ANNEXURE-I-A

भारतीय प्रौद्योगिकी संस्थान काशी हिन्दू विश्वविद्यालय IIT INDIAN INSTITUTE OF TECHNOLOGY BANARAS HINDU UNIVERSITY

DEPARTMENT OF MECHANICAL ENGINEERING

QUOTATION ENQUIRY

Ref: IIT (BHU) /373/O/QTN/ **Due Date: 26/03/16 up to 16:00 hrs** *(Last date and time of quotation receiving)* **Date: 19/03/16** *(Date of tender enquiry)*

To

Dear Sir,

Please submit your lowest rate for supplying the under mentioned items. Quotation in duplicate must Reach us before the date marked above and should contain the following information:

1. Full specification and make of the items as per annexure 1-A offered and its rate F.O.R. Varanasi
2. Sales tax at concessional rate as applicable to educational institution.
3. Your VAT / CST registration number, PAN & TIN numbers
4. Conditions of supply and terms of payment
5. If you are a manufacture of the item or if you have proprietary right over it, please mention it in the quotation & provide a certificate.
6. Please mention your agency commission in Indian Rs., if applicable (in case of imported items).
7. Please give undertaking as per annexure-I-B

Quotation must be sent in a **sealed envelope** with word "**QUOTATION**", & kind attention Prof. P. Shukla, our reference number, and due date as given above, clearly marked over it. The quotation should reach the office of undersigned within the due date & time. Quotation received after last date & time shall be considered as late bids and therefore rejected.

SL. NO.	**Name of Items**	**Description / Technical Specification**	**Quantity**
1	Subsonic wind tunnel	As per ANNEXURE-I-A	1 unit
2	Multi tube manometer	-do-	-do-
3	Lift & drag measurement balance	-do-	-do-
4	NACA0012 Aerofoil pressure Tapping	-do-	-do-

N.B.: Other terms & conditions:

1. Warranty of all equipment should be at least 5 year or above from the date of installation.

2. All the quoted instruments should follow International standards.
3. The institute reserves the right to authenticate the antecedents of the quoting firms, if they are not original equipment manufacturer (OEM) or are not authorized dealers on behalf of OEM.
4. Bids of only those bidders shall be considered for price comparison , who fulfill all the technical criteria as per annexure 1-A.
5. Late delivery penalty as per IIT(BHU) Purchase manual 2015 shall apply.
6. Conditional bids shall not be accepted and will be rejected as unresponsive.
7. All the technical &commercial clarification shall be asked only on email, hence valid email id and the name of responding person should be provided on each bid. All the replies regarding technical & commercial queries shall be given in the stipulated time, failing to do so may lead to rejection of bid.

The Sealed quotations will be opened on 26/03/16 at 16:30 hrs in the office of

Head, Deptt of Mechanical engineering IIT (BHU)

HOD/COS/PI

Annexure-I A

TECHNICAL SPECIFICATION

ITEMS FOR WHICH ENQUIRY IS SOUGHT ARE

1. Subsonic Wind Tunnel
2. Multi-tube Manometer
3. Lift and drag measurement balance
4. NACA0012 Aerofoil with Pressure Tappings

1. SUBSONIC WIND TUNNEL

Description:

- Compact, practical open-circuit suction wind tunnel for studying aerodynamics.
- The wind tunnel should give accurate results and should be suitable for undergraduate study and research projects. Should offer a comprehensive range of optional models and instrumentation, including a computer-based data acquisition system.
- Air should enter the tunnel through an aerodynamically designed effuser (cone) that accelerates the air linearly. It then should enter the working section and should pass through a grill before moving through a diffuser and then to a variable-speed axial fan. The grill should protect the fan from damage by loose objects. The air should leave the fan, pass through a silencer unit and then back out to atmosphere.
- A separate control and instrumentation unit should be supplied to controls the speed of the axial fan (and the air velocity in the working section).
- The control and instrumentation unit should also include manometers and electrical outlets to supply electrical power to other optional instruments.
- The working section of the tunnel should a square section with a clear roof, sides and floor. The sides should be removable. The floor and each side panel should have a special position to support the optional wind tunnel models. A protractor and a model holder should be supplied along with wind tunnel to support and accurately adjust the angle of any models fitted.
- A Pitot-static tube and a traversing Pitot tube should be fitted on the working section, upstream and downstream of any models. It can be connected to the manometers of the instrumentation unit (or other optional instruments) to show pressure.
- A metal frame to support the wind tunnel. The frame should include lockable castors for convenient mobility.
- Electronic sensors on the optional wind tunnel instrumentation can be connected to Data Acquisition System. Data Acquisition system should allow accurate real-time data capture, monitoring, display, calculation and charting of all relevant parameters on a suitable computer

