronically controlled			
12	Software	General specs	<p>j. The system should have provision for interfacing with computer and data analysis software should be capable of simultaneous data collection</p> <p>k. Software should have facility for remote operation and diagnostics of the instrument.</p> <p>l. The software should be compatible with the ICDD and COD</p> <p>m. Highly integrated software with options to do back ground subtraction, smoothing, K<math>\alpha</math>1 - K<math>\alpha</math>2 separation/elimination, multiple peak</p>		

			<p>separation. multiple plotting, custom report generation and peak and line profile analysis It should be capable of doing Rietveld based quantitative phase analysis employing various profile fitting techniques, Single Line Fitting up to Whole Powder Pattern Fitting, indexing for working on below applications should be offered.</p> <p>n. This shall include phase analysis (qualitative and quantitative), crystallite size determination, % crystallinity, lattice strain determination, FWHM, particle size determination, 3D crystal structure display, indexing, lattice parameter calculation, Rietveld refinement, standard less quantitative analysis, Reference Intensity Ration (RIR), Phase mapping etc</p> <p>o. The diffraction data may be output as colour-coded diffraction profiles, reflection lists, or as raw data files, or in ASCII/ CSV forms, and exportable to popular platforms like MS Excel. The offered data acquisition software should run on Windows platform format for additional user manipulation</p> <p>p. Manufacturer must offer their licensed</p>		
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			<p>software developed by them with certificates along with media and exhaustive operating manual(s).</p> <p>q. Minimum 2 free licenses should be presented for all the analysis softwares considering the academic usage of the softwares, with minimum 5 years validity.</p> <p>r. Upgradation of software free of cost for at least 5 years.</p>		
		Database	<p>e. Diffraction data to be processed by automated 'search-match' software which makes use of the International Centre for Diffraction (ICDD)Data Base</p> <p>f. Latest versions of ICDD PDF-2 2021 database (latest release available at the time of dispatch of the XRD system) in the name of NCESS and free Crystallography Open Database (COD) for peak search and peak fitting with 5 years validity from the date of registration. Rate concession provided by ICDD for academic institutions to be included.</p> <p>g. All database should be integrated into OEM analysis software.</p> <p>h. ICDD PDF 4+ 2021 and ICSD databases for 5 years to be quoted under option.</p>		
		Rietveld Software	<p>The following facilities should be included</p> <p>Should be proprietary</p>		

			<p>a) Capable for single line fitting up to whole powder pattern fitting</p> <p>b) Overall XRD pattern decomposition facility</p> <p>c) Facility of Indexing</p> <p>d) Lattice parameter determination and refinement</p> <p>e) Quantitative phase analysis</p> <p>f) Minimum 2 license should be provided.</p> <p>g) Relevant software/hardware updating should be provided at free of cost.</p>		
13	<b>Calibration and Standard Reference material (SRM)</b>	<p>c. Necessary NIST traceable standard samples should be supplied along with the system to check system calibration/instrument alignment, 2theta position accuracy &amp; performance.</p> <p>d. The 2theta peak position accuracy of <math>\pm 0.01</math> deg 2theta over the entire angular range will be treated as the acceptance criteria during installation.</p>			
14	<b>External Chiller unit (X-ray Tube cooling system)</b>	Type	<p>c. Compatible with quoted XRD machine</p> <p>d. High quality Branded indoor type chiller.</p> <p>c. Should be small in size with low noise and vibration free operation</p> <p>d. Digital setting, display and control</p>		
		Heat Dissipation and Water Pressure	Compatible for the XRD machine		
		Water Temp	15-22 Deg. C. (adjustable).		
		Noise level	<p>Very Low noise.</p> <p>Specific noise reduction method should be there to reduce the operating noise levels to almost imperceptible levels while maintaining</p>		

