



TENDER DOCUMENTS

Mechanical Lab Equipment

NUTECH / SCM / Mech Lab Phase-III (A)-2019 / TD-098

NATIONAL UNIVERSITY OF TECHNOLOGY

TENDER NOTICE

National University of Technology (NUTECH)

NUTECH / SCM / Mech Lab Phase-III (A)-2019 / TD-098

Sealed bids are invited from Government / FBR Registered Firms for the procurement of Mechanical Laboratory Equipment for NUTECH on **CPT Basis**.

1. Tender documents containing terms, conditions and detailed specifications of items (including draft contract) can be downloaded from NUTECH website "<https://nutech.edu.pk>" w.e.f **06 Nov 2019**.
2. Quotations shall be submitted as per requirement of the tender documents.
3. Bidders will be required to submit **Bank Draft / CDR** equal to **5%** of quoted value as Bid Bond in favor of National University of Technology (NUTECH).
4. Sealed bids with detailed specifications should reach on the following address latest by **1030 hours on 10 Dec 2019**. Late submission will not be entertained.
5. Bids will be opened at **1100 hours on 10 Dec 2019** at SCM Office.
6. Project is to be completed in **90 days** from the date of award of contract.
7. Submit Rs 1500/- as Tender fee in favor of NUTECH HBL Account (**NUTECH Tendering and Contracts, 5037-7000210755**). Please attach bank receipt with technical offer. Offers will not be entertained without payment of processing fee.

Deputy Director (Supply Chain Management)

NATIONAL UNIVERSITY OF TECHNOLOGY, UPROAD,I-12,ISLAMABAD

Tel: 0092-51-5476768, Ext: 178

NATIONAL UNIVERSITY OF TECHNOLOGY
SUPPLY CHAIN MANAGEMENT
INVITATION TO TENDER

Tender submission time: 1030 hours, 10 Dec 2019

1. NUTECH desires to procure the list of item(s) / Store(s) **onCPT** basis. as per **Annexure-A**. Interested bidders are requested to send their bids through courier or deliver at NUTECH under "Single Stage – Two Envelopes" (two envelopes placed together in third envelope), marked clearly as "**Technical Offer**" and "**Commercial Offer**" respectively to the undersigned, latest by or before above mentioned due date.

2. **Conditions Governing Contracts.** The contract made as result of this IT will be in accordance with the draft contract published on NUTECH University website and other special conditions (Mentioned in this document) that may be added to given contract for the supply of Mechanical Lab Equipment.

3. **Delivery of Tender.** The offer is to be submitted i as under:-

- a. **Technical Offer.** Please also note that Technical Offer should contain only Annexure-A, special conditions compliance & Annexure B duly filled in (supported with relevant technical literature / details / catalogues etc) and receipt of tender processing fee. Copy of bid bond WITHOUT MENTIONING PRICE should be attached with technical offer as well. Only technical details (literature/brochures/relevant material) without mentioning the financial aspect of the offer in duplicate would be enclosed in an envelope. In technical proposal, all items must have the brand names, model number, manufacturer name, country of origin, manufacturer's warranty including parts with complete specs and brochures. Re-conditioned and re-furbished equipment shall not be acceptable. Following information will be clearly marked on the envelope:

- (1) Technical Offer
- (2) Performa Invoice (without price)

- (3) Tender number
- (4) Date/ time of opening

b. **Commercial Offer.** Commercial Offer will contain Annexure-C and bid bond (Dully mentioned and placed in separate envelope. The offer indicating the quoted price (**IN USD only**) in figures as well as in words along would be enclosed in an envelope. Following information will be clearly marked on the envelope.

- (1) Commercial Offer
- (2) Performa invoice with price
- (3) Tender number

c. Both the envelopes i.e. commercial offer and technical offer would be enclosed in yet another properly sealed envelope that will be marked with address of this office only. There should be clear indication that this envelope contains tender documents.

d. The tender duly sealed will be addressed to the following:-

Deputy Director (Supply Chain Management Office)
NATIONAL UNIVERSITY OF TECHNOLOGY (NUTECH)
I J P ROAD, I-12, ISLAMABAD
Tel: 0092-51-5476768, Ext: 178

4. **Date and Time For Receipt of Tender.** SCM Office will not accept any excuse of delay occurring in post. Tenders received after the appointed / fixed time will NOT be entertained. The appointed time will, however, fall on next working day in case of closed / forced holiday.

5. **Tender opening.** The offers shall be opened 30 minutes after submission time. Commercial offers will be opened at later stage if Technical Offer is found acceptable on examination by technical authorities. Date and time for opening of commercial offer shall intimated later. Only legitimate / registered representatives of firm will be allowed to attend tender opening.

6. **Validity of Offer.** The validity period of quotations must be indicated and should be 90 days from the date of opening of commercial offer. Conversion rate of Foreign Exchange (FE) / Local Currency (LC) components will be considered with effect from opening of commercial offer.

