



**INDIAN MARITIME UNIVERSITY  
MUMBAI PORT CAMPUS**

**TENDER FOR "SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID  
MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS  
LABORATORY"**

**at IMU Mumbai Port campus, Hay Bunder Road**

**TENDER NO – IMU-MPC/PUR/2021-22/FM and EE/21**

**VOLUME – I**

<b>Issue of Tender Document</b>	<b>: 28.07.2021</b>
<b>Pre-Bid Meeting</b>	<b>: 1430 Hrs on 04.08.2021</b>
<b>Last Date for Submission</b>	<b>: up to 1230 Hrs.on 09.08.2021</b>
<b>Opening of Technical Bid</b>	<b>: 1430 Hrs on 09.08.2021</b>
<b>Earnest Money Deposit (EMD)</b>	<b>: NIL</b>
<b>Estimated Cost</b>	<b>: 18.5 Lacs</b>

[Bidders are advised to study the Tender Document (including all Sections, Schedules and Annexure etc.,) carefully. Submission of Tender shall deem to have been done after careful study and examination of the Tender Document with full understanding of its implications.]

All bidders are requested to visit IMU Mumbai Campus website : [www.imumumbaiport.ac.in](http://www.imumumbaiport.ac.in) & [www.imu.edu.in](http://www.imu.edu.in) for regular updates.

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**INDIAN MARITIME UNIVERSITY**  
**(A central University, Govt. of India)**  
**Mumbai Port Campus,**  
**Mumbai - 400033**

**TENDER NO. IMU-MPC/PUR/2021-22/FM and EE Lab/21**

**TENDER FOR "SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS LABORATORY" AT IMU MUMBAI PORT CAMPUS**

**1. OBJECTIVE:-**

IMU Mumbai Port Campus is inviting open tenders from qualified bidders for providing "**SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS LABORATORY**" at IMU Mumbai Port Campus, Hay Bunder Road, Mumbai - 400033.

**2. PRE-QUALIFICATION CRITERIA:-**

The eligible bidder has to satisfy the following condition:

<b>Sr. No.</b>	<b>Qualification Criteria</b>	<b>Supporting Documents</b>	<b>Bidder Confirmation with Page No.</b>
2.1.	The bidder should possess valid trade license, PAN and GST Registration Certificate	Copy of trade license, PAN, GST Certificates should be submitted with application.	
2.2.	Bidder should be a Manufacturer or an authorized dealer.	In case of bidder is an authorized dealer, letter of authorization from OEM shall be submitted and in case of manufacturer BIS certificate should be submitted.	
2.3.	The bidder should have average annual turnover of Rs. <b>3 Lakhs</b> during the last 03 financial years (i.e. 2017-18, 2018-19, 2019-20).	1. Copy of Profit & Loss Account of the company for each of the 3 years authenticated by a Chartered Accountant. 2. Copy of Income Tax return for each of the 3 years authenticated by a Chartered Accountant	

**3. EARNEST MONEY DEPOSIT (EMD):-**

Bidders shall submit a bid security declaration in the attached format as Annexure - IV

**4. Security Deposit:-**

- 4.1. Within 07 days of the successful bidder's receipt of notification of award from IMU - MPC, the Bidder shall furnish a Security Deposit at the rate of 03% of the contract value in the form of an A/C Payee Demand Draft drawn in the name of Indian Maritime University - Mumbai Port Campus, payable at Mumbai.
- 4.2. Security Deposit will be refunded / returned without any interest 90 days after successful completion of AMC period. The refund or return of Security Deposit is subject to the complete fulfillment of the contract obligation by the supplier to the satisfaction of IMU and after adjustment of dues to IMU or penalty imposed by IMU.

## **5. GENERAL INSTRUCTION:-**

5.1. **Sale of Documents:** The Tender document can be downloaded free of cost from the IMU website [www.imu.edu.in](http://www.imu.edu.in) and [imumumbaiport.ac.in](http://imumumbaiport.ac.in).

### **5.2. Submission:**

5.2.1. The tenderer's shall seal the Technical-Bid and Price-Bid in separate envelopes (Cover-1 and Cover-2) duly marking the envelopes as "**Cover-1-Technical Bid**" and "**Cover-2-PriceBid**".The two shall then be sealed in an outer envelope.

5.2.2. The main envelope shall contain the following:

#### **Outer Envelope**

- (a) Covering Letter;
- (b) **Sealed Cover –1** containing following documents
  - i. Tender document duly filled in and signed in each page with stamp signifying the acceptance of all the tender conditions.
  - ii. Annexure – I (Compliance matrix to be filled & signed)
  - iii. Annexure – II (Form of Tender)
  - iv. Annexure – III
  - v. Annexure – IV (Bid Security Declaration)
  - vi. Mandate form as per (Annexure –V)
- (c) **Sealed Cover –2** containing following document
  - i. Price Bid in Given format to be duly filled in, signed and sealed.

The sealed outer envelope of Tender-bids shall be addressed To:

**THE DIRECTOR, INDIAN MARITIME UNIVERSITY, MUMBAI  
PORT CAMPUS, HAY BUNDER ROAD, MUMBAI – 400 033.**

A tender box will be kept in the main gate of the Campus for submitting the tenders.

5.2.3. The IMU-MPC, in exceptional circumstances, and at its sole discretion, may extend the tender due date by issuing a corrigendum.

5.2.4. The tenders will be opened in the above address in the presence of the representatives of the bidders who choose to attend the tender opening (The maximum number of representatives attending the technical bid opening to be limited to 01 person from each bidder).

5.2.5. The financial bids of the bidders who are technically qualified will be opened. The Bidders are requested to visit IMU Mumbai port Campus website [www.imu.edu.in](http://www.imu.edu.in) and [www.imumumbaiport.ac.in](http://www.imumumbaiport.ac.in) for updates.