			optimal cooling performance. Since the lab is in office premise, noise making chillers are not acceptable.		
		Volume	Should be small in size having volume (foot print) less than 1 m <sup>3</sup> volume.		
		Warranty	Minimum 5 years warranty		
15	<b>Online UPS</b>	<p>c. A suitable branded and reputed make 3 phase input, 1 phase output online 15/20 KVA UPS system with inbuilt isolation transfer for supporting XRD instrument, and a 3 phase input, 1 phase output online 10 KVA UPS system with inbuilt isolation transfer for supporting chiller, compressor and pump and other accessories of XRD with 1-hour backup time with sufficient batteries for both.</p> <p>d. The brand of UPS should have local service support available (Trivandrum).</p>			
16	<b>Other Requirements Remote Diagnostic support Accessories and Tool kit</b>	<p>g. Remote diagnostics with internet connectivity with the manufacturer to solve hardware and software issues at site (NCESS TRIVANDRUM).</p> <p>h. Necessary hardware and software licence for 5 years should be quoted.</p> <p>i. Complete set of tool-kits for the maintenance of XRD System and its accessories.</p> <p>j. All consumables and possible replacements</p>			

		<p>for all accessories and peripherals to run for 2 years should be quoted.</p> <p>k. Accessories with lesser shelf life to be replaced on its expiry.</p> <p>l. A comprehensive list of accessories, spares and consumables with catalogue/part number and cost must be provided and updated according to changes made by OEM.</p>			
17	<b>Data collecting and processing system</b>	<p>A data collection system (work station desktop) and a data processing system (laptop) of branded latest configurations of i5 core, with high capacity (1TB) Hard disk with 7200rpm; with Intel integrated Graphics card; DVD +/-RW,; 8 GB RAM 4.0GHz clock speed, 8MB cache. Desktop should have CD/DVD writer drive, 24" LED Color monitor, Key board, mouse. Both systems should be equipped with latest licensed windows operating system with compatible with latest version of Microsoft Office Professional license.</p>			
18	<b>Warranty and Service Support</b>	<p>i. Five years on-site comprehensive warranty should be offered for entire offered configuration of Advanced X-ray Diffraction, all attachments and accessories. (After successful commissioning and installation of the equipment). Warranty must include free</p>			



		<p>replacement of faulty/defective parts.</p> <ul style="list-style-type: none"> <li>j. 5 years warranty includes for both parts and labour (not including the down time) for advanced X-ray Diffraction and all attachments and accessories also.</li> <li>k. Warranty applicable to chiller compressor, and UPS for 5 years (not including the down time) for both parts and labour. There should be no financial impact on the buyer during the total warranty period.</li> <li>l. Down time caused by error in instrument, delay in service should not to be included in the time calculation of five years comprehensive warranty.</li> <li>m. Extended comprehensive warranty or comprehensive AMC for subsequent Five-year period (6<sup>th</sup> year to 10<sup>th</sup> year), ie after first 5 years warranty, should be quoted.</li> <li>n. Warranty should start from date of installation.</li> <li>o. Service response time, turn-around time &amp; up-time of the equipment should be clearly specified.</li> <li>p. Service response time must be less than 72 hours.</li> </ul>			
<p><b>19</b></p>	<p><b>After sales support and spares</b></p>	<ul style="list-style-type: none"> <li>i. The vendor must have an Indian sales and service provider, for which the documentation should</li> </ul>			

		<p>be submitted (A signed document from the OEM) along with bids.</p> <ul style="list-style-type: none"> <li>j. Availability of telephonic support, including telephone numbers and e mail addresses must be detailed.</li> <li>k. Any issues related to change in authorized agency /service engineer should not affect the smooth running of XRD lab.</li> <li>l. The vendor should undertake the availability of the spares for the next 10 years, at least, from the date of the installation of the instrument. An undertaking in this regard should be submitted with the quotation.</li> <li>m. Relevant software/hardware information in case of updating of the model of the supplied system should be provided at free of cost.</li> <li>n. Details of service support structure to be provided along with the quotation. The manufacturer and/or their Indian representative must have qualified, and factory trained service engineer in India to be able to attend to service on submitting a complaint.</li> <li>o. Only factory trained, and certified engineers are acceptable to attend the service.</li> </ul>			
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		p. Spare parts for the whole equipment including X-ray tube to last for 3 years to be included and specified in separate list with prices separately for each spare.		
<b>20</b>	<b>Installation criteria</b>	Criteria	The firm must have at least 20 installations of Advance X-ray Diffraction in leading educational and R&D institutions in India. The installation/performance certificate should be included in the technical bid.	

