MERTHANDAM COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

HEAT TRANSFER LAB

Major Equipments Available in the Lab

Sl.No	Name of the Equipments	Specification	Qty
1	Guarded plate apparatus	**Materials** : Asbestos sheet (commercial grade) **Specimen diameter** : 150 mm **Specimen thickness (L)** : 12 mm **Heat input (Qi)** : 0.86 W	1
2	Lagged pipe apparatus	**Location of Thermocouples 1,2,3 at radius** : 50 mm **Location of Thermocouples 7,8,9 at radius** : 100 mm **Location of Thermocouples 10,11,12 at radius** : 150 mm **Length of the pipe** : 600 mm	1
3	Natural convection-vertical cylinder apparatus	**Diameter of the tube (d) :** 44 mm **Length of the tube (L) :** 500 mm **Power measurement :** Voltmeter and Ammeter **No of thermocouples :** 8	1
4	Forced convection inside tube apparatus	**Specimen** : Copper tube, ID 25mm X 400 mm long **Heater** : Nichrome wire band heater **Blower** : 1300 rpm, 230v, 50 Hz. **Manometer** : U type.	1
5	Pin-fin apparatus	**Fin Length L** : 150 mm **Fin diameter d_f** : 12 mm **Thermal conductivity of fin (brass)** K : 110.7 W/m^2K **Diameter of the orifice do** :20 mm **Width of the duct W** : 150 mm **Breadth of the duct B** : 100 mm	1
6	Stefan-Boltzmann apparatus	**Specimen material :** Copper **Size of the Disc :** Ø 20 mm X 0.5 mm thickness **Base plate :** Ø 250 mm X 12 mm **Copper tube diameter :** 200 mm **Digital temperature :** 0-199.///9^{o}C **Water jacket :** 230 mm	1
7	Emissivity measurement apparatus	**Specimen material** : Brass **Specimen size** : Ø 150 mm, 6 mm thickness **Heater** + Sand witched type Nichrome, 400 W **Thermo couple** : 7 Nos **Voltmeter** : Digital type 0 – 360 V **Ammeter** : Digital type 0 -3 amps **Dimmer set** : 0-240V,12 amps **Temperature indicator** : Digital type 0-300^{o}C	1
8	Parallel/counter flow heat exchanger apparatus	**Specimen material** : Copper tube **Size of the specimen** : Ø 12.5 mm X 1500 mm long **Outer shell material** : GI **Outer shell diameter** : 40 mm **Geyser capacity** : 1 ltr, 3 kw	1
9	Air-conditioning test rig	**Brand :** Superb Technologies **Material :** mild steel **Color :** White and blue **10Voltage :** 220 V	1

		Frequency : 50 Hz **Phase :** Single Phase **Power Source :** Electric	
10	Composite wall apparatus	**Thickness of asbestos :** 10 mm **Thickness of wood :** 10 mm **Thickness of MS plate :** Specimen Diameter : 300 mm **Heater diameter :** 300 mm **Heater power :** 500 W	1
11	Insulating powder apparatus	**Diameter of inner sphere :** 75 mm **Diameter of outer sphere :** 150 mm **Insulating powder :** magnesia	1
12	HC Refrigeration test rig	**Brand :** Subi Tek **Power Supply :** AC **Phase :** Single Phase **Automation Grade :** Manual **Type :** Shell & Tube **Material :** Stainless Steel **Primary Exchanger Material :** Aluminium **Tube Material :** Steel	1
13	Fluidized bed cooling tower apparatus.	**Tower size :** (300 x 300 x 1000) mm **Collecting tank capacity :** 20.0 litrs **Heater range :** 30-100^{o}C **Heater power supply :** 230 V AC / 3000 W **Pump supply :** 230 V AC **Pump capacity :** 0.5 HP **Blower capacity :** 0.5 HP **Temperature sensor :** RTD (PT-100)	1

COURSES OFFERED

Sl.No	Odd Sem (Course code & Name)	Class	Even Sem (Course code & Name)	Class
1	-	-	ME3682 Heat Transfer Lab	III MECH

M3682 HEAT TRANSFER LAB

OBJECTIVES

1 To gain experimental knowledge of Predicting the thermal conductivity of solids and liquids.

2 To gain experimental knowledge of Estimating the heat transfer coefficient values of various fluids.
3 To gain experimental knowledge of Testing the performance of tubes in tube heat exchangers

OUTCOMES:

At the end of the course the students would be able to

CO1. Conduct experiment on Predict the thermal conductivity of solids and liquids

CO2. Conduct experiment on Estimate the heat transfer coefficient values of various fluids.

CO3. Conduct experiment on Test the performance of tubes in tube heat exchangers

LIST OF EXPERIMENTS:

1. Thermal conductivity measurement of pipe insulation using lagged pipe apparatus.

2. Determination of thermal conductivity of a composite wall, insulating powder, oils, and water.

3. Determination of heat transfer coefficient of air under natural convection and forced convection. 4. Heat transfer from pin-fin under natural and forced convection.

5. Determination of heat flux under pool boiling and flow boiling in various regimes.

6. Determination of heat transfer coefficient in film-wise and drop-wise condensation.

7. Determination of friction factor, heat transfer coefficient of cold/hot fluid and effectiveness of a tube-in-tube heat exchanger.

8. Determination of Stefan – Boltzmann constant.

9. Determination of emissivity of a grey surface.

10. Calibration of thermocouples / RTDs at standard reference temperatures