भारतीय समुद्रीय विश्वविद्यालय
Indian Maritime University
(केन्द्रीय विश्वविद्यालय, भारत सरकार / A Central University, Govt. of India)
कोलकता परिसर / Kolkata Campus

ISO 9001:2015 Certified by IRQS
NABCB QM 006

IMU-KC/Control Engineering Lab/22-23 25 October 2022

Sub: Bid for Supply and Installation of Experimental Setups for Control Engineering Laboratory of IMU – Kolkata Campus

Tender Abstract:

Tender No. & Date	IMU-KC/Control Engineering Lab/22-23 dated 25.10.2022
Tender Title	Tender towards Supply and Installation of Experimental Setups for the Control Engineering Laboratory of IMU-KC
Tender documents can be downloaded from IMU-KC website www.merical.ac.in ; www.imu.edu.in	On 25.10.2022 at 1600 hrs.
Cost of Tender Form	Nil
Pre-Bid Meeting (Optional)	On 09.11.2022 at 1500 hrs.
Last date and time of submission	On 15.11.2022 at 1500 hrs.
Date and Time for Opening of the Technical Bids	On 15.11.2022 at 1530 hrs.
Address for Communication	The Deputy Registrar Indian Maritime University – Kolkata Campus P-19, Taratala Road Kolkata – 700 088

Sealed quotations are invited under Two Bid System (Technical Bid & Financial Bid) towards supply and installation of the following experimental setups for the Control Engineering Laboratory of Indian Maritime University – Kolkata Campus, located at P-19, Taratala Road, Kolkata – 700 088 with the following technical specifications:

Sl. No.	Experimental Setups	Technical Specifications	Required Quantity (in nos.)
01.	Hydraulic Set up for measurement of flow, Pressure and Temperature with ON/OFF controller. Using different transducers (at-least 2 nos.)	The setup consists of 1ph Induction motor1HP with pump, Tank100ltr, pressure Gauge and switch, orifice meter, Rota meter, flow meter, flow control valve, U tube manometer, inverted tube manometer, and temperature sensor (Thermostat) with Temperature control with ON/OFF controller	01 no.

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02.	Pressure transducers (Module / trainer) (Operational of Pressure transducers)	Pressure Vessel: shape-cylindrical, material-CRCC, diameter- 4 inch, length-12 inch, capacity-10kg/cm^2, with 1/2" BSPconnection. A.F.R. / F.R.L.: 0-10kg/cm^2, with pressure gauge. Bellows gauge / diaphragm gauge: 0-300mm Hg / 0-2.5kg/cm^2 / 0-4kg/cm^2. Bourdon tube pressure gauge: Dial size-6", Range- 0-4kg/cm^2 Bottom connection- ½" BSP connection. Air Compressor: Tank Capacity: 25 liters,Discharge 2CFM, Motor- 2H. P 230-volt Ac Operated. Working Pressure: 5-6 kg/cm^2.	02 nos.
03.	Temperature transducers Module/Trainer	Transducer (4nos): NTC Thermistor, Platinum RTD, Type K Thermocouple, ICTemperature Sensor. Heating Element: Wire-Wound Resistance. Signal Conditioning Circuitry: Instrumentation Amplifier, X 100 Amplifier, DC Amplifier, Comparator, Electronic Switch. Inout Circuits: Rotary and Slide Potentiometers. Output Circuits: Relay, Buzzer. Interconnections: 4mm Banana Sockets.Power Supply: 230 V (+/-)10% 50 Hz Accessories: Manual set of Patch Cords.	02 nos.
04.	Functioning of Mist Detector	• Range (measurement & indication) 0 - 30 ppm, Trend up to50ppm • Range (IMO specification) 0 - 15 ppm (according MO regulations) Accuracy better than IMO MEPC.107(49) • Electrical power supply 24V - 240V, AC or DC, automatic selection Electricalpower consumption. < 10 VA • Sample Oily water from the separator outlet, 0,1 - 4 l/min Sample temperature range. +1°C to +65°C Sample connections R 1/4" Female • Alarm 1 & 2 Set Points 1 - 15ppm (independently adjustable)Alarm 1 operating delay for annunciation 1 - 540 sec Alarm 2 operating de- lay for control 1 - 10 sec Alarm con- tacts2 independently adjustable contacts Alarm contact operation mode De-energized in Alarm State Alarm ratings 3A, 240V each Alarm output 0 - 20 mA or 4 - 20 mA, for 30 ppm reversible, extolled	01 no.
05.	Operation of an Automatic flow, pressure/level and	• PID Controller with closed loop controlfacility • Input supply:230V/ 50 Hz AC mains • Sensor Input: 0-24V from Controller	01 no.

