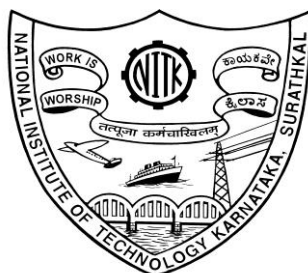


NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

DEPARTMENT OF CHEMICAL ENGINEERING
POST SRINIVASNAGAR, MANGALORE – 575 025 (D K)

Phone: (0824) 2474000.
E- mail: info@nitk.ac.in

Fax: (0824) 2474033
Website: <http://www.nitk.ac.in>



TENDER DOCUMENT

Tender Notification No	: NITK /CH/HTEM/IRG/ 2019-2020 / 1510	Date: 06.02.2020
Name of Goods	: Heat Transfer Equipment Module (Detailed specification is enclosed)	
Estimated amount put to Tender	: ₹ 21.00 Lakhs (Including GST)	
EMD Amount (2% of estimated amount)	: ₹42,000.00	
Time for Supply of item	: 45 Days	
Date for Request tender document	: 27/02/2020, 4.00 p.m.	
End date for submission of e-tender	: 27/02/2020, 5.00 p.m.	
Address for Submission of Tender	: https://mhrd.euniwizarde.com	
Opening date of technical bid	: 02.03.2020, 3.00 p.m.	
Contact Details of Buyer	: Dr. I.Regupathi Associate Professor, Department of Chemical Engineering, N.I.T.K. – Surathkal P.O. Srinivasnagar – 575 025 Ph: +919731161327 Email: regupathi@nitk.edu.in	



NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

POST SRINIVASNAGAR, MANGALURU – 575 025

(An Autonomous Body of the Ministry of HRD, Govt. of India)

Phone: (0824) 2474 000.

Fax: (0824) 2474 033/ 2474 039

Email: registrar@nitk.ac.in

Website: <http://www.nitk.ac.in>

Tender Notification No: NITK /CH/HTEM/IRG/ 2019-2020 / 1510

Date: 06.02.2020

NOTICE INVITING e-TENDER (e-NIT)

The National Institute of Technology Karnataka, Surathkal (in short – NITK, Surathkal) is an autonomous institute under Ministry of HRD Govt of India imparting Technical Education and engaged in Research Activities. It is proposed to procure equipment for Central Research Facility.

Online Tender (<https://mhrd.euniwizarde.com/>) is invited for the following items in **two cover system** (i.e., Technical bid and financial bid) subject to the following terms and conditions, from the reputed manufacturers or it's authorized dealers so as to reach this office on or before scheduled date and time. The tender (Technical bid) will be opened online on the due date as mentioned. Bidders can verify their bid status through online portal <https://mhrd.euniwizarde.com/>. The financial bid of only such bidders whose technical bid is accepted shall be opened on the same day or later pre-informed date.

Name of Goods : **Heat Transfer Equipment Module**
(Detailed specification is enclosed)

1. Estimated Cost : ₹ 21.00 Lakhs (Including GST)

2. E M D (2% of estimated amount) : ₹ 42,000.00

3. Date for Request tender document : 27/02/2020, 4.00 p.m.

4. End date for submission of e-tender : 27/02/2020, 5.00 p.m.

5. Address for Submission of Tender : <https://mhrd.euniwizarde.com>

6. Date of opening of technical bid : 02/03/2020, 3.00 p.m.

Contact Details of Buyer : **Dr. I.Regupathi**
Associate Professor,
Department of Chemical Engineering,
N.I.T.K. – Surathkal
P.O. Srinivasnagar – 575 025
Ph: +919731161327
Email: regupathi@nitk.edu.in

**Sd/-
HOD**

SECTION 1 A:- PROCEDURE FOR SUBMISSION OF E-TENDER

The bidders are required to submit soft copies of their bid electronically on the e-Wizard Portal using valid Digital Signature Certificates. Below mentioned instructions are meant to guide the bidders for registration on the e-Wizard Portal, prepare their bids in accordance with the requirements and submit their bids online on the e-Wizard Portal. For more information bidders may visit the e-Wizard Portal <https://mhrd.euniwizarde.com>

1. REGISTRATION PROCESS ON ONLINE PORTAL

1. Bidders to enroll on the e-Procurement module of the portal <https://mhrd.euniwizarde.com> by clicking on the link "Bidder Enrolment" as per portal norms.
2. The bidders to choose a unique username and assign a password for their accounts. Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the e-Wizard Portal.
3. Bidders to register upon enrolment their valid Digital Signature Certificate (DSC: Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India with their profile.
4. Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse. Foreign bidders are advised to refer "DSC details for Foreign Bidders" for Digital Signature requirements on the portal.
5. Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC / e-Token.

