TENDER DOCUMENTS

MECHANICAL LAB EQUIPMENT

NUTECH/SCM/Mech Lab-2019/TD-040

NATIONAL UNIVERSITY OF TECHNOLOGY

TENDER NOTICE

National University of Technology (NUTECH)

NUTECH/SCM/Mech Lab-2019/TD-040

Sealed bids are invited from Government / FBR Registered Firms for the procurement of Mech laboratory equipment for NUTECH Technology Labs.

1. Tender documents containing terms & conditions and detailed specifications of items can be downloaded from NUTECH website "https://nutech.edu.pk/d-p.php" w.e.f **08 Mar 2019.**
2. Quotations shall be submitted as per requirement of the tender documents.

a. Bidders will be required to submit bank draft/PO equal to 5% of quoted value as Bid Bond in favor of National University of Technology (NUTECH).

3. Sealed bids with detailed specification should reach on the following address latest by **1130 hours on 25 Mar 2019.** Late submission will not be entertained.
4. Bids will be opened at **1200 hours** on **25 Mar 2019**at SCM Office.
5. Project is to be completed in 75 days from the date of award of contract.
6. Submit Rs 1500/- as Tender fee in favour of NUTECH HBL account: NUTECH Tendering and contracts, 5037- 000210755. Please attach bank receipt with technical offer. Offers will not be entertained without payment of processing fee.

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

NATIONAL UNIVERSITY OF TECHNOLOGY

SUPPLY CHAIN MANAGEMENT OFFICE

INVITATION TO TENDER

Submission Date/Time 25 Mar 2019 at 1130 hours

1. NUTECH desires to procure the list of item(s)/Store(s) as per **Annexure-A**. Interested bidders are requested to send their bids through courier or deliver at NUTECH under two separate sealed envelopes (placed together in third envelope), marked clearly, **"Technical Offer"** and **"Commercial Offer"**, respectively to the undersigned, latest by or before above mentioned due date. If due to any unforeseen circumstances, NUTECH establishment remains closed, then the last date of submission will be extended to next working day.

2. Please also note that Technical Offer should contain Annexes-A & B duly filled in (supported with relevant technical literature /details/ catalogues etc) and receipt of tender processing fee. Commercial Offer will contain Annexure- C and bid bond. Please ensure no space is left blank in the annexes.

3. Following must be noted for this IT (Invitation to Tender):-

   a. 2 x copies of technical offer are to be provided.

   b. Annexes A, B and C must be signed and stamped, Attach only relevant documents.

   c. Please complete all document as per given format. Do not use any other format or letter head. Offer may be rejected if given format is not followed.

   d. Validity of offer will be 90 days.

   e. Delivery period will be 75 days after the date of award of contract.

   f. Tender(s) must be accompanied with a Bid Bond in agreement of faithful compliance of the conditions of Contract/Purchase Order. This amount will be equivalent to 5% of the total quoted value. In case of non-acceptance of any offer, the Bid Bond will be returned to the bidder by fastest possible means. The Bid Bond amount submitted by the successful bidder will however, be refunded on effective termination of Contract/ Purchase Order. (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.

   g. 2 years warranty against 5% bank guarantee will be required from the successful bidders from the date of commissioning.

   h. Rates should be quoted on Free Delivery basis at NUTECH Islamabad.

4. We reserve the rights to accept or reject any or all tenders as a whole or in part without assigning any reason whatsoever. The decision in this regard will be firm, final and binding on all bidders.

DD (Supply Chain Management)

NATIONAL UNIVERSITY OF TECHNOLOGY

SUPPLY CHAIN MANGEMENT OFFICE

TECHNICAL OFFER

Annex A

User Reference No **Mech Lab Eqpt-003**___ Date: **21-01-2019**

Technical Specification

Ser	Part No	Eqpt	Description	Country of Origin	A/U	Qty Req	Bidder Compliance			Tech Scrutiny to be done by user	
							Yes	No	Alternate Offer	Accepted	Rejected
										Reason of Rejection	
1.		**Hydraulic Bench with data acquisition system, compatible software and following Modules and Accessories**	Sump Tank: Material Fiber Glass or better, Capacity 130 liters minimum. Volumetric Tank: Material (Fiber Glass), Capacity 90 liters minimum Delivery Pump Capacity 0-55 lpm The bench must be capable to meet operational requirement of the below mentioned modules and accessories. (a) Impact of Jet Apparatus (b) Pipe Friction Apparatus (c) Fluid Friction Measurement (d) Orifice Discharge Apparatus (e) Venturi Apparatus (f) Horizontal Osborne-	USA, Canada, Europe, Japan, South Korea	Nos	4					