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	temperature Controller	• PID Control output: 0-10V DC • Orifice assembly • Differential Pressure Transmitter (Honeywell) • Glove Valve • Electric Linear Valve Actuator (Hoenywell) • Motor Pump-230V AC, 1/2HP 220V,operated for water circulation in line. • 3 pin electric socket is provided on unitwith motor ON/OFF switch • Two Tanks	
06.	Linear valve, Quick openingvalve, Equal percentagevalve, Plot of characteristics of all valves	Control Valve: 3 nos, Characteristics - Linear, Equal (%) & quick opening, Type –pneumatic, size – 1/2", Actuator – 15squre inch, Stroke – 14mm, input – 3- 15 PSIG. Water Tank: Material – Stainless Steel, capacity 25 liters. Water Circulation: FHP pimp champion/ standard make. Overhead Tank: Material – Stainless Steel capacity: 10liters. Flow Measurement: Rotameter. Pressure Head Measurement: By Single Column Manometer. Pressure Regulator: 0-2kg/cm^2. Pressure Gauge: Bourdon Type, 0-2kg/cm^2. Piping: Size ½ “. An English instruction manual consisting of experimental procedures block diagram etc. will be provided along with the apparatus. The whole setup is well designed and arranged on a rigid structure painted with industrial PU point.	01 no.
07.	Flapper Nozzle Characteristic trainer	A.P.R. / A.F.R. Unit: 0-10kg/cm^2 withpressure gauge. Micrometer: Display Electro Mechanical for Displacement. Pressure Gauge: 0-2kg/cm^2. Air Compressor: Tank Capacity - 25 liters, Discharge - 2CFM Motor - 2HP 230 V AC Operated, Working Pressure - 5-6kg/cm^2.	03 nos.
08.	I/P converter Trainer and P/I converter	I/P Converter: Input - 4-20mA Output –3-15 PSI. P/I Converter: Input - 3-15 PSI Output -4-20mA. Air Pressure Regulator: Range - 0- 4.1kg/cm^2, with pressure gauge. Digital Current Indicator: Supply - 1ϕ 230V AC Range – 0-20mA. Current Source: Supply - 1ϕ 230V ACRange - 0-20mA. Pressure Vessel: Capacity – 2.1kg/cm^2. Pressure Gauge : Range - 2.1kg/cm^2.	01 no.
09.	Valve positioner training unit with	• Direct Acting/Reverse acting/ATO/ATC type diaphragm actuator	01 no.

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	ATO/ATC type diaphragm actuator	• Valve Positioner • AFR • Compressor unit • Pressure gauges • Mechanical linkage • **Spare:** Control Valve Positioner Cutaway	
10.	LVDT Trainer Kit	DC Linear variable differential transformers, converts changes in physical position into an DC electrical output, complete set up	03 nos.
11.	Strain Gauge Trainer kit (Bonded Type)	• kit Strain in terms of Kilograms on a cantilever beam • Measurement System: Physical by Weights and Transducer with electronic instrumentation • Transducer: Temperature compensated strain gauges mounted on a stainless steel cantilever beam • Type: Cu-Ni foil with polyamide carrierbase • Gauge Resistance: 350 Ohms (Nominal) • Gauge Length: 6 mm • Gauge Width: 2.4 mm, Gauge Base: 12.5 mm x 4.3 mm, Gauge Factor: 2:1(approx.) • Configuration: Bridge with two arms as strain gauges	03 nos.
12.	Thermocouple based Temperature measurement	Thermocouple and RTD based Temperature measurement with ON/OFF controller of a system	03 nos.
13.	PID trainer kit	Closed loop temp control of an Oven with RTD sensor and PID Kit for measurement of P,I, PI & PID through oscilloscope.	02 nos.
14.	Microprocessor / Microcontroller based DC motor control	DC motor 1/4HP, 220V, 1500rpm with mechanical loading arrangement, facility for measurement of SCR triggering in oscilloscope, zero crossing detector etc.	02 nos.
15.	Fuzzy logic trainer	• DC Power Supply • Display Meters • PC Labview Software Based • Fuzzy Logic Controller: - A. • Fuzzy Software Controller, • Process Monitoring Mode, FuzzificationMode, Defuzzifier • B. Computer Interface Adaptor	01 no.
16.	Synchros (Trainer Kit)	• Synchro transmitter	02 nos.