21	<b>Site Installation and Commissioning</b>	<p>h. Vendor is responsible for setting up the laboratory and training within 6 months from date of delivery, with factory trained engineers and application specialist.</p> <p>i. Lab furnishing charges to be quoted under option.</p> <p>j. <b>Electrical Connection:</b> 220 to 240V, 50/60 Hz single phase/three phase operation as per Indian Electrical standards</p> <p>k. The alignment guarantee must be validated at site by using NIST or standard reference sample for peak position accuracy. The 2theta peak position accuracy of <math>\pm 0.02</math>deg 2theta over the entire angular range will be treated as the acceptance criteria during installation.</p> <p>l. Complete service and user's manual for the diffractometer and attachments should be provided.</p> <p>m. All technical documentation and Operational Manual shall be in English language. In addition to the hard copies, soft copies of the manuals shall be submitted.</p> <p>n. Acceptance of the installation will be after observing the instrument for first seven days after installation. Any error during these seven</p>			
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		days will be treated as installation error.			
22	<b>User Training</b>	d. The supplier/manufacturer must provide training to designated 4 users, for the operation, troubleshooting and maintenance of the complete system by a highly skilled full time Engineer & application scientist who should complete the training within a period of 6 months from the date of			

		<p>acceptance of the system by NCESS, at the Site.</p> <p>e. The theoretical training shall include at minimum the following topics: 1) The diffractometer, use and purpose of optical accessories (divergent slits, Soller, filters, masks, detectors, spinner ...). Theoretical and practical part; 2) Preparation of samples (the influence of preparation conditions on the outcome). Theoretical and practical part; 3) Collection diffractogram; 4) Treatment diffractograms; 5) Qualitative and semi quantitative analysis by RIR (Reference Intensity Ratio); 6) Quantitative analysis by the Rietveld method - principles of the method.</p> <p>f. In case the user is changed, the vendor should give training at NCESS, Trivandrum, according to the requirement. This should be free of cost during the warranty period.</p>			
<p><b>23</b></p>	<p><b>Terms and conditions</b></p>	<p>j. Order will be processed for the entire XRD unit along with all accessories including chiller, UPS and all related softwares.</p> <p>k. Vendor is responsible for unloading the items from shipping</p>			

		<p>vehicle and shifting it to the to the room specified by NCESS. Unloading the XRD unit and shifting the item to lab should under the supervision of a qualified engineer or specialist appointed by vendor.</p> <ol style="list-style-type: none"> <li>l. Any unforeseen error occurred due to improper unloading of the items (XRD unit and its accessories) or improper handling during shifting the same to lab, will be under the responsibility of vendor. If any such damage happens, that product should be replaced</li> <li>m. The firm has to guarantee support for both system and spares for a minimum period of 10 years.</li> <li>n. Provision should be there for on-line remote diagnosis of faults</li> <li>o. The firm must have at least 20 installations of Advance X-ray Diffraction within India for desired experience of maintenance.</li> <li>p. Free training on different applications to selected users on site.</li> <li>q. Compliance of all listed specifications/terms and conditions sheet should be indicated by the vendors in tabular form.</li> </ol>			
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		<p>r. Year of manufacturing of the equipment should not be earlier than 6 months to the placement of order.</p>		
24	<p><b>Note to the bidders regarding technical bid</b></p>	<p>h. Price related information to be given only in price bid cover, not in the technical bid cover.</p> <p>i. If any feature not mentioned/left over in the technical bid by the bidder, the same will be presumed to be absent without any further references to the bidder/vendor. No further discussion with the bidder can be entertained.</p> <p>j. The firm should submit the technical bid in full description and nomenclature and there shouldn't be any ambiguity. Brochure of all the products quoting should be provided with the technical bid. During technical evaluation, if required clarification may be sought from the firm. This clarification must be provided in official letter head of the firm.</p> <p>k. Mention clearly the service, installation and personnel training. Provide sufficient information about your after-sale service capabilities/man power and a list of customers possessing similar equipment, preferably in south India.</p>		