2. TENDER DOCUMENTS SEARCH

1. Various built-in options are available in the e-Wizard Portal which is further synchronizing with CPP Portal to facilitate bidders to search active tenders by several parameters. These parameters include Tender ID, organization, location, date, value, etc.
2. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, a form of contract, location, date, other keywords, etc. to search for a tender published on the Online Portal.
3. Once the bidders have selected the tenders they are interested in, they may download the required documents/tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the Online Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.
4. The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification/help from the Helpdesk.

3. BID PREPARATION

1. Bidder should take into account any corrigendum published on the tender document before submitting their bids.
2. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid.
3. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that needs to be submitted. Any deviations from these may lead to rejection of the bid.
4. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document/schedule and generally, they can be in PDF / XLS / PNG, etc. formats. Bid documents may be scanned with 100 dpi with black and white option.

4. BID SUBMISSION

1. Bidder to log into the site well in advance for bid submission so that he/she uploads the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
2. The bidder to digitally sign and upload the required bid documents one by one as indicated in the tender document.
3. Bidder to select the payment option as Online” to pay the tender fee/ EMD wherever applicable and enter details of the instrument.
4. A standard BoQ format has been provided with the tender document to be filled by all the bidders. Bidders to note that they should necessarily submit their financial bids in the prescribed format and no other format is acceptable.
5. The server time (which is displayed on the bidders’ dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, the opening of bids, etc. The bidders should follow this time during bid submission.
6. All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data, which cannot be viewed by unauthorized persons until the time of bid opening.
7. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
8. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
9. Kindly have all relevant documents in a single PDF file of compliance sheet.
- 10. The off-line tender shall not be accepted and no request in this regard will be entertained whatsoever.**

5. AMENDMENT OF BID DOCUMENT

At any time prior to the deadline for submission of proposals, the institutions reserve the right to add/modify/delete any portion of this document by the issuance of a Corrigendum, which would be published on the website and will also be made available to the all the Bidder who has been issued the tender document. The Corrigendum shall be binding on all bidders and will form part of the bid documents.

6. ASSISTANCE TO BIDDERS

1. Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.
2. Any queries relating to the process of online bid submission or queries relating to e-Wizard Portal, in general, may be directed to the 24x7 e-Wizard Helpdesk. The contact number for the helpdesk is **011-49606060, 23710092, 23710091, Sanjeet Kumar Jha +91-8882495599, 9350530626, Gagan +91 8448288987, Vijay +91 9113518121**

7. INSTRUCTIONS TO THE BIDDERS

1. **Process for Bid submission through MHRD portal is explained in Bidder Manual. Bidders are requested to download Bidder Manual from the home page of MHRD website (<https://mhrd.euniwizarde.com>). Steps are as follows (Home page \implies Downloads \implies Bidder Manuals).**
2. The tenders will be received online through portal <https://mhrd.euniwizarde.com>. In the Technical Bids, the bidders are required to upload all the documents in .pdf format.
3. Possession of Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/ e-Token in the company's name is a prerequisite for registration and participating in the bid submission activities through <https://mhrd.euniwizarde.com>. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available on the web site <https://mhrd.euniwizarde.com> under the link 'DSC help'. Tenderers are advised to follow the instructions provided in the 'Instructions to the Tenderers for the e-Submission of the bids online through the e-Wizard Portal for e-Procurement at <https://mhrd.euniwizarde.com>.
4. **The bidder has to "Request the tender" to MHRD portal before the "Date for Request tender document", to participate in bid submission.**
8. All entries in the tender should be entered in online Technical & Commercial Formats without any ambiguity.
9. Any order resulting from this e-tender shall be governed by the terms and conditions mentioned therein.
10. No deviation to the technical and commercial terms & conditions are allowed.
11. The tender inviting authority has the right to cancel this e-tender or extend the due date of receipt of the bid(s).