Total Estimated Amount: 16,70,000.00 (Rupees Sixteen Lakh Seventy Thousand Only) plus applicable GST.

EMD: Prospective firms should submit EMD amounting to Rs. 40,000.00 (Rupees Forty Thousand Only) favouring "Indian Maritime University – Kolkata Campus" payable at Kolkata in the form of Demand Draft drawn on any Nationalised / Scheduled Bank. EMD may be exempted upon submission of the valid MSME / NSIC Registration Certificate only.

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1. The quotations/bids duly sealed, signed & completed in all respects should be deposited in the Tender Box kept at the office of the Deputy Registrar (Room No. 130) or can be sent by post. The incomplete quotations/bids will be treated as rejected. The quotations received after stipulated time & date will not be considered & rejected and no correspondence in this regard will be entertained.

2. Tenderers/Bidders are requested to visit the website www.merical.ac.in ; www.imu.edu.in regularly. Any changes/modifications in tender enquiry will be intimated by corrigendum through this website only.

   In case, any holiday is declared by the Government on the day of opening, the tenders will be opened on the next working day at the same time.

3. The firms are required to submit the following documents duly signed and sealed:

- **Technical Bid (Cover – I)**

i. EMD as stated above
ii. Copy of Firm's registration, PAN Card, GST No.
iii. Copy of Income Tax Statement for the last three financial years i.e. 2019-20, 2020-21 & 2021-22.
iv. Copy of all authentic documents regarding firm's turnover etc. during last three Financial Years 2019-20, 2020-21 & 2021-22.
v. Copies of Work Order towards the proof of similar supply during the last three Financial Years since 2019-20.
vi. Copy of an undertaking stating that if the information/declaration/documents furnished in respect of eligibility criteria are found to be wrong or misleading at any stage, the firm will be liable to punitive action.
vii. Undertaking on the letterhead that the firm is not blacklisted in any Govt. department.
viii. Undertaking on the letterhead towards acceptance of the terms and conditions of the tender documents.
ix. Undertaking towards Warranty and AMC as per Sl. No. 7 of the Terms & Conditions.

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- **Price Bid (Cover – II)**

  Price Bid should be submitted on the letterhead of the prospective firms in the following format:

Sl. No.	Name of the Item	Quantity (in nos.)	Rate per unit (in Rs.)	Applicable taxes per unit	HSN Code	Total rate per unit (including taxes)	Total Amount (Rs.)
A	B	C	D	E	F	G=D+E	H=C+G
1.	Hydraulic Set up for measurement of flow Pressure and Temperature	01 no.					
2.	Pressure Transducers Module Trainer	02 nos.					
3.	Temperature Transducers	02 nos.					
4.	Functioning of Mist Detector	01 no.					
5.	Operation of an Automatic Flow Pressure Level and Temperature Controller	01 no.					
6.	Linear valve Quick opening valve Equal percentage valve Plot of characteristics of all valves	01 no.					
7.	Flapper Nozzle Characteristic Trainer	03 nos.					
8.	I P Converter Trainer and P I Converter	01 no.					
9.	Valve positioner training unit with ATO ATC type diaphragm actuator	01 no.					
10.	LVDT Trainer	03 nos.					
11.	Strain Gauge Trainer kit	03 nos.					
12.	Thermocouple based Temperature Measurement	03 nos.					
13.	PID Trainer Kit	02 nos.					
14.	Microprocessor Microcontroller based DC Motor Control	02 nos.					
15.	Fuzzy Logic Trainer	01 no.					
16.	Synchros Trainer Kit	02 nos.					

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