5.2.6. IMU reserves the right to cancel or withdraw the tender any time. IMU also reserves the right to reject any or all tenders without assigning any reason.

## **6. Validity:**

The offer will remain valid for a period of 120 days from the date of opening of tender. If required, the validity shall be extended for further period by mutual consent.

## **7. Cancellation of Tender:**

The bidder shall read and understand the contents of the tender documents, carefully. Failure to comply with the requirements of tender submission will render the tender liable for rejection. Tenders, which are not responsive to the requirements of the tender conditions, will be rejected.

## **8. Evaluation of Bids:**

### **8.1. Technical Bid Evaluation:**

- 8.1.1. The information furnished by the bidder in Cover - I in the prescribed format supplied by IMU- MPC will form the basis for the technical evaluation. In exceptional cases IMU- MPC or his representative reserves the right to obtain any clarifications from any of the bidder without vitiating the tendering process.
- 8.1.2. If, in the opinion of the IMU- MPC the documents supplied in support of the tender do not meet the requirements of the tender specifications, the tender may be determined as non-responsive and may be rejected by the IMU- MPC. Bids of only the technically qualified bidders, who fulfill all the pre-qualification / eligibility criteria, will be considered for further evaluation.
- 8.1.3. If a bidder does not fulfill even single minimum eligibility criteria / pre-qualification criteria during the technical bid evaluation, his financial bids will not be evaluated.

### **8.2. Financial Bid Evaluation:**

- 8.2.1. The bidder may place their bids for 'any' or 'all' lab equipment.
- 8.2.2. The Bidder who is placing their bids for only one lab equipment should write NOT APPLICABLE in the bid for the other equipment.
- 8.2.3. The price bid will be reviewed for each equipment separately or both cumulatively for all items at the discretion of IMU-MPC i.e. IMU-MPC may declare L1 for each equipment separately or cumulatively.
- 8.2.4. The L1 for each item will be calculated as per formula [Rates quoted for items including extendable warranty + Average of two years AMC rates quoted]

## **9. Inspection & Rejection:**

The supply may be subject to inspection by IMU-MPC and IMU's decision to the acceptance of any equipment or rejection of any equipment/goods as not conforming to specification shall be final and binding on the successful bidder. Such equipment / goods which are rejected shall be removed by the bidder at their own expense and replaced by fresh ones within a time, as determined by IMU. The supply may be subject to inspection as per this clause.

## **10. Payment Terms:**

- 10.1. No advance payment will be made.
- 10.2. The Supplier shall be paid 100% of payment against Supply, Installation, Commissioning, Acceptance Testing, Training and putting in to operation of equipment at designated place against the invoice.
- 10.3. Up to 30% of total payment may be considered against supply of complete material prior to installation on case to case basis. Additional 30% payment may be considered after completion of installation. Balance payment after Commissioning, Acceptance Testing, Training and putting in to operation of equipment at designated place against the invoice.
- 10.4. In respect of AMC, AMC charges will be paid at the end of each AMC period.
- 10.5. The Tax Invoice raised by the supplier must be in compliance of relevant GST acts, rules & notifications made there under and should bear the IMU MPC GST Registration no. 27AAAAI2610K2ZW.
- 10.6. GST on LD charges/ penalty deducted against supplies and EMD/ Security deposit/ performance guarantee forfeiture against supplies, if any, shall be borne by you.

**11. Clarification /Information:**

A bidder requiring any clarification regarding the tender documents may notify in writing to the address mentioned in the invitation of tenders or E-Mail to [procurement.mumbaiport@imu.ac.in](mailto:procurement.mumbaiport@imu.ac.in) with a copy to [director.mumbaiport@imu.ac.in](mailto:director.mumbaiport@imu.ac.in).

**12. Arbitration & Jurisdiction:**

In the event of disputes, differences, claims and questions arising between the parties hereto arising out of this Agreement or anyway relating hereto or any term, condition or provision herein mentioned or the construction or interpretation thereof or otherwise in relation hereto, the parties shall first endeavour to resolve such differences, disputes, claims or questions by mutual discussion and failing such settlement, the same shall be referred for arbitration by a sole Arbitrator appointed by IMU HQ. Such arbitration shall be held in accordance with the provisions of the Arbitration and Conciliation Act 1996 or re-enactment thereof for the time being in force and shall be held in Chennai. In case the Arbitration award is not acceptable to either of the parties, they may approach courts having jurisdiction at Chennai only.

**13. Scope of Work:**

13.1. Supply, Installation and AMC of LAB equipment as mentioned in the table below: -

**A. Fluid Mechanics Laboratory:**

Sl. No.	Name of the Equipment	Qty
1	Metacentric Height & Stability Apparatus.	01
2	Pump Impeller Models.	01
3	Transparent hydraulic flow control directional valves. (3/4, 4/2, 5/2 etc)	01
4	Hydraulic Trainer Unit 4.1 for Standard hydraulic components 4.2 for Transparent Hydraulic Trainer Unit using all functional transparent hydraulic components	01 set each
5	Michell Tilting Pad Thrust Bearing Apparatus	01
6	Journal Bearing Apparatus	01

**B. Electrical and Electronics Laboratory**

Sl. No.	Name of the Equipment	Qty
1	Digital Oscilloscope	01
2	Digital Multimeter	03
3	8085 Microprocessor trainer kit	04
4	8051 Microcontroller kit	04
5	Oil Mist Detector	01
6	Air Circuit Breaker Trainer with Power Supply & Controls	01
7	Function Generator (Digital)	01