SECTION 1 B: INSTRUCTION TO BIDDER (ITB)

1. The bid should be submitted in two covers System-Technical Bid and Financial Bid online through portal <https://mhrd.euniwizarde.com>:

1.1 **Envelope No.1 – Technical Bid:** The agencies should give details of their technical soundness and provide a list of customers of a previous supply of similar items to Universities, Institutes or Government Departments/ Undertakings/ public sectors with contact details. The details of the Bidder/ profile should be furnished along with the copy of all related documents. This envelope should be uploaded **online tender** (<https://mhrd.euniwizarde.com/>) and digitally signed as “**Envelope No. 1 – Technical Bid (Excel format)**”.

1.2. **Document to be scanned and submitted by uploading in the technical bid:**

- a) The Bidder should possess a Licence certificate for manufacture /supply of the item.
- b) List of Owner/partners of the firm and their contact numbers
- c) The Bidder should possess Income-tax PAN Number.
- d) The Bidder should possess a valid GST registration number.
- e) Catalogue of the Product with detailed product specifications.
- f) List of Service Centres
- g) List of customers with contact details.
- h) The average annual turnover should not be less than 30% of the estimated cost put to tender/Tender for the job work. The copy of the Balance sheet, Profit & Loss A/c., Trade or Manufacturing A/c for the last 3 years should be enclosed
- i) **Warranty Period Offered for the tendered item to be specified. If the Warranty period is not conforming to the schedule of requirements given in section 3 of the document, the bid is liable to be treated as non-responsive and rejected.**
- j) **EMD in an original form valid for minimum six months, through Bank Guarantee or DD, drawn on any scheduled bank in favour of “Director NITK, Surathkal”, payable at Surathkal should be submitted, in case of EMD payment made through E-Payment, UTR Number with details should be uploaded. EMD shall bear no interest. Any bid not accompanying with EMD is liable to be treated as non-responsive and rejected.**
- k) NSIC/ MSME registration certificate (in case of bidders claiming exception of EMD while submitting a bid)
- l) **Contract form given in section 5 needs to be submitted.**

The above documents should be furnished in the technical bid envelope.

2. Envelope No.2 – Financial bid: The agencies should submit their financial bid as per the (.xls) format is given in Section 4 of the Notice Inviting Tender in this cover. The rate should be quoted both in words and figures. Upload

online bid (<https://mhrd.euniwizarde.com>). This envelope should be upload online only as “Envelope No. 2 – Financial Bid”.

Both the Envelope No. 1 and 2 should be kept in another separate envelope upload though online <https://mhrd.euniwizarde.com>. Digitally signed with the following details.

- 3 The tender will be accepted only from the **manufacturers or its authorised supplier**.
4. The Institute **reserves the right to visit the factory** before or after the issue of supply order to satisfy itself regarding the quality of production. In case of any remarks /default noted, the EMD will be forfeited even if pre-qualified.
5. **The Financial Bid shall be in the format of Price Schedule given in Section 4. The Contract form as per format is given in section 5 shall be submitted. The incomplete or conditional tender will be rejected.**
6. Details of the item to be carried out, approximate quantity and the specifications are mentioned in “**Section 3**” appended to this Notice Inviting Tender.
7. **The item to be used is strictly according to the specification and subject to test by the Institute/concerned authorities. It must be delivered and installed in good working condition.**
8. The Institute **reserves the right to cancel or reduce the quantity** included in the schedule of requirements at any time after acceptance of the tender with a notice. The Contractor/Supplier shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the work/supply in full but he did not derive in consequence of the foreclosure of the whole or part of the works.
9. **Performance Security of 5 % of the contract value in terms of Bank Guarantee by scheduled banks shall be given by the successful bidder for the total period of Warranty. In the case of import, Indian Agent has to submit a performance guarantee in INR.**
10. **The release of EMD:** The EMD shall be released after receipt of performance security from the successful bidder.
- 11 **The validity of bids:** The rate quoted should be valid for a minimum of 90 days. No claim for escalation of the rate will be considered after opening the Tender.
- 12 **Imports: In case, Goods are to be imported, the Indian agent should furnish authorisation certificate by the principles abroad for submission of the bid in response to this Notice Inviting Tender.**
- 13 **Clarification of Tender Document:**
A prospective bidder requiring any clarification of the Tender Document may communicate to the contact person given in this notice inviting tender. The contact person will respond to any request for clarification for the Tender Document received not later than 5 working days prior to the last date for the receipt of bids
- 14 **Amendment of Tender document:** At any time prior to the last date for receipt of bids, Institute may for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the Tender document by an amendment.
- 15 **Institute may at its own discretion extend the last date for the receipt of bids.**