Standard Features:

- Should be supplied with a comprehensive user guide
- Should have Five-year warranty

Experiments:

A wide variety of subsonic aerodynamics experiments (some of them may need ancillaries), including should be possible on the equipment:

- Flow past bluff and streamlined bodies with pressure and velocity observations in the wake
- Investigations into boundary layer development
- Influence of aspect ratio on aerofoil performance
- Performance of an aerofoil with flap, influence of flap angle on lift, drag and stall
- Pressure distribution around a cylinder under sub and super-critical flow conditions
- Study of characteristics of models involving basic measurement of lift and drag forces
- Study of the characteristics of three-dimensional aerofoils involving measurement of lift, drag and pitching moment
- Study of the pressure distribution around an aerofoil model to derive the lift and comparison with direct measurements of lift
- Drag force on a bluff body normal to an air flow

- Flow visualisation

OPERATING CONDITIONS
Operating temperature range: +5°C to +40°C
Operating relative humidity range: 80% at temperatures < 31°C decreasing linearly to 50% at 40°C

Specifications

Working Section:
Precision aluminium frame with plastic panels to ensure rigid and accurate results
Working section should not be less than: 300 x 300 x 600mm, Square cross-section
Both side panels should be completely removable for easy access. Should include two mounting points for models, on the side panel and underside of the working section.

Fan:
Fan motor should not be less than 3.5 kW
Maximum fan speed should be more than 2900 rpm

***Contraction Ratio should be* 9:1**

Effuser/Diffuser: Should be made from glass fibre

Exhaust Silencer should be fitted as standard

Pitot and Pitot static tubes with 2 manometers should be supplied as standard

A minimum of 32 way differential pressure display unit with digital displays should be supplied– which can be used without a PC

3x Model Mounting Positions should be available

Nett dimensions: Should not be more than 3700 mm x 1100 mm x height 2000 mm.

Maximum Air velocity: Should not be less than 35 ms^{-1}

Noise levels: Should not be more than 85dB(A) at operator's ear level

Additional items required-

2. Multi-Tube Manometer

- Should have minimum Thirty-five tube tilting manometer for measuring pressure taken from monitoring points on models in subsonic wind tunnels
- Should use water as manometer fluid with colouring for safety and ease of visibility
- Easy-to-read scale should be printed on a protective plastic screen common to each manometer tube
- Should have preset incline levels for consistency and accuracy – up to five times magnification
- Should have pressure reading level preset by adjustable fluid reservoir – Which should include fine-adjustment handwheel
- Should have adjustable feet for precise set up

Standard Features

- Supplied with comprehensive user guide
- Should have Five-year warranty

Specification

Inclination:
The manometer should be inclined at the following preset angles (from vertical): 10°, 20°, 30°, 40°, 50°, 60°, 70°, 78° (60° should give x 2 magnification, 78° should give x 5 magnification)

Scale range: should be 0 - 600 mm in 2 mm divisions

3.Lift and Drag Measurement Balance

Measures lift and drag forces on models mounted Subsonic Wind Tunnel

- Should be single-component balance to measure lift and drag forces on models mounted in the tunnel
- Should Transmit the force on the model directly to a strain gauged load cell with digital display
- Should Include power supply

Standard Features

- Supplied with comprehensive user guide
- Should have Five-year warranty

Specification

Maximum load: Should not be less than 10 kg (100 N). Loadcell must be rated to 20 kg

Typical scale for models: 1/18th

4. NACA0012 Aerofoil with Pressure Tappings

The aerofoil should have minimum 20 static pressure tappings along its chord on the upper and lower surfaces, which should connect to tubes that pass through the aerofoil and then out to clear, numbered, flexible tubes. Students should be able to connect the tubes to other optional pressure-measurement instruments, to allow them to measure the pressure distribution around the aerofoil, from which they can find the lift.

Using a Pitot tube, students can traverse the aerofoil wake to find the downstream pressure distribution and find the drag on the aerofoil. Students can compare these values of lift and drag with direct measurements found from a balance. They can also compare them with the results from another aerofoil with the same profile.

Varying the angle of attack of the aerofoil with respect to the air stream allows students to find the changes to the pressure distribution. It also allows investigations into the critical conditions at stall.

