Model Engineering College, Thrikkakara, Kochi 21

TENDER SCHEDULE

Tender No. 11/2022-23/MEC

No. A2/2184/2022/MEC **30.11.2022**

Tenders are invited for the supply of Equipments for Thermal Engineering Lab II

Last date for receipt of tender will be 16.12.2022 11am . Late tenders will not be accepted. The tenders will be opened at 1 PM on 23.12.2022 in the presence of the tenderers or their authorized representatives who may be present at that time.

Intending tenderers may, on application to the Principal , Model Engineering College, Thrikkakara obtain the requisite tender forms on which tenders should be submitted. Application for the tender form should be accompanied by a cash remittance of ₹600 **+ 18% GST** which is the price fixed for a form/set of forms and which is not refundable under any circumstances. The tender forms are not transferable. Sale of tender forms will be closed at **3pm** on 15.12.2022 . Cheques, postage stamps etc., will not be accepted towards the cost of forms, nor will the forms be sent per V.P.P. Duplicate tender forms, if required will be issued at ₹300 **+ 18% GST and** per copy.

Every tenderer should send along with his tender, an **earnest money of 1 %** of the total cost of the articles tendered (rounded to the nearest rupee) subject to a minimum of ₹ 1500, if the amount calculated at one per cent of the value of the articles tendered for falls below ₹ 1500. If the Government has exempted any firm from furnishing the EMD, they should produce relevant document along with the tender

The successful tenderer shall, deposit a sum equivalent to **5 %** of the value of the quoted value as **security deposit**, less the amount of money deposited by him along with his tender

Place:Thrikkakara

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Appendix A

Equipments for Thermal Engineering Lab II

S. No.	Name of the Equipment
1.	**Parallel and Counter Flow Heat Exchanger Apparatus** (1 Nos) The apparatus should consist of a concentric tube heat exchanger. The hot fluid namely hot water is to be obtained from the Geyser (heater capacity 3 kW) & it flows through the inner tube. The cold fluid i.e., cold water can be admitted at any one of the ends enabling the heat exchanger to run as a parallel flow or as a counter flow exchanger. Measuring jar to be provided for measure flow rate of cold and hot water. This can be adjusted by operating the different valves provided. Temperature of the fluid can be measured using thermocouples with digital display indicator. The outer tube is provided with insulation to minimize the heat loss to the surroundings. **SPECIFICATIONS:** Specimen material: Copper tube Size of the specimen: ⌀ 12.5mm x 1500 mm long Outer Shell material: G.I Size of the Outer Shel: ⌀25 mm Geyser capacity: 1 ltr, 3 kW
2.	**Shell and Tube Heat Exchanger Apparatus** (1 Nos) The apparatus should consist of fabricated SS shell, inside which SS tubes are fitted. Hot water passes to one end through the tubes and exit to another end. The cold water is admitted at the one end of shell, which passes over the hot-water tubes. The tubes are arranged in the shell so that the flow of cold and hot fluid crosses each other to make it cross flow. Valves are provided to control the flow rates of hot and cold water. Flow rates of hot and cold water are measured using Rotameter. A pump is used to circulate the cold water from a re-cycled type water tank. A 3 KW water heater is to be fitted for hot water. A digital temperature indicator is used to measure the temperature at different points. **SPECIFICATIONS:** Shell Material: Stainless steel shell Tube Material: Stainless Steel, Size of the specimen: ⌀ 12.5mm x 500 mm long Size of the Outer Shell: ⌀150 mm Geyser capacity: 3 ltr, 3 kW
3.	**Heat Transfer in Natural Convection** Apparatus (1 Nos) The apparatus should consist of a stainless-steel tube fitted in a rectangular duct in a vertical position. The duct is open at the top and bottom and forms an enclosure and serves the purpose of undisturbed surroundings. One side of the duct is made of acrylic sheet for visualization. A heating element is kept in the vertical tube, which heats the tube surface. The heat is lost from the tube to the surrounding air by natural convection. Digital temperature indicator measures the temperature at different points with the help of seven temperature sensors, including one for measuring surrounding temperature. The heat input

	to the heater is measured by Digital Ammeter and Digital Voltmeter and can be varied by a Dimmerstat. **SPECIFICATIONS:** Specimen : Stainless Steel tube, Size of the Specimen : I.D 38mm / O.D 44mm, 500mm length Heater : Nichrome wire type heater along its length Thermocouples used : 8nos. Ammeter : Digital type, 0-2amps, AC Voltmeter : Digital type, 0-300volts, AC Dimmerstat for heating coil : 0-230 V, 2 amps, AC power Enclosure with acrylic door : For visual display of test section (fixed)
4.	**Heat Transfer in Forced Convection Apparatus** (1 Nos) The apparatus consists of a blower for supply of air to the test section through a heating element. The test section is made up of copper / stainless steel / brass. An electrical heater is placed around the tube heats the air, using a dimmer provided can control heat input. Airflow is measured by the manometer, which is connected across an orifice placed near the test section. The surface temperature of the tube wall is measured at different sections using thermocouples embedded in the walls. The heater input can also be measured using volt and ammeter. The whole system should be a single unit, consisting of a metallic, powder coated control panel with m s square tube table, which gives esthetic finish. The apparatus is to be provided with digital instrumentation to get accurate readouts and results. **SPECIFICATIONS:** Test Section: Copper Tube of 25mm ID, 32mm OD and 400 mm long (Manometer: U-tube With Water as Working Fluid Blower: Centrifugal ½ Hp, 220 Vac Variac: Electronic Dimmer 1.5kw. Heater: Externally Heated, Nichrome Band Type (250w) Voltmeter: Digital Voltmeter of Range 0-300v Ac Ammeter: Digital Ammeter of Range 0-5a Ac. Temperature Indicator: Digital Temperature Indicator of Range 0-400°c Thermocouples: Teflon Coated Cr –al (K-type)-7 No.
5.	**Transient Heat Conduction Equipment** (1 Nos) Should have an oil heater and specimen to be held in chuck which is at the top of oil heater. Three Thermocouples, one inside the specimen and the other two for measuring the air temperature and oil temperature. Digital temperature indicator should indicate the respective temperatures of thermocouples by means of selector switch. **SPECIFICATIONS:** • Oil Heater : 500W • Digital temperature indicator: 199.9 deg C • Thermocouple: Al – Cr type.

	• Specimen Material: Copper.
6.	**Calibration of Thermocouple Trainer Kit** (1 Nos) • Temperature Range: 0-100°C • Indicator: 3½ digit to read upto ±1999 Counts • Thermocouple Type: J-type Fe/K [J-Type] • Power Supply: 230V ±10%@50 Hz Accessories: Water Heater (kettle), Glass bead thermometer (110°C)
7.	**Calibration of Pressure Gauge (Digital Type)** (1 Nos) Pressure Measurement Trainer Module should comprise of strain gauge-based pressure cell, foot pump to build the pressure, pressure tank fitted with release valves and a bourdon pressure gauge. Digital pressure indictor to read the pressure in Kg / Cm^2 to be provided. **Specifications:** • Pressure Sensor: Strain gauge based, capacity 10 Kg/cm2 • Indicator: 3 1/2 digits to read upto +-1999 counts. • Bridge Balancing: Potentiometer • Bridge Excitation: 10V DC • Resolution: 0.1 Kg/cm2 • Power Supply: 230V +-10%@50Hz Accessories: Pressure chamber with Dial gauge,Foot air pump; Necessary cable to be provided.

• Rates should be inclusive of taxes , duties ,freight and installation etc..

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