7. **Documents.** Following information's / copy of documents must be provided / attached with offer:-

- a. A copy of letter showing firm's financial capability.
- b. NTN/GST number be mentioned on the offer and copy of registration Certificate issued by Sales Tax Department, attached.
- c. Foreign supplier to provide its Registration Number issued by respective Department of Commerce authorizing export of subject stores.
- d. Annexes A, B and C and special conditions must be signed and stamped. Attach only relevant documents.
- e. Complete all Annexes as per given format. Do not use your format or letter head. Offer may be rejected if given format is not followed.
- f. OEM/principal agency agreement must be provided.

8. **Disqualification.** Offers are liable to be rejected if:-

- a. Validity of offer is not quoted as required in IT or made subject to confirmation later.
- b. There is any deviation from the General/ Special / Technical Instructions.
- c. Offers are found conditional or incomplete in any respect.
- d. Tender processing fee (with tech offer) and EM/Bid Bond (with fin offer) are NOT attached.
- e. Multiple rates are quoted against one item.
- f. Manufacturer's relevant brochures and technical details on major equipment assemblies are not attached in support of specifications.
- g. Offer received later than appointed / fixed date and time.
- h. Subject to restriction of export license.

- i. Offers (Commercial / technical) containing non-initialled / unauthenticated amendments / corrections / overwriting. If the validity of the agency agreement has expired. The commercial offer against FOB / CIF / C&F tender quoted in local currency
 - j. If the offer is found to be based on cartel action in connivance with other sources/participants of the tender.
9. **Earnest Money / Bid Bond.** Commercial Offer must be accompanied with a Bid Bond (CDR/Pay Order/Bank Draft) in agreement of faithful compliance of the conditions of Contract. This amount will be equivalent to 5% of the total quoted value. The Bid Bond amount submitted by the successful bidder will however be refunded on effective termination of Contract. (The Bid Bond will be forfeited in case of default by the bidder from his commitments made through his offer). Submission of Bid Bond is mandatory; otherwise your offer will be rejected. Bid Bond will be used as performance guarantee till the delivery of stores, otherwise separate performance guarantee valued at 5 % of contract will be submitted by successful firm till stores are delivered and inspected.
10. **Return of Earnest Money/Bid Bond.**
- a. Bid Bond to the unsuccessful bidders will be returned on finalization of the contract.
 - b. Bid Bond of the successful bidder/bidders will be returned on submission of Bank Guarantee against warranty period OR Bid bond retained for the warranty period as the case maybe.
11. **Terms of Payment/ LC Charges** In case of CPT/FOB (all categories) contracts payment will be made through letter of credit (LC). LC opening charges in Pakistan are to be borne by NUTECH. Payment will be made through irrevocable LC in favour of Manufacturer. Payment will be in USD.
12. **Bank Guarantee (BG).**In case where equipment is backed by warranty, the BG submitted equal to 05% of FOB/FOR/CPT etc value shall remain valid for up to 60 days after completion of warranty period.
13. **Taxes/ Duties** All taxes /duties /import Licenses Fee as applicable under government laws in Pakistan as well as country of supplier shall be on firm.
14. **Insurance:-** Insurance will be NUTECH's responsibility through NICL.

15. **Freight charges /Custom clearance:** Custom clearance and all freight related will be supplier's responsibility. NUTECH will provide applicable exemption certificates and documents. Delivery till NUTECH will be firm's responsibility and all associated costs will be part of quotation as well.
16. **Warranty.** All goods /store offered would be brand new, from current year of production and will be governed as per warranty clause. The warranty period may be covered by a BG as stipulated above depending on the value /criticality of the tender equipment /stores.
17. **Delivery Schedule.** Store will be delivered within 90 days from contract signing date.
18. **Force Majeure.** If non-compliance with the period of delivery or services can be proved to be due to Force Majeure, such as but not limited to mobilization, war, riot, strike, lockout or the occurrence of unforeseen events, the period shall be reasonably extended.
19. **Subletting** Supplier is not allowed to sublet wholly or part of the contract to any other firm /company without prior permission of the purchaser's .Firm found in breach of the clause will be dealt with as per purchaser's right and discretion
20. **Arbitration.** The dispute shall referred for adjudication to a board comprising of Rector NUTECH and two arbitrators, one to be nominated by each party who before entering upon the reference shall appoint an umpire by mutual agreement, and if they do not agree a judge of the Superior court will be requested to appoint the umpire. The arbitration proceeding shall be held in Pakistan under Pakistan Law. The venue of arbitration shall be the place from which the contract is issued or such other place as the purchaser at his discretion may determine. Arbitration award so given will be firm and final
21. **Export License/Permit /End User Cert.** It shall be the responsibility of the Supplier to obtain from the Government concerned all permits and export licenses, etc required to enable each consignment to be shipped immediately as per the delivery schedule. In case the supplier fails to arrange export license within 30 days of signing the contract the purchaser reserves the right to cancel the contract on the risk and expense of the supplier without prior notice. The purchaser will provide End

User Certificate for the purpose of getting the export licenses/permit on behalf of the supplier for the export of the Contracted good /stores.