		<p>l. Equipment Model and make to be mentioned; brochures must be provided along with the technical bid.</p> <p>m. All technical features must be equal to the given NCESS specification or higher and better than the given specifications.</p> <p>n. The decision of NCESS Technical Evaluation Committee, constituted by order of Director NCESS, will be final for technical specifications.</p>		
25	<b>Required Documents along with technical specifications</b>	<p>For the equipment quoted, the supplier must provide:</p> <p>List of at least 20 users in India, with similar systems installed preferably in last 5 years.</p> <p>The name(s) of the service engineer(s) employed by them who is/are competent to service the equipment being quoted with their locations in India.</p> <p>The supplier should provide calibration/traceability certificate of the equipment as per National institute of Standards &amp; Technology (NIST) / National Physical Laboratory (NPL) UK / United Kingdom Accreditation System (UKAS) preferably</p>		
26	<b>Scope of work done in Comprehensive Warranty period (CWP) and Comprehensive</b>	<p>f. The CWP and CAMCP should take care of the maintenance and service for trouble free operation. This should include telephonic support;</p>		

	<p><b>AMC period (CAMCP)</b></p>	<p>two planned maintenance visits and 2 emergency breaks down visits in a year. Response time within 48 hours. Guaranteed service visit with spares within 15 days</p> <p>g. Maintenance should include thorough Lubrication of the Goniometer gear wheels, Lubrication of the mechanical assemblies which are subject to continuous movements. Cleaning of the certain assemblies, checking &amp; alignment of precision parts/assemblies. Complete performance checking/ operational qualification after the maintenance. Replacement of all faulty and wearable parts.</p> <p>h. Service should be offered for entire offered configuration of Advanced X-ray Diffraction, all attachments and accessories, which includes for both parts and labour (not including the down time).</p> <p>i. Service response time, turn-around time &amp; up-time of the equipment should be clearly specified Service response time must be less than 72 hours.</p> <p>j. During the 5 yrs CWP and CAMCP, in case of XRD tube failure,</p>			
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		the XRD tube should be replaced at free of charge/cost.		
27	<b>Demonstration</b>	Demonstration of Offered Instrument	During technical evaluation of the Technical bid, the purchaser (NCESS) may like to see demonstration (if required) of the offered instrument in India only. It shall be the responsibility of the supplier to arrange for showing demonstration of their offered instrument to the buyer (NCESS) properly in India. Failing in showing demonstration as per the purchaser's requirement shall be considered as disqualification (in respect of technical bid). However, demonstration of offered instrument (Model & Make) should be arranged within 30 days of such intimation from the buyer, failing of which may lead to disqualification of your Bid.	

## ANNEXURE II

### Checklist for submission of documents for Techno-Commercial Bid

14. Technical Specification Compliance Statement (On the letter head of the Company)
15. Manufacturer's Authorization Form
16. Price Reasonability Certificate
17. Declaration Certificate (Acceptance of terms & conditions of the tender)
18. Non-Blacklisting Declaration - As on date of submission of the proposal, the Bidder is neither blacklisted by Central Government/ State Government or Instrumentalities thereof nor is any criminal case against the Bidder/ its Partners/ Directors/ Agents pending before any court of law.
19. Copy of Firm Registration
20. Bidder should have 3 years' experience in the selling and providing service (related Equipment) to reputed Central Government Institutes/Petroleum Engineering Colleges/ Universities/ Oil Companies/ Research Institutes (Self Declaration) – List of Clients & Purchase Orders of X-Ray Diffractometer (XRD)
21. The Bidder or their OEM should possess any valid standard certification like ISO 9001:2008 & 14001:2004.
22. MOST IMPORTANT: Document related to prior installation and service – At least 20 Academic and R&D National Organizations in India
23. Certificate of AERB compliance
24. NIST standard compliance certificate
25. Certificate stating the radiation dosage for the quoted model.
26. Certificate undertaking the availability of the spares for the next 10 years.