- 13.2. **Supply of Equipment:** The supply shall include complete set of equipment including accessories, spares and consumables as described in the subsequent paragraphs of the "Technical Specification" along with the pedestal for easy accessibility for the trainees (Annexure I).
- 13.3. **Installation, Demonstration and User Acceptance Testing:**
- 13.3.1. The supplier is required to supply the items within 30 days of the issuance of the work order and do the installation and demonstration of the equipment within 30 days of the arrival of materials at the IMU's site of installation; otherwise the penalty clause will be the same as per the supply of materials.
- 13.3.2. The successful Bidder shall depute their Service Engineer for demonstration and acceptance test or calibration of the equipment to the satisfaction of IMU-MPC Campus. IMU-MPC may request to demonstrate the functioning of the equipment, after installation, by asking to perform a few experiments and verification of the results either by theoretical or other practical means.
- 13.3.3. The equipments failing the acceptance tests shall be replaced at the supplier's cost, the whole or any part of the equipment as may be necessary for conclusion of the acceptance tests to the satisfaction of IMU.
- 13.3.4. The supplier shall provide necessary consumables till the completion of acceptance testing, without any additional cost.
- 13.3.5. All parts and equipment should be brand new and unused. Refurbished items shall not be accepted.
- 13.4. **Documentation:**
- 13.4.1. The successful bidder shall provide IMU with necessary documents including the following:
- 13.4.1.1. Operational and Maintenance Manuals of equipment.
- 13.4.1.2. Equipment serial numbers and models.
- 13.4.1.3. Test Certificates, Licenses if any.
- 13.4.1.4. Acceptance test results and acceptance status.
- 13.4.1.5. Training Material.
- 13.4.1.6. Full documentation with the software. (if applicable)
- 13.4.2. Two sets of hardcopy of the above shall be handed over to nominated personnel of IMU. Soft copy of the documents shall also be provided where applicable.
- 13.4.3. A video clip on the operation of equipment shall be made available.
- 13.4.4. Manuals for the instruments are to be supplied with respect to operation, maintenance, ordering spares / technical services as applicable
- 13.5. **Site Preparation:** The supplier must provide complete details regarding space and all the other infrastructural requirements needed for the equipment, which IMU should arrange before the arrival of the equipment to ensure its timely installation and smooth operation thereafter. The supplier shall visit the IMU Campuses and see the site where the equipment is to be installed and may offer his advice and render assistance regarding specification, material and associate fittings/ fixtures required for preparation of the site and other pre-installation requirements, to bring the equipment at the stage of operation, within One week of issuance of order. The warranty period for the supplied system would commence from the date of Acceptance by IMU.

- 13.6. **Replacement of Defective Equipment:** All damaged or unapproved goods shall be returned at suppliers cost and risk and the incidental expenses incurred thereon shall be recovered from the supplier. Defective part in equipment, if found before installation and/or during warranty period, shall be replaced within 30 days on receipt of the intimation from this office at the cost and risk of supplier including all other charges. In case supplier fails to replace above item as per above terms & conditions, IMU may consider 'Banning' the supplier and any other remedies, as deemed fit by IMU-MPC.

#### **14. Comprehensive Onsite Warranty:**

- 14.1. A comprehensive onsite warranty for the supplied equipment shall be provided by the supplier for a minimum of **Three year (One year + Two years extended warranty)** from the date of final acceptance of the equipment by IMU. The supplier will be notified of any defect or claim arising under this warranty and the warranty support shall be provided at site of IMU Campuses.
- 14.2. If the supplier having been notified fails to remedy the defect immediately as per 15.2, IMU may proceed to take such remedial action as may be necessary at the supplier's expense. The period that the equipment is out of commission / operation as a result of supplier's failure to remedy the defects notified shall result in extension of the warranty period correspondingly and imposition of penalty (Rs.2,000/- (Rupees Two Thousand only) per instance which will be adjusted from the Security Deposit or any other dues to the supplier).

#### **15. Comprehensive Onsite Annual Maintenance Contract :**

- 15.1. Comprehensive maintenance for **Two years** is to commence immediately after the expiry of the comprehensive Three years warranty period for items mentioned in "Section - A" and to commence after successful repairs, service & shifting of items mentioned in "Section - B".
- 15.2. The supplier shall provide necessary comprehensive preventive and corrective maintenance on site i.e., by sending the engineer to the IMU Campuses for attending the maintenance requirements of the supplied equipment. In case of intimation of breakdown, the successful bidder should physically attend the site within two working days of reporting of breakdown. All spares which need replacement during the period of onsite maintenance are to be replaced without any additional cost. The conditions specified for warranty will be applied by during AMC period and vice-versa.



**TECHNICAL SPECIFICATION AND COMPLIANCE MATRIX**

**A. Fluid Mechanics Laboratory**

<b>Sl. No.</b>	<b>Name of the Equipment</b>	<b>Specifications</b>	<b>Compliance To Specification (YES/NO)</b>
1	Metacentric Height & Stability Apparatus.	❖ Water Tank: 650 x 450 x 350 mm approx.	
		❖ Floating Pontoon:	
		❖ Rectangular Floating pontoon: 370 x 210 x 80 mm approx. which is less than 3 Kg.	
		❖ Half Round Bottom Floating Pontoon: 370 x 210 x 80 mm approx. which is less than 3 Kg.	
		❖ Vee Chine Floating Pontoon: 370 x 210 x 80 mm approx. which is less than 3 Kg.	
		❖ One horizontal movable clamped weight for adjusting the heel which should be less than 200 g	
		❖ One vertical movable clamped weight for adjusting the centre of gravity which should be less than 600g	
		❖ Clinometer Scale: Min: $\pm 30^0$ , Max.: $\pm 40^0$	
		❖ Angular tilt of Pontoon: Nominally $8^0$ on each side of the vertical centre line.	
		❖ Height scale of the floating body: Min.: 100 mm, Max.: -150 mm	
	❖ To be supplied as one Unit.		
2	Pump Impeller Models.	❖ <b>Sectioned For Training Purpose "Open Impeller Centrifugal Pump Closed-Coupled Pump Model":</b> The section should clearly show: Bearing, Pump shaft, impeller open type, mechanical seals, supports, volute casing.	
		❖ <b>Sectioned For Training Purpose "Closed (Shrouded) Impeller Centrifugal Pump Model":</b> The section should clearly show: Bearing, Pump shaft, Impeller, Impeller Vanes, Packing Seals	
		❖ <b>Sectioned For Training Purpose "Self-Priming Double-Acting Positive Displacement Reciprocating Piston Pump Model":</b> The section should clearly show: Piston, Cylinder, Valve, Air Chamber, Bearing, Seals.	
		❖ <b>Sectioned For Training Purpose "Swash Plate Type-Piston Pump Model":</b> The section should clearly show: Pistons and relevant Valves, Seals and Swash Plate.	
		❖ <b>Sectioned For Training Purpose "Self-Priming, Positive Displacement, Rotary Type Vane Pump Model":</b> Section should show:- Rotor, Vanes, Bearing, Seals.	
		❖ <b>Sectioned For Training Purpose "Double-Acting Reciprocating Hand Pump Model":</b> The section should show: Cylinder, Suction Valves,	