22. **Technical Specification:** The supplier will provide OEM certificate, quality certificate /inspection document to the purchaser confirming the quality of the product being supplied under this contract .Store must bear the manufacturer's identification marking /monogram.

23. **Inspection /Testing of Store:** Inspection testing will be carried out at NUTECH by the concerned inspection team /inspector as detailed by the technical authority of respective department on behalf of the NUTECH in accordance with the laid down Acceptance Criteria .(Acceptance Test Procedure (ATPs)/Drawing /Test standard AND SPECIFICATION). The supplier will provide ATPs with technical offer. Mutually agreed/approved ATPs will form part of contract to govern the inspection of store subsequently

24. **Requirement of Samples.** The requirement of tender sample will be included in the case if required for evaluation by technical authorities' .Beside this advance sample if required will be also made part of the IT as well as the contract.

25. **Change In Specification /Mfr/Model.** No alternation marked/brand and quality of store will be entertained after the tender have been opened.

26. **Checking of Store at Consignee End.** All stores will be checked at Consignee's end in the presence of the supplier's representative. If for some reason, the supplier decides not to nominate his representative for such checking, an advance written notice to this effect will be given by the supplier to the consignee prior to or immediately on shipment of store .In such an event the supplier will clearly undertake that decision of consignee with regard to quantities and description of consignment will be taken as final and discrepancy found will be according made up by supplier. In all other cases the consignee will inform the supplier about arrival of consignment immediately on receipt of store through registered email/letter and telephone .If no response from the supplier is received within 15 days from initiation of letter the consignee will have the right to proceed with the checking without supplier's representative .Consignee's report on checking of the stores will be binding on the supplier in such cases.

27. **Packing /Marking.** The supplier shall be responsible for proper packing of the Store in standard export packing worthy of transportation by sea /air /road rail so as to ensure their content being free from lose or damages due to faulty packing on arrival at the ultimate destination. Packing of stores will be done at the expenses of the supplier. All packing cases, containers and other packing material shall become the property of the NUTECH on receipt. Marking of packages /instruction will render the store liable to reject .Any loss occurred /demurrage paid due to wrong marking will be make good by the supplier

28. **Performa Invoice:** Please ensure Performa invoice has fol components incorporated:-

- a. HS Code
- b. Incoterm
- c. Payment Terms
- d. Origin of good
- e. Port of shipment
- f. Port of departure
- g. Seller & Buyer acceptance (on Performa Invoice)
- h. Invoice Date
- i. Latest date of shipment
- j. Seller complete bank detail

29. **General Instructions:** Following must be noted:-

- a. The firm should provide point to point acceptance of each clause of IT and special instructions attached with IT.
- b. Firm will render a certificate with technical offer that firm is neither defaulter nor blacklisted by any Government / semi Government organization directly or indirectly.
- c. Rates should be quoted on Free Delivery basis at NUTECH Islamabad.
- d. **2 years** warranty against **5% Bank Guarantee** of the store value will be required from the successful bidders from the date of commissioning as performance bond.
- e. The stipulated delivery period should be strictly adhered to. Any anticipated delay that is beyond the control of Seller will be informed

(in writing) well in advance of the expiry of the due date of the activity along with reasons thereof, requesting for the grant of extension in delivery period. If the Seller fails to do so, or the Buyer is not convinced with the rationale provided by the Seller, Liquidated Damages up to/at 2% per month or part thereof, will be imposed. However, the maximum limit of the Liquidated Damages will not exceed 10% of the contract value, in any way.

- f. If even after applicability of 10% LD, the Seller fails to deliver the required stores, the Buyer will be at liberty to Cancel the contract, and /or procure the stores from an alternate source, on the Seller's "Risk & Cost/Expense". In that case, the Seller will be bound to make payment to the new source through NUTECH. The purchaser's decision under this clause shall NOT be subjected to arbitration.
- g. .NUTECH reserves the right to cancel the Contract without assigning any reason whatsoever during its currency / execution / after placement, if the firm is found to be involved in any dubious activity, litigation, lacking to meet contractual obligations with the purchaser or is blacklisted with any other Public procurement agency. No claims / loss /damage of whatsoever nature shall be entertained and NUTECH's decision in this regard will be final and binding on the Supplier / Seller.
- h. An appropriate amount may be paid for mobilization against Bank Guarantee/CDR/Demand Draft/Pay Order.