**2. The list of Indian Customers who have bought the same/similar instrument within the last two years, with contact details:**

**3. Details of Service centre: (In case of dealers, also please state whether Authorised Dealership Certificate is enclosed)**

Place of Delivery: Stores, National Centre for Earth Science Studies, P.B.No.7250, Medical College P.O., Thiruvananthapuram – 695 011, Kerala, India.

I / We understand the instructions to the tenderers and General Terms and Conditions of the Contract governing supplies detailed in Annexure-B. I/We have thoroughly examined the specifications of the stores referred above and my/our offer is to supply stores strictly in accordance with and subject to the terms and conditions stipulated in Annexure-B.

Stamp and Signature of the Tenderer

ANNEXURE B

**INSTRUCTIONS TO THE TENDERERS AND GENERAL TERMS AND CONDITIONS OF THE CONTRACT**

1. **PRICES:** Tenders shall be made in ENGLISH and submitted with price for delivery at National Centre for Earth Science Studies, Akkulam, Medical College PO, Thiruvananthapuram-11, Kerala. The quoted amount should be inclusive of all charges like packing & forwarding charges, inland freight & other related charges, freight, statutory levies, unloading, installation etc.
2. **RIGHTS OF THE PURCHASER:** The Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.
3. **VALIDITY OF OFFER:** The prices quoted should be firm and quotation has to be valid for a period of 120 days from the date of opening of tender.
4. **CATALOGUE:** Tenderers shall furnish Leaflet/Technical Literature of the Stores offered by him along with the offer.
5. **TRANSPORTATION:** Stores shall be supplied under supplier's risk.
6. **MODE AND TERMS OF PAYMENT:** Full payment after successful installation/commissioning and acceptance of stores at Purchaser's Site.
7. **WARRANTY:** The supply made by the supplier shall be of best quality and workmanship shall be in accordance with the specifications stipulated in the Purchase Order. Defects/deficiencies shall be made good by the supplier free of cost, notified within the applicable warranty period.
8. **SUBMISSION OF TENDERS:** **The quotation should be submitted by e-procurement in PDF format by 'logging on' in the website [eprocure.gov.in/eprocure/app](http://eprocure.gov.in/eprocure/app)**
9. **ENGINEER'S SERVICE MANUAL AND INSTRUCTION MANUAL:** The Engineer's Service Manual including Circuit Diagram and Instruction Manual (Original Copies) of the equipment shall be supplied along with the delivery/shipment by the supplier in the event of a purchase order. This aspect should be clearly indicated in the offer.

**10.DELIVERY/SHIPMENT:**

a. The time for delivery of the stores stipulated in the purchase order shall be deemed to be the essence of the contract and delivery must be completed not later than the period specified therein.

b. Failure and termination: If the contractor fails to deliver the stores or any part thereof within the period prescribed for such delivery, the purchaser shall be entitled at his option either;

i) to recover from the contractor as agreed liquidated damages and not by way of penalty, a sum of 2% of the price of any stores which the supplier has failed to deliver as aforesaid, for each month or part of a month, during which the delivery of such stores may be in arrears or

ii) to purchase elsewhere, without notice to the contractor on the account and at the risk of the contractor, the stores not delivered or there of a similar description (where others exactly complying with the particulars are not in the opinion of the purchaser readily procurable, such opinion being final) without cancelling the contract in respect of the portion of stores not yet due for delivery.

iii) to cancel the contract or a portion thereof and if so desired, to purchase or authorize to purchase of stores not so delivered or others of similar description (where others exactly complying with the particulars are not in the opinion of the purchaser readily procurable, such opinion being final) at the risk and cost of the contractor.

**11.LAW GOVERNING THE CONTRACT:** The contract shall be governed by the laws of India for the time being in force. The marking of all stores supplied must comply with the requirements of Indian Acts relating to Merchandise Marks and all the rules made under such Acts.

**12. JURISDICTION:** The courts within the local limits of Thiruvananthapuram, the place from the purchase order is issued, will be the jurisdiction to deal with and decide any matter arising out of the contract subject to the clause 18 hereof.