			Reynolds Apparatus							
	(a)	**Impact of Jet Apparatus**	Nozzle Diameter 6mm, 4mm Nozzle to target distance: 20mm or more Target Plate: (a) Flat Plate, (b) 90 degree cone, (c)180 degree hemisphere, (d) 30 degree Flat Target Plates Diameter: 30mm Set of Weights: 5*5g, 5*10g, 5*20g, 4*50g, 4*100g, 2*200g All necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** Demonstration of the principle of linear momentum. 1- Study of the jet forces. 2- Influence of flow rate and flow velocity. 3- Influence of different deflection angles.	USA, Canada, Europe, Japan, South Korea	Nos	2				
	(b)	**Fluid Friction in Pipes Apparatus**	Pipes of different internal diameter, roughness and materials. Different types of valves (angle-seat, gate, diaphragm and ball). Different types of couplings (in-line strainer, elbows, sudden widening, sudden contraction, etc.). Special couplings: Pitot tube, Venturi tube and diaphragm with measuring plate. Pressure tapings with quick action connections. Two water	USA, Canada, Europe, Japan, South Korea	Nos	2				

			manometers,range:0- 1200 mm Two Bourdon manometers, range: 0 - 3bar One flow meter, range: 100-6000 l./h. Quick Coupling. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** 1- Determination of pressure loss due to friction in pipes made of different materials and with different diameters and roughness. 2- Determination and comparison of pressure loss in different types of valves. 3- Determination and comparison of pressure loss in different fittings. 4- Measurement of the flow with the Venturi tube and the Pitot tube. 5- Determination and comparison of the discharge coefficient determined in the Venturi tube and the Pitot tube.							
	(c)	**Energy Losses in Pipes**	Water Storage Tank Apprx 1000 mm Tank Capacity: 6 liters minimum (including level indicator),	USA, Canada, Europe, Japan, South Korea	Nos	2				

			Bore (nominal): 5mm, To regulate flow rate needle valve must be included Quick coupling. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities:-** 1. Head Loss Measurements 2. Determination of Critical Reynolds Number							
	(d)	**Orifice Discharge Apparatus**	Transparent cylindrical tank. Different type of interchangeable mouthpieces: diaphragm, including Venturi and cylindrical. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** Determination of the discharge, velocity and contraction coefficient of multiple geometries.	USA, Canada, Europe, Japan, South Korea	Nos	2				
	(e)	**Venturi Meter Apparatus**	Manometer range: 0 to 300 mm of water. Number of manometer tubes: Min 8 Upstream diameter of the throat: Approximately 25 mm to narrowing: Downstream: 21° Upstream: 10°	USA, Canada, Europe, Japan, South Korea	Nos	2				

			Experimental Capabilities 1. Demonstration of Veturi meter for use as water flow meter. 2. Demonstration of the pressure recovery at the divergent section. 3. Energy conversion in divergent/convergent pipe flow. 4. Recording the pressure curve in a Venturi nozzle 5. Recording the velocity curve in a Venturi nozzle 6. Determining the flow coefficient.							
	(f)	**Horizontal Osborne-Reynolds Apparatus**	Inner diameter: 16-20 mm. External diameter: 20-24 mm. Length: 750-800 mm. Water Supply Tank Capacity: 2.4-2.6 Litres Tank with a valve and an injection needle, Having capacity: 0.4-0.6 l. Control valve to adjust the water flow in the experiments. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** 1.- Observation of laminar, transition and turbulent flows. 2.- Association of laminar, transition and turbulent flows with their corresponding Reynolds number. 3.- Observation of the parabolic velocity profile	USA, Canada, Europe, Japan, South Korea	Nos	2				