Deputy Director
Supply Chain Management Office

Annex-ATechnical SpecificationsNUTECH / SCM / Mech Lab Phase-III (A)-2019 / TD-098

Ser	Items	Description	A/U	Country of Origin	Qty Req	Bidder Compliance		
						Yes	No	Alternate
1.	Heat Pump for Cooling and Heating Operation Apparatus with DAQ	<ul style="list-style-type: none"> • Piston hermetic compressor with minimum 400W for a range 7.2°C / 55°C • Low pressure manometer R134a with dual scale temperature / pressure • HP and LP safety pressure switch • High pressure manometer R134a with dual scale temperature / pressure • Volume of the exchanger: 1.19 L min • R134a refrigerant needle flow meter with magnetic transmission • Thermostatic expansion valve with internal pressure equalization (X2) • Suction line accumulator minimum volume 0.3 L • Reverse cycle 4-way valve with electrical coil • Cooling water tank with lid minimum volume 75 L • Flow rate HMT maximum: 6m³ /h • Water flow rate control valve • Water float flow meter (X2) 	No	Europe/ USA	1			

		<ul style="list-style-type: none">• Must include the instrumentation to measure temperature, flow and pressure• Wattmeter for calculation of power• Data Acquisition system for• temperatures at R134a compressor inlet, outlet, R134a condenser outlet, R134a expansion valve inlet, R134a evaporator inlet, water inlet, water condenser outlet and water evaporator outlet• Pressures at R134a high and low pressure,• Flow rates at condenser water flow, evaporator water flow, and R134a flow <p>Experimental Values</p> <ul style="list-style-type: none">• Identification of components of a reversible water / water heat pump• Visualization of the processing of the refrigerant through glass grilles (evaporation and condensation)• Measurement of various operating parameters (power consumption, temperature of refrigerant and of the water, pressures)• Energy efficiency analysis of the system and trace on the refrigerating cycle on enthalpy diagram• Study of a reversible system						
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2.	Refrigeration System with two stage Compression Apparatus	<ul style="list-style-type: none"> • Semi-hermetic compressor accessible two-stage industrial type • Refrigerant: R404A • Condensing temperature upto + 35°C • Evaporating temperature upto -35°C • Cooling capacity: 6000 W min • Equipped with Oil Separator, Air condenser, Liquid tank, Brazed plate exchanger, Dehydrator, Liquid indicator, An electromagnetic valve, Refrigerant flowmeter with bypass valve, Thermostatic expansion valve with external equalizer, Evaporator with forced ventilation of ceiling type • Low and high pressure compressors • Adjustable intercooling via refrigerant injection • Heat exchanger for additional super cooling of the liquid refrigerant • Closed refrigeration chamber with evaporator with fan and adjustable electric heater as cooling load • Instrumentation for measurement of the temperature, drive power of the compressors and cooling load power • Approximate power consumption of Low pressure compressor (LP) 300W • Approximate power consumption of High pressure compressor (HP) 800W • Adjustable to be used as single stage compression cycle 	No	Europe/ USA	1			
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		<p>Experimental Capabilities</p> <ul style="list-style-type: none"> • Identification of components of a refrigerating system with two stage compressor • Study of the basic concept of a refrigeration installation R404A, with two stages. • Study of the thermodynamic cycle on temperature-enthalpy or h-s diagram. • Calculation of cooling power to the condenser and evaporators. • Calculation of overall efficiency of the unit and COP 					
3	<p>Film wise and Drop wise Condensation and Boiling Apparatus with DAQ</p>	<ul style="list-style-type: none"> • Frame made of anodized aluminium profiles, width 45 mm or more • depth of the profile grooves: 16 mm or more, width of the profile grooves openings: 8.5 mm or more in surface, • structural assemblies by galvanized screws, shutter gasket for the groove • A Glass Cylinder of heat resistant glass, 350 mm high x 160 mm diameter with V = 1.5 L approximately • Heating resistors Minimum power 1000 W with Control of heating power through a potentiometer • Two float flow meters with control valve Scale: • Two condensers Materials of the first copper condenser: • Film Materials of the second 	No	Europe/ USA	1		