- 16 The bids shall be written in English language and any information printed in another language shall be accompanied by an English translation, in which case for the purpose of interpretation of the bid, the English translation shall govern.
- 17 The Institute reserves the right of accepting any bid other than the lowest or even rejecting all the bids. The decision of the Institute Purchase Committee is final in all matters of tender and purchase.
- 18 The bidder should give the following declaration while submitting the Tender.
- 19 Relaxation for Start-up, MSEs, Make in India will be as per GOI norms.
- 20 Any other details required may be obtained from the contact person (Buyer) given in the Notice Inviting Tender during the office hours.

DECLARATION

I/we have not tampered/modified the tender forms in any manner. In case, if the same is found to be tampered/modified, I /we understand that my/our tender will be summarily rejected and full Earnest money deposit will be forfeited and I /we are/are liable to be banned from doing business with NITK, Surathkal and/or prosecuted.

Signature of the Bidder : _____

Name and Designation : _____

Business Address : _____

Place:
Date:

Seal of the Bidder's Firm

SECTION 2: CONDITIONS OF CONTRACT

1. In the case of the domestic supplier, the rate should be quoted on FOB basis (Door Delivery).
2. In the case of import, either CIF or FOB (foreign currencies) rate should be quoted. All components of expenditure to arrive at Bangalore need to be explicitly specified.
3. The bidder shall indicate the excise duty exemption for the goods if applicable.
4. The rates should be quoted for preferably FOR destination from supply within India.
5. The institute is eligible for customs duty & GST exemption (for research related Procurement of Goods) & In the case of import, there will be no GST.
6. The rate quoted should be on a unit basis. Taxes and other charges should be quoted separately, duly considering exemptions if any.
7. Rate quoted should be inclusive of Testing, commissioning and installation of equipment and Training.
8. Payment: No advance payment will be made. Payment will be made only after the supply of the item in good and satisfactory condition and receipt of performance security by the supplier. **In the case of Imports, the payment will be made through LC / Sight Draft / After Installation, and performance security need to be submitted at the time of LC commitment/issue of sight draft.**
9. Guarantee and Warranty period should be specified for the complete period conforming to section 3 of this tender document.
10. The period required for the supply and installation of the item should be specified conforming to section 3 of this tender document.
11. In case of dispute, the matter will be subject to Mangalore Jurisdiction only.

SECTION 3: SCHEDULE OF REQUIREMENTS, SPECIFICATIONS AND ALLIED DETAILS

[To be filled up by the Department / Center of NITK, Surathkal]

Item(s) Name to be procured : Heat Transfer Equipment Module

Type (Equipment / Software / Furniture / Others) : Equipment

Brief Specifications of the Item(s) : **As per Annexure "A"**

(Attach Additional Sheet if necessary)

Quantity : 01 No

Any other details / requirement : Nil

Warranty Period required : 05 Years

Delivery Schedule expected

After release of Purchase order

(In Weeks) : 06 Weeks

EMD (in Rupees) : Rs. 42,000.00

Performance Security to be given

by Successful Bidder after release of : 5% of PO value

Purchase Order (in Rupees)

**SECTION 4 - PRICE BID (Draft format for indigenous Supplies)
[To be used by the bidder for submission of the bid]**

Reference Number:

Date:

Sr. No.	Description of the Item and Specification	Qty. in Units	Unit Price (Rs.)	Discount %	GST (%)	Other charges if any (please specify details)	Total Price (Rs.)
1							
2							

1. Delivery Mode: Delivery at NITK Surathkal, at the site only.

Total Bid Price in the above column should be inclusive of all taxes and levies transport, loading, unloading, etc.

Delivery Period:..... days.

Validity Date: Minimum 90 days from the date of submission of Tender/Tender.

2. Payment Term: Payment within 30 days from the date submission of bill Acceptance Certificate to concerned Dept./ Sect.

PAN No. :

GST Registration No. :

Seal and Signature:.....

Name & Business Address:.....

Note: Price Bid should be submitted in given format only. For additional information/extra items above format may be typed and used.