		Delivery Valves, Rocker Arm, Control Level, Chamber, Pump Body.	
		<b>❖ Sectioned For Training Purpose "Jet (Ejector) Pump Model":</b> The section clearly shows: The section should clearly show the compressed air/steam path and chemical/water path separately.	
		<b>*Note:</b> <ul style="list-style-type: none"> <li>➤ Each impeller model assembly to be sectioned for education and training purpose only. Though each unit is sectioned, its components keep their movement functionality as if working. All parts painted in contrasting colours to outline the functions. Each piece of the equipment should be in accordance with suitable colour code.</li> <li>➤ Each model to be supplied complete with: base board, explanatory plate, plastic cover, without electric- motor, maintenance manual &amp; practical manual.</li> <li>➤ All the models of pumps are for the educational training purpose only.</li> </ul>	
3	Transparent hydraulic flow control directional valves. (3/4, 4/2, 5/2 etc)	<b>❖ 4/2 solenoid valve with mechanical interlocking</b> <ul style="list-style-type: none"> <li>• Bistable. Coil-operated on both sides.</li> <li>• Max. Pressure: 10 bar, low consumption coil (12w).</li> <li>• Connector for the valve coil required. The parts should be made up of a transparent methacrylate body with internal industrial metal parts.</li> </ul>	
		<b>❖ 4/3 solenoid valve with closed mid-position.</b> <ul style="list-style-type: none"> <li>• Coil-operated on both sides and spring centered.</li> <li>• Max. Pressure: 10 bar, low consumption coil (12w).</li> <li>• Connector for the valve coil required.</li> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metal parts</li> </ul>	
		<b>❖ 4/3 solenoid valve, A-B-T linked in mid-position</b> <ul style="list-style-type: none"> <li>• Bistable. Coil-operated on both sides.</li> <li>• Max. Pressure: 10 bar, low consumption coil (12w).</li> <li>• Connector for the valve coil required.</li> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metal parts.</li> </ul>	
		<b>❖ 4/3 solenoid valve, A-B-P linked in mid-position</b> <ul style="list-style-type: none"> <li>• Bistable. Coil-operated on both sides.</li> <li>• Max. Pressure: 10 bar, low consumption coil (12w).</li> <li>• Connector for the valve coil required.</li> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metal parts.</li> </ul>	
		<b>❖ 4/3 solenoid valve, A-B-P-T linked mid-position.</b>	

		<ul style="list-style-type: none"> <li>• Bistable, Coil-operated on both sides.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Max. Pressure: 10 bar, low consumption coil (12w).</li> </ul>	
		<ul style="list-style-type: none"> <li>• Connector for the valve coil required.</li> </ul>	
		<ul style="list-style-type: none"> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metal parts.</li> </ul>	
		❖ 4/2 solenoid valve, spring return.	
		<ul style="list-style-type: none"> <li>• Coil-operated and spring return.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Max. Pressure: 10 bar, low consumption coil (12w).</li> </ul>	
		<ul style="list-style-type: none"> <li>• Connector for the valve coil required.</li> </ul>	
		<ul style="list-style-type: none"> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metalparts.</li> </ul>	
		❖ 4/3 directional control valve. Manually operated.	
		<ul style="list-style-type: none"> <li>• P-A-B-T linked in mid-position.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Manual operation on both sides and spring centered.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Max. Pressure: 10 bar.</li> </ul>	
		<ul style="list-style-type: none"> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metalparts.</li> </ul>	
		❖ 4/3 directional control valve. Manually operated.	
		<ul style="list-style-type: none"> <li>• Relieving mid-position.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Manual operation on both sides and spring centered.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Max. Pressure: 10 bar.</li> </ul>	
		<ul style="list-style-type: none"> <li>• The parts should be made up of a transparent methacrylate body with internal industrial metal parts.</li> </ul>	
4	Hydraulic Trainer Unit	The components of the Hydraulic Trainer Unit are as follows:	
		❖ <b>Portable Trolley :(1 No.)</b>	
		The <u>Hydraulic Trainer Unit</u> shall be with Portable Trolley with rigid Frame. No. of wheels- 4, Two fixed & two swivel type. Load mounting capacity: 500 Kg.	
		❖ <b>Aluminum profile Plate/Mounting Board : (1 No.)</b>	
		All of the components should fit securely and safely onto the Profile Plate/ Mounting Board. Both side should have grooves and if required both sides can be used.	
		The grooves should be compatible with the ITEM profile system. Side caps included.	
		Grid dimensions: 50 mm.	
		Size: 1200 x 800 mm approx.	
		❖ <b>Hydraulic power Pack: (1 No.)</b> The power pack should be of the external gear pump type with a single pump. The motor with the hydraulic power pack should be AC, single phase, 230 V, 0.65 W power rating, frequency 50 Hz, actuation should be manual via ON/OFF switch, the delivery rate at nominal speed should be 2.2 lpm at 1320 min <sup>-1</sup> , operating pressure should be 6 MPa (60 bar), oil tank capacity should be minimum 5 liters, duty cycle	