		<p>condenser gold plated approximately 3 microns thick</p> <ul style="list-style-type: none"> • Capacity: approximately 1 Kg of distilled water • Manometer and pressure sensor Manometer -1 to 3 bars that measures the vapor pressure in the test chamber and Pressure sensor connected online for displaying pressure on the digital display • Test cylinder safety relief valve with pressure switch • Ejector control valve • Eleven temperature measurements Type thermocouple probes Three per condenser (x2) Four for the inputs and outputs of water One for the boiling temperature • Low level sensor contactless • Data Acquisition system with standard monitoring and configuration software for recording data • Heater thermal protection <p>Experimental Capabilities:-</p> <ul style="list-style-type: none"> • Visualization of the condensation in drops on the gold condenser and into a film on the copper condenser • Study of heat transfer • Study of the relation temperature / pressure for the water at saturation • Measurement of the effect of increasing the rate of flow of cooling fluid on the heat transfer coefficient. 						
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4	<p style="text-align: center;">Journal Bearings Apparatus</p>	<ul style="list-style-type: none"> • Freely supported bearing on the motor shaft and sealed with a rubber diaphragm <ul style="list-style-type: none"> ▪ Journal Diameter 50 mm or more ▪ Bearing Diameter 55 mm or more ▪ Effective Width of Bearing 70 mm or more ▪ Overall Bearing Width 80 mm or more ▪ Volume of Oil in Bearing 65.5 cm³ ▪ Nominal Bearing Speed 500-3000 rev/min • A control unit for adjusting motor speed and a display to show the motor speed • Bearing should have 12 equi-spaced pressure tapings around its circumference and four additional ones along its topside and on a vertical radial plane • The bearing can be loaded by attaching weights (included) to arms connected to the bearing with load Weights 100 g • Compatible with multi grade and monograde oil • Single shaft 300-800 micrometer clearance <p>Experimental Capabilities:-</p> <ul style="list-style-type: none"> • Observation of oil wedge (film thickness) and hence eccentricity variations for different speeds and loads 	No	Europe/ USA	1			
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		<ul style="list-style-type: none"> • Observation of the pressure profiles at these conditions • Observation of the critical bearing whirl • Measuring pressure profiles for chosen conditions and plotting the Cartesian and polar pressure curves • Measuring pressure profiles for chosen conditions and plotting the theoretical Sommerfeld curve • Measurement of shaft speed and journal speed at the critical whirl • All tests may be conducted for either direction of rotation of the shaft • Eccentricity measurement along axial, lateral, radial and tangential direction. • Film thickness measurement along axial, lateral, radial and tangential direction • Plotting of minimum film thickness over at least two revolutions. • System must be supplied with stroboscope 						
5	Hydrogen Bubble Apparatus with DAQ	<ul style="list-style-type: none"> • Tank capacity of 25 L min. • Submersible adjustable speed pump: Approximate flow rate:-1200 l./h. or more • Approximate height: 15 m. • Flow rectifier and inlet gate to obtain a uniform flow without turbulence. • Approximate Dimensions: 650 x 300 	No	Europe/ USA	1			

		<p>mm.,</p> <ul style="list-style-type: none"> • Plate made of stainless steel as the anode. Three threads made of platinum with a diameter of 0.2 mm. and three different lengths form exchangeable cathodes. • Bubble generator with approximate intensity: 500 mA, Pause: 0-2000 ms, Pulse: 0-2000 ms. • Set of submersible white light LEDs with adjustable intensity. <ul style="list-style-type: none"> • Set of models:- like Cylinders with different diameter, Rectangular block, Flat plate with rounded ends, Triangular Flat plate, Curved plate etc • Webcam and sheet for cutting models • DAQ system for recording flow rates and relevant data <p>Experimental Capabilities</p> <ul style="list-style-type: none"> • Visualization of the flow around different obstacles. • Understanding laminar and turbulent flow. • Boundary layer separation and vortex formation. • Two-dimensional visualization of the hydrogen bubble flow. • Quantitative analysis of the flow parameters with little bursts of bubbles. • Visualization and demonstration of 						
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		<p>the boundary layer.</p> <ul style="list-style-type: none"> • Demonstration of Karman vortices. • Visualization of flow around models created by the user. (Sheet to be supplied along the unit) • Presentations with flow patterns recordings using a video camera or webcam must be included in the offer 						
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<p>Firm Name: _____</p> <p>Signature: _____</p> <p>Name: _____</p> <p>Designation: _____</p>
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Annex A-1**Special Instructions**

Description	Bidder Compliance		
	Yes	No	Alternate
Environment Conditions (a) Temperature range: 05°C to +45°C (b) Relative humidity: 0-70% non-condensing			
Warranty period Two years from the date of commissioning.			
Training Notes Supplier will provide a set of handouts for training on operation and maintenance of the equipment			
Publications Supplier is to provide hard and soft copies (CD) of following manuals. (a) Operational / Maintenance manual: - Qty 01 with Equipment and additional Qty 02 for record purposes and should consist of following sections:- (1) Equipment Description /Operation:- (a)Specifications (b)Description (c)Operation (2) Servicing:- (a)Maintenance Schedule (b)Adjustment / test (c)Removal / Installation procedure (d)Tools Required (3) Trouble shooting guide (4) Cleaning requirements (b) Full parts description along with detailed diagrams (exploded view). (c) Experimental manuals which must contain the list and procedure of the experiments that equipment can perform.			