Place:

Date:

**SECTION 4 - PRICE BID (Draft format for Imported Supplies)
[To be used by the bidder for submission of the bid]**

Reference Number:

Date:

S. No.	Description of Items & Specifications	HSN/SAC Code	Quantity in Units	IGST %	Price basis (CIF)	Total Bid Price
1						
2						
	Installation and Commissioning Charges (if any, quote in INR)					
	Bidder Commission (if any quote in %)					
	Other Charges (please specify details)					
Grand Total						

HSN Code: Harmonised System of Nomenclature Code no. and # SAC Code: Service Accounting Code no.

1. Delivery Period:..... days.
2. Validity Date: Minimum 90 days from the date of submission of Tender.
3. The validity of the bid: 90 days from the date of submission of the Tender or Tender.
4. Mode of Shipment: _____
5. Port of Shipment: _____

Place:

Date:

SECTION 5: CONTRACT FORM

[To be provided by the bidder in the business letter head]

1. (Name of the Supplier's Firm) hereby abide to deliver them by the delivery schedule mentioned in section 3 tender document for the supply of the items if the purchase order is awarded.
2. The item will be supplied conforming to the specifications stated in the tender document without any defect and deviations.
3. Warranty will be given for the period mentioned in the tender document and service will be rendered to the satisfaction of NITK, Surathkal during this period.

Signature of the Bidder : _____

Name and Designation : _____

Business Address : _____

Place:

Seal of the Bidder's Firm

Date:

BANK GUARANTEE FORMAT FOR PERFORMANCE GUARANTEE BOND

(To be typed on Non-judicial stamp paper of the value of Indian Rupees of One Hundred) (TO BE ESTABLISHED THROUGH ANY OF THE NATIONAL BANKS (WHETHER SITUATED AT MANGALORE OR OUTSTATION) WITH A CLAUSE TO ENFORCE THE SAME ON THEIR LOCAL BRANCH AT MANGALORE OR ANY SCHEDULED BANK (OTHER THAN NATIONALISED BANK) SITUATED AT MANGALORE. BONDS ISSUED BY CO-OPERATIVE BANKS ARE NOT ACCEPTED.)

To,
Registrar,
National Institute of Technology Karnataka,
Srinivasnagar P.O., Surathkal
Mangalore – 575025

LETTER OF GUARANTEE

WHEREAS National Institute of Technology Karnataka (Buyer) has invited Tenders vide Tender No..... Dt. for purchase of AND WHEREAS the said tender document requires that any eligible successful tenderer (seller) wishing to supply the equipment / machinery, etc. in response thereto shall establish an irrevocable Performance Guarantee Bond in favour of “**Registrar, National Institute of Technology Karnataka, Surathkal**” in the form of Bank Guarantee for Rs (10% (ten percent) of the purchase value) and valid till **one year or up to warranty period whichever is later** from the date of issue of Performance Guarantee Bond may be submitted within 30 (Thirty) days from the date of Order Acknowledgement as a successful bidder.

NOW THIS BANK HEREBY GUARANTEES that in the event of the said tenderer (seller) failing to abide by any of the conditions referred in tender document / purchase order / performance of the equipment / machinery, etc. this Bank shall pay to National Institute of Technology Karnataka, Surathkal on demand and without protest or demur Rs (Rupees.....).

This Bank further agrees that the decision of National Institute of Technology Karnataka, Surathkal (Buyer) as to whether the said Tenderer (Seller) has committed a breach of any of the conditions referred in the tender document/purchase order shall be final and binding.

We, (name of the Bank & branch) hereby further agree that the Guarantee herein contained shall not be affected by any change in the constitution of the Tenderer (Seller) and/ or National Institute of Technology Karnataka, Surathkal (Buyer).

Notwithstanding anything contained herein:

1. Our liability under this Bank Guarantee shall not exceed Rs. (Indian Rupees only).
2. This Bank Guarantee shall be valid up to(date) and
3. We are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if National Institute of Technology Karnataka (NITK) Surathkal serve upon us a written claim or demand on or before.....(date).

This Bank further agrees that the claims if any, against this Bank Guarantee, shall be enforceable at our branch office at situated at (Address of local branch).

Yours truly,
Signature and seal of the guarantor:
Name of Bank & Address:
Date:

Instruction to Bank: Bank should note that on expiry of Bond Period, the Original Bond will not be returned to the Bank. The bank is requested to take appropriate necessary action on or after expiry of bond period.