Standard Features

- NACA 0012 Aerofoil
- Symmetrical cross-section
- 300 mm span
- 150 mm chord
- 20 pressure tappings (ten on each side)
- Should have Five-year warranty

Annexure-I B

INDIAN INSTITUTE OF TECHNOLOGY (BHU) VARANASI

TO BE RETURNED

Following proforma should be filled in and duly signed by the firm and sent alongwith the quotation. (Please refer to the detailed instructions/notes before filling this proforma).

1. Validity of the offer : ……..

2. Approximate Delivery Period : ……..

3. (a) Whether rates have been quoted F.O.R. site and covers packing forwarding and insurance charges. : YES / NO

(b) If not, please mention the same : ……..

4. (a) Whether the prices are inclusive of Sales Tax and other taxes. : YES / NO

(b) If not, kindly specify the amount / rate : ……..

5. If the Sales Tax is charged extra, declaration for charging Sales Tax correctly attached. : YES / NO

6. (a) Whether supply will be made directly or through any Local / Regional / Authorized Dealer / Stockist : Directly/Stockist/Authorized Dealer

(b) If through a Stockist / Dealer: -

(i) Name and full address of the Party : ……

……..

(ii) Whether the order to be placed with the : Principal / Stockist / Dealer

(iii) Who will raise the bill : Principal / Stockist / Dealer

(iv) Cheques will be drawn in favour of : Principal / Stockist / Dealer

(v) Whether any Delivery, Packing and Forwarding Charges will be payable to local Stockist/Dealer : YES / NO (Please specify the amount/percentage etc, if any)

7. Our terms of payment (Please indicate your preference by a (✓) mark). Please note that no other payment terms are likely to be accepted. .

(a) <u>For Local Firms or if the bills are raised by the Local Dealers.</u>

(i) 100% Payment on bill basis : ……..

OR

(ii) 100% payment against Proforma Invoice after receipt of materials in good condition, installation and satisfactory report.
(**Only under exceptional cases)**

(b) <u>If the bills are raised by outstation Firms</u>

(i) 100% Payment on bill basis : ……

OR

(ii) 100% payment against Proforma Invoice after receipt of materials in good condition, installation

and satisfactory report : ……..

OR

(iii)D.G.S. & D. Terms of Payment for D.G.S. & D Rate Contract items : ……..

OR

(iv) 75% against Proforma Invoice (at site) or documents through Bank and 25% after receipt of materials in good condition, installation and satisfactory report. : ……..

OR

(v) 90% payment against Proforma Invoice (at site) or documents through bank and 10% after receipt of materials in good condition, installation and satisfactory report (Only under special Circumstances). : ……..

8. Whether any Excise Duty is payable on the items. : YES / NO
If yes, indicate the amount / percentage. : ……..%

9. Whether any installation charges are payable extra. : YES / NO
If yes, amount to be specified. : ……

10. Whether any discount for educational institution :
offered on the printed price list of the manufacturer. : YES / NO

Please mention the amount / percentage. : ……..

11. Whether the product is on DGS &D/D.I. Rate contract.
If yes, please enclose a photocopy of the same. : YES / NO

12. Whether the product bears I.S.I. Mark. YES / NO
If yes, please mention the I.S.I. License no. : ……

13. (a) Whether the firm is Sales Tax payer. : YES / NO
If yes, please mention the Sales Tax Numbers. : ……

(b) Whether the Local Dealer(s) is / are Sales Tax payer(s) : YES / NO
If yes, please mention the Sales Tax numbers of each : ……..

14. Whether printed / authenticated price list of the Firm's Products and Catalogue etc. enclosed. : YES / NO

Signature of the Authorised Official with Seal

TO BE RETURNED WITH QUOTATION

ANNEXURE-I C

UNDERTAKING

WE HEREBY UNDERTAKE THE FOLLOWING:

1. We will not sell the product (s) to other institutions, bodies and also in the market on the rates less than those quoted by us to the Institute.

2. The goods on which Sales Tax has been charged are not exempted for payment of Sales Tax under C.S.T. Act or U.P.S.T. Act or the rules made there under and the amount mentioned on account of Sales Tax on goods is not more than what is payable under the provisions of the relevant Act or Rules made there under.

3. The rate of Excise Duty mentioned in the quotation is in accordance with the provisions of the rules and the same is payable to the Excise Authorities in respect of the stores.

4. The goods / Stores / articles offered shall be of the best quality and workmanship and their supply will be strictly in accordance with the technical specifications and particulars as detailed in the quotation.

5. The information furnished by us in the quotation is true and correct to the best of our knowledge and belief.

6. We have read and understood the rules, regulations, terms and conditions and agree to abide by them.

Authorised Signatory
(Seal)