<p>Spares / Technical Support</p> <p>(a) Supplier to have in-country spares / technical support and ensure spares and technical support / assistance for next 10 years</p> <p>(b) Comprehensive list of spares required for scheduled maintenance of Equipment is to be provided</p> <p>(c) Any software provided must have its license</p> <p>(d) Software upgrade support must be provided free of cost for 10 x years with renewed license at every upgrade</p> <p>(e) Supplier must also provide calibration service for at least 5 years after commissioning</p>			
<p>Additional Spare / Replaceable parts.</p> <p>(a) Replaceable spare / parts during scheduled inspections are to be identified and provided as per requirement along with equipment sufficient to cater five years consumption.</p> <p>(b) All specialized / standard tools required for inspection / repair / servicing must be supplied along with equipment.</p>			
<p>Physical Inspection Criteria: 100% physical inspection of store will be carried out before commissioning of the equipment for following details:-</p> <p>(a) For physical damage, scratches and deformity.</p> <p>(b) Accessories /components as per contractual specifications.</p> <p>(c) Technical Manuals (Operation manual, user guide, IPBs).</p> <p>(d) Quality certificate and calibration certificate by the OEM</p> <p>(e) OEM certificate and verifiable documents by the supplier that store has been procured from certified source and is factory new and from latest production.</p> <p>(f) Brand name and country of origin.</p>			
<p>Commissioning</p> <p>(a) Commissioning by OEM rep at his own cost and risk at designated place at NUTECH.</p> <p>(b) Any special requirement for installation, operation and commissioning must be specified in the offer by the supplier.</p>			
<p>Training</p> <p>01 week OEM operational/ maintenance training at NUTECH</p>			
<p>Improvement and Safety Measures</p>			

Any improvement and safety measures suggested by NUTECH during commissioning are to be resolved by the supplier / manufacturer at no extra cost.			
<p>Liability of Supplier</p> <p>(a) OEM certificate of authorized dealership Supplier is to provide original OEM certificate of subject equipment bought directly from the manufacturer and being an authorized dealer.</p> <p>(b) In case the equipment supplied is not compatible with specifications, the supplier will be obliged to call his representatives at his own cost for consultation and corrective action</p>			
<p>Special Notes</p> <p>(a) Additional requirements for the maintenance of equipment (if any) must be intimated by the supplier in technical offer.</p> <p>(b) Supplier must provide the list of organizations using same equipment in Pakistan (if any).</p> <p>(c) Equipment must be a standard product of OEM available at web address of OEM.</p> <p>(d) In case of premature failure of the equipment, OEM has to replace / rectify the item free of cost. Required transportation charges would be borne by the supplier.</p>			

Firm Name: _____
Signature: _____
Name: _____
Designation: _____

Annex-B**TECHNICAL OFFER****NUTECH / SCM / Mech Lab Phase-III (A)-2019 / TD-098****Fill in following essential parameters:-**

1. Validity of Offer: _____ Days (Should not be less than **90 days**)
2. Delivery period: _____ Days (After placement of Offer)
3. Country of Origin: _____
4. Warranty Period: _____

General

1. GST Number: _____ (Enclose Copy)
2. NTN / CNIC: _____ (if exempted, provide valid exemption certificate)

Payment Terms (through LC)

1. 80 % through LC on sight.
3. 20% after delivery, installation / commissioning, user satisfaction certificate.

Details of Foreign Principal Information with account details)

1. Name / Title: _____
2. Address: _____

OEM Name:	Firm Name:	Signature:
OEM Focal Person:	Firm Focal Person:	Official Seal:
OEM Phone Number:	Firm Phone Number:	Name:
OEM Email Id:	Firm Email Id:	Designation:

Annex CSCHEDULE TO TENDER

Ser	Item	Description	A/U	Qty	Price Per Unit (USD)	Total Price (USD)
1.	Heat Pump for Cooling and Heating Operation Apparatus with DAQ	<ul style="list-style-type: none"> • Piston hermetic compressor with minimum 400W for a range 7.2°C / 55°C • Low pressure manometer R134a with dual scale temperature / pressure • HP and LP safety pressure switch • High pressure manometer R134a with dual scale temperature / pressure • Volume of the exchanger: 1.19 L min • R134a refrigerant needle flow meter with magnetic transmission • Thermostatic expansion valve with internal pressure equalization (X2) • Suction line accumulator minimum volume 0.3 L • Reverse cycle 4-way valve with electrical coil • Cooling water tank with lid minimum volume 75 L • Flow rate HMT maximum: 6m³ /h 	No	1		