BANK GUARANTEE FORMAT FOR EARNEST MONEY DEPOSIT / BID BOND

(To be typed on Non-judicial stamp paper of value Indian Rupees One Hundred)

(TO BE ESTABLISHED THROUGH ANY OF THE NATIONAL BANKS (WHETHER SITUATED AT MANGALORE OR OUTSTATION) WITH A CLAUSE TO ENFORCE THE SAME ON THEIR LOCAL BRANCH AT MANGALORE OR ANY SCHEDULED BANK (OTHER THAN NATIONALISED BANK) SITUATED AT MANGALORE. BONDS ISSUED BY CO-OPERATIVE BANKS ARE NOT ACCEPTED)

LETTER OF GUARANTEE

To

Registrar,
National Institute of Technology Karnataka,
Srinivasnagar P.O., Surathkal
Mangalore – 575025

IN ACCORDANCE WITH YOUR TENDER for the supply of, M/s.
(hereinafter called the "Bidder") having its Registered Office at....., wish to participate in the said bid for the supply..... as an irrevocable Bank Guarantee against Earnest Money Deposit for an amount of Rs. (Rupees.....) valid up to **(180 days from the date of issue of Bank Guarantee)**, is required to be submitted by the bidder as a condition precedent for participating in the said bid, which amount is liable to be forfeited by the Purchaser on (1) the withdrawal or revision of the offer by the bidder within the validity period, (2) Non acceptance of the Letter of Indent / Purchase order by the Bidder when issued within the validity period, (3) failure to execute the contract as per contractual terms and condition within the contractual delivery period and (4) on the happening of any contingencies mentioned in the bid documents.

During the validity of this Bank Guarantee:

We,(Bank name) having the registered Office at guarantee and undertake to pay immediately on first demand by NITK Surathkal, an amount of Rs..... (Rupees.) Without any reservation, protest, demur and recourse. Any such demand made by the NITK Surathkal shall be conclusive and recourse. Any such demand made by the purchaser shall be binding on the Bank irrespective of any dispute or difference raised by the Bidder.

The Guarantee shall be irrevocable and shall remain valid up to (180 days from the date of issue of Bank Guarantee) If any further extension is required, the same shall be extended to such required period on receiving instruction from the Bidder, on whose behalf the is Guarantee is issued.

Notwithstanding anything contained herein:

- * Our liability under this Bank Guarantee shall not exceed Rs..... (Rupees.....).
- * This Bank Guarantee shall be valid up to (date).
- * We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee Only and only if you serve upon us a written claim or before (date).

This Bank further agrees that the claims if any, against this Bank Guarantee shall be enforceable at our branch office at situated at(Address of local branch).

Yours truly,

Signature and seal of the
guarantor: Name of Bank:
Address:
Date:

Instruction to Bank: Bank should note that on expiry of Bond Period, the Original Bond will not be returned to the Bank. The bank is requested to take appropriate necessary action on or after expiry of bond period

Annexure-A

TENDER SPECIFICATIONS HEAT EXCHANGER EQUIPMENT MODULE

1. Heat Exchanger Base Unit to control the variables with data acquisition system:

- A common heat exchanger base unit is to be supplied to control the variables with data acquisition facility for the (i) Concentric Tube Heat Exchanger, (ii) Plate Heat Exchanger, (iii) Shell & Tube Heat Exchanger, (iv) Coil Vessel Heat Exchanger and (v) Jacketed Vessel Heat Exchanger.
- All the variables like flowrates of hot and cold water, pump operation, temperature measurement and data acquisition should be computer controlled. It should provide simultaneous visualization of all parameters involved in the process using the computer.
- It should have the provision to prepare and supply hot water. It should contain stainless steel tanks – 2 Nos (minimum volume of 30 liters) for cold and hot water storage, Electric heating element (minimum of 3000 W), PID temperature-controlled thermostat to heat the water at a temperature minimum of 70°C, switch to control the level of water in the tank. It should also have the provision to modifications and control the PID parameters using the computer.
- It should have the provision to change the direction of cold/hot water flow, measure the flowrates and pump the cold/hot water to the heat exchangers.
- Control valves and other fittings for changing and controlling the water flow of hot and cold water as well for draining of water out. Flow sensors for hot water and cold water with range: minimum flowrate: **maximum of 0.25 liter/min and Maximum flowrate: minimum of 6.5 liter/min.**
- It should have centrifugal pump with speed control from computer with minimum speed control for the water **flowrate increment of 1 lit/min.**
- It should have '**J type**' **thermocouples (Temperature sensors)** or higher precision sensors to measure the water temperature at least **10 different locations** (points) in the heat exchangers.
- It should have Pressure regulators to avoid high pressure situations in the exchangers and tared at minimum 0.6 bar.
- Various connections/fittings should be provided to connect with the different exchangers.
- The base unit should be built with high quality metal frame and elements like anodized aluminium or stainless steel
- **Computer Control Software:**
 - A 'Microsoft windows compatible softwares' with perpetual licence should be installed in the computers for PID Control, Data Acquisition and Data Management. The software should be common for all heat exchanger types.
 - It should able to Control the PID controller, flow and temperature sensors of all the type of heat exchangers.
 - Acquisition and management of the data obtained from various heat exchangers
 - Provision should be there to provide filtered signals to avoid external interferences while carrying out the experiment as well as processing the experimental data. The software should provide easy analysis of data during the experimental run as well as post the experiment.