2		**Wind Tunnel with Accessories, Data Acquisition System and Mounting Models**	Test Section: 300mm * 300mm * 600 mm or bigger Flow velocity: 0 to 30 m/s (Minimum) Compatible software and Data Acquisition System. Wind tunnel Must have following capabilities and accessories (a) Three component balance for measurement of lift, drag and pitching moment (Lift ±10N, Drag ±10N.(Min), PM ±10N-m (Min) including Interface and Sensors (b).Boundary Layer analysis including Flat Plate Model (c)Wake Analysis capability including model (d) Flutter analysis capability with compatible model **Compulsory Accessories:-** (a) Particle Image Velocimetry (PIV) (Laser preferably) and compatible Fog or smoke Generator with required models for flow visualization / calculation of velocity (b) Differential Pressure Transducer with independent minimum 32-Way Pressure Display Unit (c) Independent Multi-Tube (at least 24 tubes) Manometer for measuring pressure (d) Angle Feedback Unit (e) Pitot-Static Traverse / rack	USA, Canada, Europe, Japan, South Korea	Nos	1				

			(f) Wake Survey Rake. (g) Bernoulli Apparatus Model. (h) Sphere Drag Model (j) Circular Plate Drag Model (k) Cylinder Drag Model (l) Wing with Flaps Drag Model for pressure and forces measurement (m) Wing and Airfoil Models with NACA 0015 or 0012 Profile Model for pressure and forces measurement (n) Wing and Airfoil Models with NACA 54118 or compatible Profile Model for pressure and forces measurement (p) Dimpled Sphere Drag Model (q) Spring-mounted Wing Model (r) Models of any modern fighter aircraft and commercial airliner (s) Drag Model of Hemisphere Convex to Airflow (t) Square Plate Drag Model (u) Automobile car / truck model **Experimental Capability** (a) Lift / Drag and Pitching moment measurements manual and through DAQ on all models (b) Manual Pressure Distribution measurement using manometers and digital recording through DAQ on above mentioned models (c) Complete Boundary Layer Analysis on specified models (d) Wake Analysis for all models							

Special Instructions

Description	Bidder			Tech Scrutiny to be done by User		
	Yes	No	Alternate Offer	Accepted	Rejected	Reasons of Rejection
Environment Conditions (a) Temperature range: 05^{o}C to +45^{o}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 Used (3) Trouble shooting guide (4) Cleaning requirements (5) Shipping and receiving (6) Storage requirements (b) **IPB** (Illustrated Parts Breakdown Manual) should have 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.						
Spares / Technical Support (a) Supplier to have in-country spares / technical support and ensure spares and technical support / assistance for next 10 years (b) Comprehensive list of spares required for scheduled maintenance of Equipment is to be provided						

(c) Any software provided must have its license (d) Software upgrade support must be provided free of cost for 10 x years with renewed license at every upgrade (e) Supplier must also provide calibration service for at least 5 x years after commissioning						
Additional Spare / Replaceable parts. (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. (b) All specialized / standard tools required for inspection / repair / servicing must be supplied along with equipment.						
Physical Inspection Criteria: 100% physical inspection of store will be carried out before commissioning of the equipment for following details:- (a) For physical damage, scratches and deformity. (b) Accessories /components as per contractual specifications. (c) Technical Manuals (Operation manual, user guide, IPBs). (d) Quality certificate and calibration certificate by the OEM (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. (f) Brand name and country of origin.						
Commissioning (a) Commissioning by OEM rep at his own cost and risk at designated place at NUTECH. (b) Any special requirement for installation, operation and commissioning must be specified in the offer by the supplier.						
Training 01 week OEM operational/ maintenance training at NUTECH						

Improvement and Safety Measures Any improvement and safety measures suggested by NUTECH during commissioning are to be resolved by the supplier / manufacturer at no extra cost.						
Liability of Supplier (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. (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						
Special Notes (a) Additional requirements for the maintenance of equipment (if any) must be intimated by the supplier in technical offer. (b) Supplier must provide the list of organizations using same equipment in Pakistan (if any). (c) Equipment must be a standard product of OEM available at web address of OEM. (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.						