		<ul style="list-style-type: none"> • Water flow rate control valve • Water float flow meter (X2) • Must include the instrumentation to measure temperature, flow and pressure • Wattmeter for calculation of power <p>Data Acquisition system for</p> <ul style="list-style-type: none"> • temperatures at R134a compressor inlet, outlet, R134a condenser outlet, R134a expansion valve inlet, R134a evaporator inlet, water inlet, water condenser outlet and water evaporator outlet • Pressures at R134a high and low pressure, • Flow rates at condenser water flow, evaporator water flow, and R134a flow <p>Experimental Values</p> <ul style="list-style-type: none"> • Identification of components of a reversible water / water heat pump • Visualization of the processing of the refrigerant through glass grilles (evaporation and condensation) • Measurement of various operating parameters (power consumption, temperature of refrigerant and of the water, pressures) • Energy efficiency analysis of the system and trace on the refrigerating cycle on enthalpy diagram • Study of a reversible system 				
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2.	<p style="text-align: center;">Refrigeration System with two stage Compression Apparatus</p>	<ul style="list-style-type: none"> • Semi-hermetic compressor accessible two-stage industrial type • Refrigerant: R404A • Condensing temperature upto + 35°C • Evaporating temperature upto -35°C • Cooling capacity: 6000 W min • Equipped with Oil Separator, Air condenser, Liquid tank, Brazed plate exchanger, Dehydrator, Liquid indicator, An electromagnetic valve, Refrigerant flowmeter with bypass valve, Thermostatic expansion valve with external equalizer, Evaporator with forced ventilation of ceiling type • Low and high pressure compressors • Adjustable intercooling via refrigerant injection • Heat exchanger for additional super cooling of the liquid refrigerant • Closed refrigeration chamber with evaporator with fan and adjustable electric heater as cooling load • Instrumentation for measurement of the temperature, drive power of the compressors and cooling load power • Approximate power consumption of Low pressure compressor (LP) 300W • Approximate power consumption of High pressure compressor (HP) 800W • Adjustable to be used as single stage compression cycle 	No	1		
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		<p>Experimental Capabilities</p> <ul style="list-style-type: none"> • Identification of components of a refrigerating system with two stage compressor • Study of the basic concept of a refrigeration installation R404A, with two stages. • Study of the thermodynamic cycle on temperature-enthalpy or h-s diagram. • Calculation of cooling power to the condenser and evaporators. • Calculation of overall efficiency of the unit and COP 				
3	<p>Film wise and Drop wise Condensation and Boiling Apparatus with DAQ</p>	<ul style="list-style-type: none"> • Frame made of anodized aluminium profiles, width 45 mm or more • depth of the profile grooves: 16 mm or more, width of the profile grooves openings: 8.5 mm or more in surface, • structural assemblies by galvanized screws, shutter gasket for the groove • A Glass Cylinder of heat resistant glass, 350 mm high x 160 mm diameter with V = 1.5 L approximately • Heating resistors Minimum power 1000 W with Control of heating power through a potentiometer • Two float flow meters with control valve <p>Scale:</p> <ul style="list-style-type: none"> • Two condensers Materials of the first copper condenser: • Film Materials of the second condenser gold plated approximately 3 microns thick 	No	1		

		<ul style="list-style-type: none"> • Capacity: approximately 1 Kg of distilled water • Manometer and pressure sensor Manometer -1 to 3 bars that measures the vapor pressure in the test chamber and Pressure sensor connected online for displaying pressure on the digital display • Test cylinder safety relief valve with pressure switch • Ejector control valve • Eleven temperature measurements Type thermocouple probes Three per condenser (x2) Four for the inputs and outputs of water One for the boiling temperature • Low level sensor contactless • Data Acquisition system with standard monitoring and configuration software for recording data • Heater thermal protection <p>Experimental Capabilities:-</p> <ul style="list-style-type: none"> • Visualization of the condensation in drops on the gold condenser and into a film on the copper condenser • Study of heat transfer • Study of the relation temperature / pressure for the water at saturation • Measurement of the effect of increasing the rate of flow of cooling fluid on the heat transfer coefficient. 				
4	Journal Bearings Apparatus	<ul style="list-style-type: none"> • Freely supported bearing on the motor 	No	1		