2. Concentric Tube Heat Exchanger:

- The Concentric Tube Heat Exchanger allows to study the heat transfer between hot and cold water in concentric tubes.

- Provision should be provided to measure the temperatures of hot and cold water at different points of the heat exchanger.
- It should have the provision to perform the heat transfer studies at co-current and counter-current flow mode.
- It should have the provision to integrate with the '**Heat Exchanger Base Unit**' and **computer to control the variables and data acquisition.**
- **Dimensions:**
 - The exchanger has four equal sections of 1000 mm each one with a **total length of 4m (L=4x1=4 m)** made-up of two concentric copper tubes with following dimension.
 - **Internal tube:** Internal diameter (D_{int}) = minimum of 16mm; External diameter (D_{ext}) = minimum of 18 mm; Wall Thickness: Minimum of 1mm. heat transfer area: minimum of 0.05 m².
 - **External tube:** Internal diameter (D_{int}) = minimum of 26mm; External diameter (D_{ext}) = minimum of 28 mm; Wall Thickness: Minimum of 1mm. heat transfer area: minimum of 0.055 m².
- Minimum of **ten 'J type' temperature sensors** for measuring cold and hot water temperature
- It should be placed with well build, high quality metallic frame, elements and panels.
- The **instruction and operating manual** should be supplied along with the unit.
- The unit should have the provision to study the (i) heat loss and global energy balance; (ii) heat exchanger effectiveness (iii) Heat transfer co-efficient under counter-current and co-current flow conditions (iii) effect of fluid flow on the heat transfer (iv) Calibration of the temperature and flow sensors (v) Hysteresis study of the flow sensor.

3. Extended Plate Heat Exchanger:

- It should allow to study the heat transfer between hot and cold water in alternate channels formed between parallel plates.
- Provision should be provided to measure the temperatures of hot and cold water at different points of the heat exchanger.
- It should have the provision to integrate with the '**Heat Exchanger Base Unit**' and **computer to control the variables and data acquisition.**
- **Dimensions:**
 - It should have Four ports or connections of hot and cold water input and output.
 - Maximum flow: Minimum of 12 m³/h.
 - Maximum work pressure: minimum of 10 bar.
 - Working Temperature range: 0 to 100 °C.
 - Maximum number of plates: minimum of 20.
 - Internal circuit capacity (Volume): 0.176 liters.
 - External circuit capacity (Volume): 0.22 liters.
 - Heat transfer Area: 0.32 m².
- Minimum of **Ten 'J type' temperature sensors** for measuring cold and hot water temperature
- **Corrugated stainless steel plates** have the provision to dismantle.
- It should be placed with well build, high quality metallic frame, elements and panels.
- The **instruction and operating manual** should be supplied along with the unit.
- The unit should have the provision to study the (i) heat loss and global energy balance; (ii) heat exchanger effectiveness (iii) Heat transfer co-efficient under counter-current and co-current flow conditions (iii) effect of fluid flow on the heat transfer (iv) Calibration of the temperature and flow sensors (v) Hysteresis study of the flow sensor.