Firm Name_____
Signature_____
Name_____
Designation_____

NATIONAL UNIVERSITY OF TECHNOLOGY
SUPPLY CHAIN MANAGEMENT OFFICE

TECHNICAL OFFER

Annex B

User Reference No **Mech Lab Eqpt-003**___ Date: **21-01-2019**

Please fill in the following essential parameters:

1. Validity of Offer:_____ Days (Should not be less than 90 days)
2. Delivery Period:_____ Days (After Placement of order)
3. Country of Origin:_____
4. Warranty/Guarantee: _____ Months from the date of final acceptance of the stores.

General

GST No: _____ (Please enclose copy)

NTN/CNIC: _____ (if exempted, please provide valid exemption certificate)

Payment Terms: (Mandatory to mention) (Please tick/ mention the desired payment term/ mode)

1. 50 % advance payment (Against valid bank Guarantee)
2. 50% Payment at dispatch / delivery / installation / commissioning / user satisfaction certificate

Details of Payment Recipient

(1) Name/Title: _____

(2) Address:_____

Signature: _____

Official Seal: _____

Name: _____

Designation: _____

NATIONAL UNIVERSITY OF TECHNOLOGY
SUPPLY CHAIN MANAGEMENT OFFICE

FINANCIAL OFFER

Annex C

User Reference No **Mech Lab Eqpt-003** Date: **21-01-2019**

Ser	Part No	Eqpt/Items	Description	A/U	Qty Req	Unit Price (Rs) (excluding GST)	GST (if applicable)	Custom Duty (Rs) (If applicable)	Gross Unit Price (with all taxes and custom)	Gross Total Amount of total Qty. (Rs)
1.		**Hydraulic Bench with data acquisition system, compatible software and following Modules and Accessories**	Sump Tank: Material Fiber Glass or better, Capacity 130 liters minimum. Volumetric Tank: Material (Fiber Glass), Capacity 90 liters minimum Delivery Pump Capacity 0-55 lpm The bench must be capable to meet operational requirement of the below mentioned modules and accessories. (a) Impact of Jet Apparatus (b) Pipe Friction Apparatus (c) Fluid Friction Measurement (d) Orifice Discharge Apparatus (e) Venturi Apparatus (f) Horizontal Osborne-Reynolds Apparatus	Nos	4					
	(a)	**Impact of Jet**	Nozzle Diameter 6mm, 4mm		2					

		Apparatus	Nozzle to target distance: 20mm or more Target Plate: (a) Flat Plate, (b) 90 degree cone, (c)180 degree hemisphere, (d) 30 degree Flat Target Plates Diameter: 30mm Set of Weights: 5*5g, 5*10g, 5*20g, 4*50g, 4*100g, 2*200g All necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** Demonstration of the principle of linear momentum. 1- Study of the jet forces. 2- Influence of flow rate and flow velocity. 3- Influence of different deflection angles.	Nos						
	(b)	**Fluid Friction in Pipes Apparatus**	Pipes of different internal diameter, roughness and materials. Different types of valves (angle-seat, gate, diaphragm and ball). Different types of couplings (in-line strainer, elbows, sudden widening, sudden contraction, etc.). Special couplings: Pitot tube, Venturi tube and diaphragm with measuring plate. Pressure tapings with quick action connections. Two water manometers,range:0- 1200 mm Two Bourdon manometers, range: 0 - 3bar	Nos	2					

			One flow meter, range: 100-6000 l./h. Quick Coupling. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** 1- Determination of pressure loss due to friction in pipes made of different materials and with different diameters and roughness. 2- Determination and comparison of pressure loss in different types of valves. 3- Determination and comparison of pressure loss in different fittings. 4- Measurement of the flow with the Venturi tube and the Pitot tube. 5- Determination and comparison of the discharge coefficient determined in the Venturi tube and the Pitot tube.							
	(c)	**Energy Losses in Pipes**	Water Storage Tank Apprx 1000 mm Tank Capacity: 6 liters minimum (including level indicator), Bore (nominal): 5mm, To regulate flow rate needle		2					