	should be 50%, weight should be around 20 Kg (maximum).	
	<b>❖ Equipment Trays : (2 No.)</b>	
	The required no. of equipment trays to be supplied. The tray design should be such that the supplied components can be kept in the tray. Also the trays should have space for each individual component.	
	<b>❖ Pressure gauge : (2 No.)</b>	
	The pressure gauge should be protected by a glycerin filling against pressure peaks, condensed water and ingress of water during cleaning.	
	Measurement range: 0 – 10 MPa, (0 – 100 bar)	
	Accuracy : 1.6 % of full-scale value	
	Operating pressure, static: 3/4 of full-scale value	
	Operating pressure, dynamic: 2/3 of full-scale value	
	Actuation: Hydraulic	
	<b>❖ Double-acting cylinder : (2 No.)</b>	
	Double-acting cylinder should be with control cam and barbed fittings. The cylinder should be compatible with a matching potentiometer. This potentiometer should be capable of being mounted on the cylinder with the help of a mounting kit. The mounting kit should also be included in the scope of supply.	
	Piston diameter; 16 mm	
	Piston rod diameter: 10 mm, with M8 thread	
	Stroke: 200 mm	
	Operating pressure: 6 MPa, (60 bar)	
	Maximum Permissible pressure $P_{max}$ : 12 MPa - (120 bar)	
	<b>❖ Hydraulic motor : (1 No.)</b>	
	Geometric displacement: 8.2 cm <sup>3</sup>	
	Max. permissible pressure in the return line: 5 MPa, (50 bar) Max. Rotary speed $N_{max.}$ : 1950 min <sup>-1</sup>	
	Output shaft spring : Ø 16 x 28, A5 x 5 DIN- 6885	
	Max. Permissible pressure $P_{max}$ : 12 MPa (120 bar)	
	<b>❖ 4/2- way hand lever valve : (1 No.)</b>	
	Operating pressure P: 6 MPa, (60 bar)	
	Maximum Permissible Pressure $P_{max}$ : 12 MPa (120 bar)	
	Actuation: Manual	
	<b>❖ 4/3-way hand lever valve with relieving mid-position : (1 No.)</b>	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar). Actuation: Manual	
	<b>❖ 4/3-way hand lever valve with closed mid-position : (1 No.)</b>	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar). Actuation: Manual	
	<b>❖ 4/3-way hand lever valve with re-circulating mid-positioning : (1 No.)</b>	
	Operating Pressure P: 6 MPa, (60 bar)	

	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar). Actuation: Manual	
	<b>❖ Pressure sequence valve, pressure relief valve: (1No.)</b>	
	The valve should be capable of being used as a pressure relief valve if port T is connected to the tank and as a pressure sequence valve if port T is connected to another power component, such as a cylinder.	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar)	
	Adjustment: Manual, Actuation: Hydraulic	
	<b>❖ 3- way pressure reducing valve: (1 No.)</b>	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar)	
	Adjustment: Manual, Actuation: Hydraulic	
	<b>❖ 2-way flow control valve : (1 No.)</b>	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar) Adjustment: Manual, Actuation: Hydraulic	
	<b>❖ One-way flow control valve: (1 No.)</b>	
	Nominal flow rate : 9 l/min	
	Opening Pressure: 70 KPa, (0.7 bar)	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar), Actuation: Manual	
	<b>❖ Non return valves: (2 No.)</b>	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa - (120 bar), Actuation: Manual	
	Opening pressure of one valve: 0.1 MPa , (1 bar)	
	Opening pressure of other valve: 0.5 MPa , (5 bar)	
	<b>❖ Shut-off valve: (1 No.)</b>	
	Shut-off valve should be with two ports. The valve should be capable of being inserted at any point to enable shutoff of the flow. Operating Pressure P: 6 MPa,(60 bar)	
	Maximum permissible pressure $P_{max}$ : 12 MPa (120 bar)	
	Actuation: Manual	
	<b>❖ 2/2 way plunger/stem actuated valve: (1 No.)</b>	
	2/2 way plunger/stem actuated valve should be capable of being operated on the hydraulic cylinder being supplied with the kit. The assembly set should also be included in the scope of supply.	
	Operating Pressure P: 6 MPa, (60 bar)	
	Maximum permissible pressure $P_{max}$ :12 MPa - (120 bar)	
	Actuation: Manual	
	<b>❖ Diaphragm accumulator with shut-off block:</b>	
	The filling and testing devise (to be included in the scope of supply and quoted separately) should be compatible with the diaphragm accumulator. This devise should be able to measure the gas filling pressure of the	