4. Shell & Tube Heat Exchanger:

- It should allow to study the heat transfer between hot and cold water in heat exchanger consists of tubes placed inside the shell with baffles.
- Provision should be provided to measure the temperatures of hot and cold water at different points of the heat exchanger.
- It should have the provision to integrate with the '**Heat Exchanger Base Unit**' and **computer to control the variables and data acquisition.**
- **Dimensions:**
 - Stainless steel tubes in bundle for hot water circulation.
 - Minimum exchange length of the shell and each tube: $L = 0.5$ m.
 - Minimum of four segmented baffles located transversally in the shell.
 - Internal tube: Number of Tubes: Minimum of 21 Stainless steel tubes; Internal diameter (Dint): minimum of 8 mm; External diameter (Dext): minimum of 10 mm. Tube thickness: minimum of 1mm; heat transfer area: minimum of 0.0125 m².
 - Shell: Internal diameter (Dint): minimum of 148 mm; External diameter (Dext): minimum of 160 mm. Tube thickness: minimum of 6 mm; heat transfer area: minimum of 0.0150 m².
- Minimum of seven J type temperature sensors for measuring cold and hot water temperature at different points of the exchanger
- It should be placed with well build, high quality metallic frame, elements and panels.
- The **instruction and operating manual** should be supplied along with the unit.
- The unit should have the provision to study the (i) heat loss and global energy balance; (ii) heat exchanger effectiveness (iii) Heat transfer co-efficient (iii) effect of fluid flow on the heat transfer (iv) Calibration of the temperature and flow sensors (v) Hysteresis study of the flow sensor.

5. Jacketed Vessel Heat Exchanger:

- The Jacketed Vessel Heat Exchanger is used to study the heat transfer between hot water flowing through a jacket and the cold water contained in a vessel.
- The heat exchanger can work in continuous or in batch mode of operation.
- Provision should be provided to measure the temperatures of hot and cold water at the inlet and outlet of the exchanger.
- It should have the provision to integrate with the '**Heat Exchanger Base Unit**' and **computer to control the variables and data acquisition.**
- **Dimensions:**
 - Total volume of the vessel: minimum of 14 Litter;
 - Interior vessel volume: minimum of 7 Litter;
 - Jacket volume: minimum of 7 Litter;
 - Should have the provision to stir the tank (Electric stirrer)
- Minimum of five J type temperature sensors for measuring cold water and hot water temperature
- It should be placed with well build, high quality metallic frame, elements and panels.
- The **instruction and operating manual** should be supplied along with the unit.
- The unit should have the provision to study the (i) heat loss and global energy balance; (ii) heat exchanger effectiveness (iii) Heat transfer co-efficient (iii) the influence of the stirring, flowrate, and vessel volume on the heat transfer process (iv) Calibration of the temperature and flow sensors (v) Hysteresis study of the flow sensor.

6. Coil Vessel Heat Exchanger:

- This heat exchanger allows to study the heat transfer between hot water flowing through a coil and cold water contained in the vessel.
- **Dimensions:**
 - Total vessel volume: minimum of 14 liters.
 - Copper coil for circulation of water: Internal Tube diameter (Dint) = Minimum of 4 mm; External Tube diameter (Dext) = Minimum of 6 mm; Total length of the tube that forms the coil: minimum of 1.5 m.
 - Should have the provision to stir the tank (Electric stirrer)
- Minimum of five J type temperature sensors for measuring cold water and hot water temperature
- It should be placed with well build, high quality metallic frame, elements and panels.
- The **instruction and operating manual** should be supplied along with the unit.
- The unit should have the provision to study the (i) heat loss and global energy balance; (ii) heat exchanger effectiveness (iii) Heat transfer co-efficient (iii) the influence of the stirring, flowrate, and vessel volume on the heat transfer process (iv) Calibration of the temperature and flow sensors (v) Hysteresis study of the flow sensor.

7. Additional Requirements:

- The system should be installed in the laboratory and the required training should be given to the Faculty and technical staff.
- The manuals for Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices should be supplied with the set-up.
- **Computers: (Optional) Minimum of 3 No's.**
 - Five computers should be supplied and installed along with the “Heat transfer equipment module” with the following configuration:
 - Processor: Intel Core i5 8500, 9MB cache; Mother Board: Chipset-Intel H series H 370; Graphics card: AMD R7 430 2GB gfx; RAM: 8GB DDR4; Hard disk: 1000GB; Operating system: Windows 10 professional (Pre Loaded) with all other necessary accessories.
- **UPS 5 KVA** should be supplied with a minimum power back-up of 1 Hr for the Heat Exchanger Base Unit and five computers (**Optional**).
- **Buyer should provide the quote for computers and UPS compulsory.**