**13.INDEMNITY:** The contractor shall at all, times indemnify the purchaser against all claims which may be made in respect of stores for infringement of any right protected by patent, registration of design or trade mark and shall take all risk of accidents or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for the sufficiency of all the means used by him for the fulfilment of the contract.

**14.ARBITRATION:** Notwithstanding anything contained in clause 16 above, in the event of any question, dispute or difference arising under these conditions or any condition contained in the purchase order or in connection with this contract (except as to any matters the decision of which is specially provided for by these conditions) the same may be referred to the sole arbitration of the Director, National Centre for Earth Science Studies, Thiruvananthapuram or some other person appointed by him, there will be no objection that the arbitrator is a Govt. servant, who has to deal with matters to which the contract relates or that in the course of his duties as a Government servant he has expressed views on all or any of the matters in the disputes or difference. The award of the arbitrator shall be final and binding on the parties to this contract.

Terms of this contract: -

a) If the arbitrator be the Director, NCESS, (i) in the event of his being transferred or vacating his office by resignation or otherwise, it shall be lawful for his successor in the office either to proceed with the reference himself, or to appoint another person as arbitrator to (ii) in the event of his being unwilling or unable to act for any reason, it shall be lawful for the Director, NCESS to appoint another person as arbitrator;

**Or**

b) If the arbitrator be a person appointed by the Director, NCESS, in the event of his dying, neglecting or refusing to act, or resigning or being unable to act for any reason, it shall be lawful for the Director, NCESS, to proceed with the reference himself or to appoint another person as arbitrator in place of the outgoing arbitrator.

Subject as aforesaid, the Arbitration Act, 1940 and the rule there under and any statutory modifications thereof for the time being in force shall be deemed to apply to the arbitration proceeding under this clause. The arbitrator shall have the power to extend with the consent of the purchaser and the contractor the time for making and publishing the award. The venue of arbitration shall be the place as the purchaser in the absolute discretion may determine.

**15.EXERCISING THE RIGHTS & POWERS OF THE PURCHASER:** All the rights, discretions and power of the purchaser under the contract shall be exercisable by and all notices on behalf of the purchaser shall be given by the Director or the Senior Manager of Centre for Earth Science Studies and any reference to ‘the opinion of the purchasers’ in the terms and conditions contained in this general conditions of the contract shall mean and be construed as reference to the opinion of any of the persons mentioned in this clause.

**16.EXEMPTION FROM PAYMENT OF DUTIES:** The purchaser is eligible for availing customs duty at concessional rate under the relevant rules.

**17.SPARES & ACCESSORIES:** Offers for plant/machinery/equipment/instrument shall also state prices or essential accessories, optional accessories and spares necessary for 5 years of satisfactory operation of the machinery/equipment/instrument offered. Prices for accessories and spares shall be itemised, offers where only lump sum prices are indicated are liable to be ignored. Particular care must be taken to list out each item of spare and quantity recommended and also individual price for these items.

**18.QUANTITY:** The purchaser reserves the right to accept or reject lowest or any offers in whole or in part without assigning any reason. It would therefore be in the interest of the tenderers to clearly understand that the purchaser may accept offers for any quantity of his choice and hence, the percentage of reduction, if any in the price quoted in case of acceptance of tender in whole or part shall be clearly stated.

**19.TRAINING:** The contractor shall, in special cases, if required by the Purchaser provide facilities for the practical training of the purchaser’s engineers and technical personnel in respect of repair, maintenance or operation of the plant/machinery/ equipment/ instrument offered at their manufacturing plant in India or abroad. The cost for such training (including travelling, boarding and other related expenses) and the number of trainees and duration of training and any other terms if any, should be indicated separately in the offer.

**20.INSTALLATION & COMMISSIONING:** In the event of an order, the supplier shall arrange satisfactory installation and commissioning of the plant/machinery equipment/ instrument at purchaser’s site, free of cost.

**21.SERVICE SOFTWARE/TOOLS:** The service software, tools required if any for the repair/maintenance of the plant/machinery/equipment/instrument shall be quoted separately.

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