			valve must be included Quick coupling. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities:-** 1. Head Loss Measurements 2. Determination of Critical Reynolds Number	Nos						
	(d)	**Orifice Discharge Apparatus**	Transparent cylindrical tank. Different type of interchangeable mouthpieces: diaphragm, including Venturi and cylindrical. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** Determination of the discharge, velocity and contraction coefficient of multiple geometries.	Nos	2					
	(e)	**Venturi Meter Apparatus**	Manometer range: 0 to 300 mm of water. Number of manometer tubes: Min 8 Upstream diameter of the throat: Approximately 25 mm to narrowing: Downstream: 21° Upstream: 10° **Experimental Capabilities** 1. Demonstration of Veturi		2					

			meter for use as water flow meter. 2. Demonstration of the pressure recovery at the divergent section. 3. Energy conversion in divergent/convergent pipe flow. 4. Recording the pressure curve in a Venturi nozzle 5. Recording the velocity curve in a Venturi nozzle 6. Determining the flow coefficient.	Nos						
	(f)	**Horizontal Osborne-Reynolds Apparatus**	Inner diameter: 16-20 mm. External diameter: 20-24 mm. Length: 750-800 mm. Water Supply Tank Capacity: 2.4-2.6 Litres Tank with a valve and an injection needle, Having capacity: 0.4-0.6 l. Control valve to adjust the water flow in the experiments. All the necessary pipe clips and tubing must be included and should be compatible with the hydraulic bench. **Experimental Capabilities** 1.- Observation of laminar, transition and turbulent flows. 2.- Association of laminar, transition and turbulent flows with their corresponding Reynolds number. 3.- Observation of the parabolic velocity profile	Nos	2					

2		**Wind Tunnel with Accessories, Data Acquisition System and Mounting Models**	Test Section: 300mm * 300mm * 600 mm or bigger Flow velocity: 0 to 30 m/s (Minimum) Compatible software and Data Acquisition System. Wind tunnel Must have following capabilities and accessories (a) Three component balance for measurement of lift, drag and pitching moment (Lift ±10N, Drag ±10N.(Min), PM ±10N-m (Min) including Interface and Sensors (b).Boundary Layer analysis including Flat Plate Model (c)Wake Analysis capability including model (d) Flutter analysis capability with compatible model **Compulsory Accessories:-** (a) Particle Image Velocimetry (PIV) (Laser preferably) and compatible Fog or smoke Generator with required models for flow visualization / calculation of velocity (b) Differential Pressure Transducer with independent minimum 32-Way Pressure Display Unit (c) Independent Multi-Tube (at least 24 tubes) Manometer for measuring pressure (d) Angle Feedback Unit (e) Pitot-Static Traverse / rack (f) Wake Survey Rake. (g) Bernoulli Apparatus Model.	Nos	1					

			(h) Sphere Drag Model (j) Circular Plate Drag Model (k) Cylinder Drag Model (l) Wing with Flaps Drag Model for pressure and forces measurement (m) Wing and Airfoil Models with NACA 0015 or 0012 Profile Model for pressure and forces measurement (n) Wing and Airfoil Models with NACA 54118 or compatible Profile Model for pressure and forces measurement (p) Dimpled Sphere Drag Model (q) Spring-mounted Wing Model (r) Models of any modern fighter aircraft and commercial airliner (s) Drag Model of Hemisphere Convex to Airflow (t) Square Plate Drag Model (u) Automobile car / truck model **Experimental Capability** (a) Lift / Drag and Pitching moment measurements manual and through DAQ on all models (b) Manual Pressure Distribution measurement using manometers and digital recording through DAQ on above mentioned models (c) Complete Boundary Layer Analysis on specified els (d) Wake Analysis for all modmodels							

TOTAL				

Firm Name_____
Signature_____
Name_____
Designation_____

Bid Bond Ref_____ **GST** _____

Custom Duty _____ **Gross Total Value**_____

Bid Bond be attached with Annex C. Copy of Bid Bond be attached with technical offer without showing its value. Exposure of Bid Bond may lead to rejection of Tech Offer.