		accumulator. The pressure relief valve being supplied along with the kit should be able to protect the accumulator from overpressure.	
		Gas: Nitrogen	
		Gas filling pressure as supplied, $P_0$ : 1 MPa, (10 bar)	
		Maximum permissible pressure $P_{max}$ ; 12 MPa (120 bar)	
		Nominal volume: 0.32 dm <sup>3</sup>	
		Adjustment: Manual, Actuation: Hydraulic	
		❖ <b>Flow dividing Valve: (1 No.)</b>	
		❖ <b>5 way distributor with pressure gauge : (1 No.)</b>	
		❖ <b>Weights:- (1 No.)</b>	
		The weights should be for loading of the cylinder and should simulate a driving or tractive load. The weight should be capable of being used vertically with a double-acting cylinder. A cover for safety should be included in the scope of supply. All the necessary accessories for using the weight with the cylinder should be supplied.	
		Mass: 9 Kg (approx.)	
		Dimensions, L x W x H : 150 x 100 x 80 mm approx.	
		❖ <b>Optional : (1No.)</b>	
		In addition to the hoses with quick couplings being supplied with the component, additional set of 10 hoses with quick coupling should be supplied as spare.	
		❖ Hydraulic Trainer to be supplied as a single Unit.	
5	Michell Tilting Pad Thrust Bearing Apparatus	❖ Anodized aluminum frame and panels made of painted mild steel.	
		❖ The unit should include wheels to facilitate its mobility.	
		❖ Tilting pad: Trapezoidal shape, Convergent Type-Rectangular, Convergent Divergent Type –rectangular of different materials with highly polished surface pressure tappings.	
		❖ Belt: Endless belt of appropriate width running over wide pulleys, immersed in oil bath.	
		❖ Motor: Variable speed motor, 0.5 HP, 1500 RPM.	
		❖ Manometer: 15 Tube manometer arrangements for measurement of pressure variation.	
		❖ Oil Tank: 0.5 x 0.2 x 0.2 m approx. For SAE-40 oil for carrying the test (approx. 3 Liters.)	
		❖ Electricity supply: 230 V AC, Single Phase, 0.5 KW.	
		❖ Floor space; 1 m x 1.5 m (approx.)	
		❖ The whole set-up is ingeniously designed and schematically arranged on a powder coated rigid structure.	
		❖ Michell Tilting Pad Thrust Bearing Apparatus to be supplied as one single Unit.	
6	Journal Bearing Apparatus	❖ Anodized aluminum frame and panels made of painted steel.	
		❖ The unit should include wheels to facilitate its mobility.	
		❖ Main metallic elements made of stainless steel.	
		❖ Journal bearing:	

	<ul style="list-style-type: none"> <li>• The sliding bearing should consist of a journal bearing driven by an electrical motor and a freely moving bearing housing. It should include 16 pressure tapplings to measure the radial and the axial distribution of pressure of the oil in the sliding bearing.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Bearing housing, either opaque or completely transparent and movable on rotating bearing journal.</li> </ul>	
	❖ Nominal bearing diameter: 52 mm approx.	
	❖ Bearing gap: 4 mm approx.	
	❖ Bearing width or length: 90 mm approx.	
	❖ Bearing load range: 6 – 18 N approx.	
	❖ Display of 12 radial and 4 axial pressure distribution of the oil film in the sliding bearing with 16 plastic tube manometers each of approx. 1800 mm length, display panel, detachable for transport.	
	❖ A tank for oil, volume: 3.5 l approx.	
	❖ Set of weights: up to 10 N.	
	❖ Oil viscosity class ISO VG 100 or SAE 30	
	❖ Speed smoothly adjustable, electronically controlled, digital display.	
	❖ Electrical connections:	
	<ul style="list-style-type: none"> <li>• Electrical supply: single-phase, 230 V , 50 Hz.</li> </ul>	
	❖ Motor:	
	<ul style="list-style-type: none"> <li>• Power output: 0.37 KW approx.</li> <li>• Max. speed: 3000 rpm approx.</li> <li>• Electronic console, including: <ul style="list-style-type: none"> <li>➤ Metallic box.</li> <li>➤ Motor connector.</li> </ul> </li> <li>• Motor speed controller. Digital display for motor speed.</li> </ul>	
	❖ Cables and accessories, for normal operation.	
	❖ Overall dimensions and weight of the apparatus:	
	<ul style="list-style-type: none"> <li>▪ L x W x H: 1200 x 800 x 2700 mm approx.</li> <li>▪ Weight: 70 kg. approx.</li> </ul>	
	❖ Manuals: This unit should be supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance and Practical Manuals.	
	❖ Journal Bearing Apparatus to be supplied as a single Unit.	

## **B. Electrical and Electronics Laboratory**

Sl. No.	Name of the Equipment	Qty	Specifications	Compliance to Specification YES/NO
1	Digital Oscilloscope	01 No.	Brand New	
			Bandwidth: 100 MHz	
			No. of Channels : 2	
			Sampling Rate : 1 Gsa/Sec	
			Vertical Resolution : 8 bits	
			Memory Depth :2 Mpts	
			Acquisition Mode: Normal/Average/Peak detect	
			Max Input Voltage : 400 V	
			Input Impedance: 1 MΩ	
			Accessories: 2 probes, Power cord	
			User Manual	
			Minimum 3years warranty Additional 2 years of AMC	
2	Digital Multimeter	03 Nos.	Brand New	
			DC voltage :upto 600V	
			AC voltage :upto 600V	
			DC current: upto 10A	
			AC current: upto 10A	
			Resistance :upto 10MΩ	
			Resolution : 3 ½ digits (2000 steps)	
			DC V Accuracy : +/-0.5%	
			Range selection: Multi range	
			Diode test, continuity test features	
			Data hold, Auto Power Off	
			Accessories :Probes	
User manual				
Minimum 3 years warranty				
3	8085 Microprocess or trainer kit	04 Nos.	Brand New	
			ROM: 8K	
			RAM: 8K	
			Peripherals :8255 port, 8253 timer	
			Onboard DAC, ADC	
			Battery backup for RAM,	
			20x2 LCD display	
			Accessories : Power cord	
			User manual	
			Minimum 3 years Warranty	
			Additional 2 years AMC	



4	8051 Microcontroller kit	04 Nos.	Brand New	
			Built-in power supply	
			Programmer support	
			PC interface	
			On board key pad	
			LCD display	
			Accessories : Power cord, interconnection cables	
			User manual	
			Minimum 3 years Warranty	
			Additional 2 years AMC	
5	Oil Mist Detector	01 No.	Brand New	
			Marine type instrument suitable for Diesel engines	
			For training purpose	
			Should be a current model commonly used in ships from reputed manufacturers - Schaller VN115/87, Graviner Mark 6 , Daihatsu MD-9M or equivalent	
			Using latest technology	
			Should be complete with 1 Sensor unit to demonstrate the working by simulating oil mist externally	
			Should include User manuals, cables/tubings	
			Minimum 3 years warranty	
			Additional 2 years AMC	
Should include Installation in the lab				
6	Air Circuit Breaker Trainer with Power Supply & Controls	01 No.	Brand New	
			Marine type ACB Trainer	
			ACB to EDO, with electronic trip protection, UV, remote ON/OFF facilities	
			Standalone panel with necessary metering & signal generation for creating alarms and trips	
			Metering and indications are required by Marine Class to be provided	
			Marine type approved components to be used	
			Interface for monitoring parameters / status on remote PC to be provided	
			Should include User manuals, cables/tubings	
			Minimum 3 years warranty	
			Additional 2 years AMC	
Should include Installation in the lab				
7	Function Generator (Digital)	01 No.	Brand New	
			Bandwidth upto 3 MHz	
			Sine, square and triangular waveforms	
			20 V peak to peak	
			Should include User manuals, cables	
			Minimum 3 years warranty	
Additional 2 years AMC				