		<p>shaft and sealed with a rubber diaphragm</p> <ul style="list-style-type: none"> ▪ Journal Diameter 50 mm or more ▪ Bearing Diameter 55 mm or more ▪ Effective Width of Bearing 70 mm or more ▪ Overall Bearing Width 80 mm or more ▪ Volume of Oil in Bearing 65.5 cm³ ▪ Nominal Bearing Speed 500-3000 rev/min <ul style="list-style-type: none"> • A control unit for adjusting motor speed and a display to show the motor speed • Bearing should have 12 equi-spaced pressure tapings around its circumference and four additional ones along its topside and on a vertical radial plane • The bearing can be loaded by attaching weights (included) to arms connected to the bearing with load Weights 100 g • Compatible with multi grade and monograde oil • Single shaft 300-800 micrometer clearance <p>Experimental Capabilities:-</p> <ul style="list-style-type: none"> • Observation of oil wedge (film thickness) and hence eccentricity variations for different speeds and loads • Observation of the pressure profiles at these conditions • Observation of the critical bearing whirl • Measuring pressure profiles for chosen conditions and plotting the Cartesian and polar pressure curves • Measuring pressure profiles for chosen conditions and plotting the theoretical 				
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		<p>Somerfield curve</p> <ul style="list-style-type: none"> • Measurement of shaft speed and journal speed at the critical whirl • All tests may be conducted for either direction of rotation of the shaft • Eccentricity measurement along axial, lateral, radial and tangential direction. • Film thickness measurement along axial, lateral, radial and tangential direction • Plotting of minimum film thickness over at least two revolutions. • System must be supplied with stroboscope 				
5	Hydrogen Bubble Apparatus with DAQ	<ul style="list-style-type: none"> • Tank capacity of 25 L min. • Submersible adjustable speed pump: Approximate flow rate:-1200 l./h. or more • Approximate height: 15 m. • Flow rectifier and inlet gate to obtain a uniform flow without turbulence. • Approximate Dimensions: 650 x 300 mm., • Plate made of stainless steel as the anode. Three threads made of platinum with a diameter of 0.2 mm. and three different lengths form exchangeable cathodes. • Bubble generator with approximate intensity: 500 mA, Pause: 0-2000 ms, Pulse: 0-2000 ms. • Set of submersible white light LEDs with adjustable intensity. • Set of models:- like Cylinders with different diameter, Rectangular block, Flat plate with 	No	1		

		<p>rounded ends, Triangular Flat plate, Curved plate etc</p> <ul style="list-style-type: none"> • Webcam and sheet for cutting models • DAQ system for recording flow rates and relevant data <p>Experimental Capabilities</p> <ul style="list-style-type: none"> • Visualization of the flow around different obstacles. • Understanding laminar and turbulent flow. • Boundary layer separation and vortex formation. • Two-dimensional visualization of the hydrogen bubble flow. • Quantitative analysis of the flow parameters with little bursts of bubbles. • Visualization and demonstration of the boundary layer. • Demonstration of Karman vortices. • Visualization of flow around models created by the user. (Sheet to be supplied along the unit) • Presentations with flow patterns recordings using a video camera or webcam must be included in the offer 				
Total Price						

If applicable:

Excises Duty @ _____ %

Sales Tax@ _____ %

Surcharge@ _____ %

Any other Tax _____ %

Note:

1. Quotation will be submitted on CPT basis..
2. Equipment shall be supplied and installed at the premises of the NUTECH. All charges such as packing, forwarding, local freight, loading and unloading, installation and commissioning, custom clearance, orientations, on job training or any other will be part of quoted price.
3. Required price will be indicated in USD (in case quoted price are in different currencies then for sake of comparison ,these will be converted into Pak Currency at rate prevailing on opening day of commercial offer).

Firm Name: _____
Signature: _____
Name: _____
Designation: _____

Tender No _____

Name of the Firm _____

Firm Address _____

Date _____

Telephone No _____

E-Mail _____

To,

DD SCM Office
NUTECH University
I-12, Main IJP Road,
Islamabad.

Dear Sir

1. I / We hereby offer to supply to the NUTECH University the stores detailed in schedule to the tender inquiry or such portion thereof as you may specify in the acceptance of tender at the price offered against the said schedule and further agree that this offer will remain valid up to 90 days after opening of commercial offer and will not be withdrawn or altered in terms of rates quoted and the conditions already stated therein or on before this date. I / we shall be bound by a communication of acceptance to be dispatched within the prescribed time.

2. I / we have understood the instructions to Tenders and General Conditions Governing Contract available at NUTECH website and have thoroughly examined the specifications / drawing and / or patterns quoted in the schedule here to and am/are fully aware of the nature of the stores required and my/ our offer is to supply stores strictly in accordance with the requirements.

Your Faithfully.

(Signature of Tender)

(Capacity in which signing)

Address

Date:

Signature of Witness_

Individual signing tender and / or other documents connected with a contract must be signed by principal authorized rep/ OEM rep/ Authorized partner firm rep.

CHECK LIST

(This checked list must be attached with your technical offer, duly filled and Signed by authorized signatory)

Tender No _____

Date _____

1	a. Tender processing fee ref no _____ b. Bank _____ c. Amount _____	
2	a. EM/ Bid Bond ref no _____ b. Bank _____ c. Amount _____	
3	Form Annex A, A-1, B and C signed by Authorized Signatory	Yes/No
4	Offering specification of items as per It	Yes/No
5	Accounting unit/Qty as per IT	Yes/No
6	Delivery Schedule as per IT	Yes/No
7	Country of origin of store _____	
8	Name of OEM:- _____	
9	Original Performa invoice (Mandatory)	Yes/No
10	Certified that there is no Deviation from IT conditions/ there is deviation from IT condition as per fol details	Yes/No
11	Blacklisting certificate. it is certified that our firm is neither default nor black listed by any govt organization directly or indirectly	Yes/No

Note: Fill and/or mark Yes/No where required

Signature of Firm Auth Signatory