**FORM OF TENDER**

**NOTE:** This Memorandum forms part of the Tender and this should be duly filled in, signed & sealed and enclosed along with the Tender.

To  
THE DIRECTOR,  
INDIAN MARITIME UNIVERSITY  
MUMBAI PORT CAMPUS  
HAY BUNDER ROAD  
MUMBAI – 400 033.

Sir,

Being duly authorized to represent and act on behalf of ..... hereinafter called "the tenderer" and having visited the sites and examined Terms and Conditions of Contract, Instructions to the Tenderers, Schedules and Bill of Quantities for the Menu of Tender for **"SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS LABORATORY"**; and

1. I / We offer to execute the work in conformity with the terms and Conditions of this tender/contract.
2. I / We undertake that, if our Tender is accepted, to do the work for the periods specified in this Schedule.
3. If my / our tender is accepted we will furnish a Security Deposit within 07 days of receipt of work order through a Demand Draft or Bankers Cheque from Nationalized Bank or a Scheduled Bank in India approved by Government of India for a sum equivalent to 3% of the value of contract of any Nationalized Bank or Scheduled Bank in India as Security deposit for the due performance of the Contract.
4. I / We agree to abide by this Tender for a period of 120 days from the date fixed for receiving the same or such further period as may be mutually agreed upon and it shall remain binding upon us and may be accepted at any time before the expiration of that period should we fail to abide by our Tenders during the above said period of 120 days or such extended period as mutually agreed upon, the IMU shall be at liberty to forfeit the Earnest Money deposited by us.
5. Unless and until a formal agreement is prepared and executed, this Tender together with your written acceptance thereof, shall constitute a binding Contract between us.
6. (i) We understand that the IMU reserves the right to,
  - a. Amend the scope of tender and value of contract under this work at any time
  - b. reject or accept any tender including the lowest, cancel the tender process and reject all tender without assigning any reason.
 (ii) We agree that the IMU will not be liable for any such action and will be under no obligation to inform the tenderer of the grounds for such action as rejection, modification, delays, cancellation etc.
7. If our Tender is accepted as a whole or as individual components, we understand that we are held fully responsible for the due performance of the Contract.
8. We agree to execute the works referred to in the Tender Documents upon the Terms and Conditions contained or referred to therein and to carry out such deviations as may be ordered.

SIGNATURE..... FOR AND ON BEHALF OF.....  
DATE .....

**Witnesses:**

- |                   |                   |
|-------------------|-------------------|
| 1. Signature..... | 2. Signature..... |
| Name.....         | Name.....         |
| Address.....      | Address.....      |

**INDIAN MARITIME UNIVERSITY**

**TENDER FOR PROVIDING "SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID MECHANICS LABORATORY and ELECTRICAL & ELECTRONICS LABORATORY" AT IMU MUMBAI PORT CAMPUS**

**Covering Letter to Accompany Technical Bid**

[On the Letter head of the Bidder and to be put in a separate sealed cover along with DD for EMD of Rs...../-]

**FROM**

**Name & Address of the Bidder**

**TO**

THE DIRECTOR,  
Indian Maritime University,  
Mumbai Port Campus  
Hay Bunder Road,  
Mumbai – 400033.

Sir,

1. Being duly authorized to represent and act on behalf of ..... hereinafter called "The tenderer" and having reviewed and fully understood all the qualifying information provided, the undersigned hereby applies to be qualified under Cover – I for the **Tender for providing "SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS LABORATORY"** AT IMU MUMBAI PORT CAMPUS.
2. Attached to this letter are copies of original documents defining
  - i) The tenderer's legal status
  - ii) The Principal place of business and
  - iii) The place of incorporation or the place of Registration
3. (i) This tender (Under Cover-I and Cover II) is made in the full understanding that contents of Cover-I will be subject to verification of all information submitted therein along with the tender and authorize IMU or its authorized representative to verify the statements, documents and information submitted and to clarify the financial and technical aspects of this application.  
(ii) We understand that the Employer reserves the right to,
  - Amend the scope of tender and value of contract under this work any time
  - reject or accept any tender including the lowest, cancel the tender process and reject all tender without assigning any reason.(iii) We agree that the Employer will not be liable for any such action and will be under no obligation to inform the tenderer of the grounds for such action.
- 4) We certify that all the particulars furnished in our Bid are true and correct and based on documentary evidence. We understand that if any of the particulars is found to be false or misleading, IMU has the right to summarily reject our bid at any stage and that our company is liable to be blacklisted/debarred by IMU for at least 3 years.
- 5) In the event of our being awarded the work, we undertake to remit the Security Deposit and execute the Contract with IMU within 07 (Seven) days from the date of issue of the Purchase Order failing which the Work Order may be cancelled.
- 6) Our Price Bid is exclusive of GST and the price quoted shall be firm till the execution of the contract and for the extended period if any.

DATE:

TENDERER'S SIGNATURE WITH STAMP

**INDIAN MARITIME UNIVERSITY**

**TENDER FOR PROVIDING "SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR  
FLUID MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS  
LABORATORY" AT IMU MUMBAI PORT CAMPUS**

**FORMAT OF BID SECURITY DECLARATION**

I/We-----

----- hereby states and understand that, if I/We -----

-----  
withdraw/modify our tender during the period of validity of the tender, The Indian  
Maritime University, Mumbai Port Campus would suspend the bidder from participation in  
any future tenders of Indian Maritime University for a period of Six (06) months.

Signature \_\_\_\_\_

Name \_\_\_\_\_

Capacity in which signed \_\_\_\_\_

Date

Place

Seal of the firm to be affixed.

**MANDATE FORM**

**(Account/s Information form)**

**REAL TIME GROSS SETTLEMENT (RTGS)/ NATIONAL ELECTRONIC TRANSFER (NEFT) / INTRA BANK ACCOUNT TRANSFER FACILITY FOR RECEIVING PAYMENTS FROM IMU.**

**A. DETAILS OF ACCOUNT HOLDER:**

NAME OF ACCOUNT HOLDERER / FIRM

COMPLETE CONTACT ADDRESS

MOBILE NUMBER / PH NO

E.MAIL:

PAN :

**B, BANK ACCOUNT DETAILS:**

**ACCOUNT NAME** (Name appearing in your Cheque Book)

BRANCH NAME WITH COMPLETE ADDRESS,

TELEPHONE NO

BRANCH CODE

**Note: Please attach a Cancelled Cheque along with the account information form.**

**COMPLETE BANK ACCOUNT NUMBER** (Please note that the Bank Account must be in the name of the Firm as appeared in the bill. In case of other Beneficiaries (Non-vendor) the Account name must be in the name of Applicant)

IFSC CODE

TYPE OF ACCOUNT (SB/CURRENT/CASH CREDIT)

MICR CODE OF BANK

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information I would not hold the IMU responsible.

( ..... )

Signature of Beneficiary

Date:

**Mandatory for Vendors/suppliers/Contractors etc., Payment:**

Certified that the particulars furnished above are correct as per our records.

(Bank's Stamp with Date & Place)

( ..... )

Signature of Bank Manager



**INDIAN MARITIME UNIVERSITY  
MUMBAI PORT CAMPUS**

**TENDER FOR "SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID  
MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS LABORATORY"  
at IMU Mumbai Port campus, Hay Bunder Road**

**TENDER NO – IMU-MPC/PUR/2021-22/FM and EE/21**

**VOLUME - II**

**FINANCIAL BID**

[Bidders are advised to study the Tender Document (including all Sections, Schedules and Annexure etc.,) carefully. Submission of Tender shall deem to have been done after careful study and examination of the Tender Document with full understanding of its implications.]

All bidders are requested to visit IMU Mumbai Campus website : [www.imumumbaiport.ac.in](http://www.imumumbaiport.ac.in) & [www.imu.edu.in](http://www.imu.edu.in) for regular updates.

**PRICE BID**

**SUPPLY, INSTALLATION & AMC OF EQUIPMENT FOR FLUID MECHANICS LABORATORY AND ELECTRICAL & ELECTRONICS LABORATORY at IMU-MUMBAI PORT CAMPUS.**

[On the Letter head of the Bidder and to be put in sealed cover]

**A. FLUID MECHANICS LABORATORY EQUIPMENT**

(Amount in Rs.)

Sl. No.	Name of the Equipment	Make & Model	Qty.	Unit Price of the equipment	Two years extendable warranty	AMC Charges for 1 <sup>st</sup> year after extendable Warrantee	AMC Charges for 2 <sup>nd</sup> year after extendable Warrantee	Total
		1	2	3	4	5	6	7 = (2*3)
1	Metacentric Height & Stability Apparatus.		01					
2	Pump Impeller Models.		01					
3	Transparent hydraulic flow control directional valves. (3/4, 4/2, 5/2 etc)		01					
4	<u>Hydraulic Trainer Unit:</u>							
	4.1 for Standard hydraulic components		01					
	4.2 for Transparent Hydraulic Trainer Unit using all functional transparent hydraulic components		01					
5	Michell Tilting Pad Thrust Bearing Apparatus		01					
6	Journal Bearing Apparatus		01					
	<b>Total:</b>							
		(Total in _____WORD)						
		<b>The rates quoted above should be only the unit price (i.e. inclusive of basic price, transportation and any other charges) and exclusive of GST and any cess on GST.</b>						

## B. ELECTRICAL AND ELECTRONICS LABORATORY

(Amount in Rs.)

Sl. No.	Name of the Equipment	Make & Model	Qty. in Nos.	Unit Price of the equipment	Two years extendable warranty	AMC Charges for 1 <sup>st</sup> year after extendable Warrantee	AMC Charges for 2 <sup>nd</sup> year after extendable Warrantee	Total
		1	2	3	4	5	6	7 = (2*3)
1	Digital Oscilloscope		01					
2	Digital Multimeter		03					
3	8085 Microprocessor trainer kit		04					
4	8051 Microcontroller kit		04					
5	Oil Mist Detector		01					
6	Air Circuit Breaker Trainer with Power Supply & Controls		01					
7	Function Generator (Digital)		01					
	<b>Total:</b>							
		(Total in _____ <b>WORD</b> )						
		<b>The rates quoted above should be only the unit price (i.e. inclusive of basic price, transportation and any other charges) and exclusive of GST and any cess on GST.</b>						

1.1.1. The bidder may place their bids for any or all lab equipment.

1.1.2. The Bidder who are placing their bids for only one lab equipment should write NOT APPLICABLE in the bid for the other equipment.

1.1.3. The price bid will be reviewed for each equipment separately or both cumulatively for all items at the discretion of IMU-MPC i.e. IMU-MPC may declare L1 for each equipment separately or cumulative.

1.1.4. The L1 for each item will be calculated as per formula [Rates quoted for items including extendable warranty + Average of two years AMC rates quoted]

**Date:**

**Place:**

**Stamp & Signature of Bidder**