HEAT TRANSFER LABORATORY

LIST OF THE EUIPMENTS

1) Thermal Conductivity Apparatus of Metal Bar
2) Thermal Conductivity Apparatus of Insulating Powder
3) Natural Convection Apparatus
4) Forced Convection Apparatus
5) Pin-Fin Apparatus
6) Emissivity Measurement Apparatus
7) Stefan Boltzmann Apparatus
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11) Transient Heat Conduction Equipment
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13) Heat Pipe
14) Two-Phase Heat Flow Apparatus
15) Composite Wall Apparatus

Name of the Equipment:	1) Thermal Conductivity Apparatus of Metal Bar

Thermal Conductivity Apparatus of Metal Bar

Specifications:

- Length of the metal bar : 460 mm
- Diameter of the metal bar : 20 mm
- Number of thermocouples mounted on the bar : 5
- Cooling water jacket diameter : 100 mm

Experiments that can be conducted:

- To determine the thermal conductivity of a good conduction materials say brass

Name of the Equipment:	2) Thermal Conductivity Apparatus of Insulating Powder

Thermal Conductivity Apparatus of Insulating Powder

Specifications:

- Radius of inner sphere : 50 mm
- Radius of outer sphere : 100 mm

Experiments that can be conducted:

- To determine the thermal conductivity of insulating powder at various heat inputs

Name of the Equipment:	3) Natural Convection Apparatus

Natural Convection Apparatus

Specifications:

- Diameter of the tube : 45 mm
- Length of the tube : 450 mm

Experiments that can be conducted:

1) To determine the convective heat transfer co-efficient for the heated vertical cylinder losing heat to the ambient by free or natural convection.
2) To find the theoretical convective heat transfer co-efficient and to compare with experimental value.

Name of the Equipment:	4) Forced Convection Apparatus

Forced Convection Apparatus

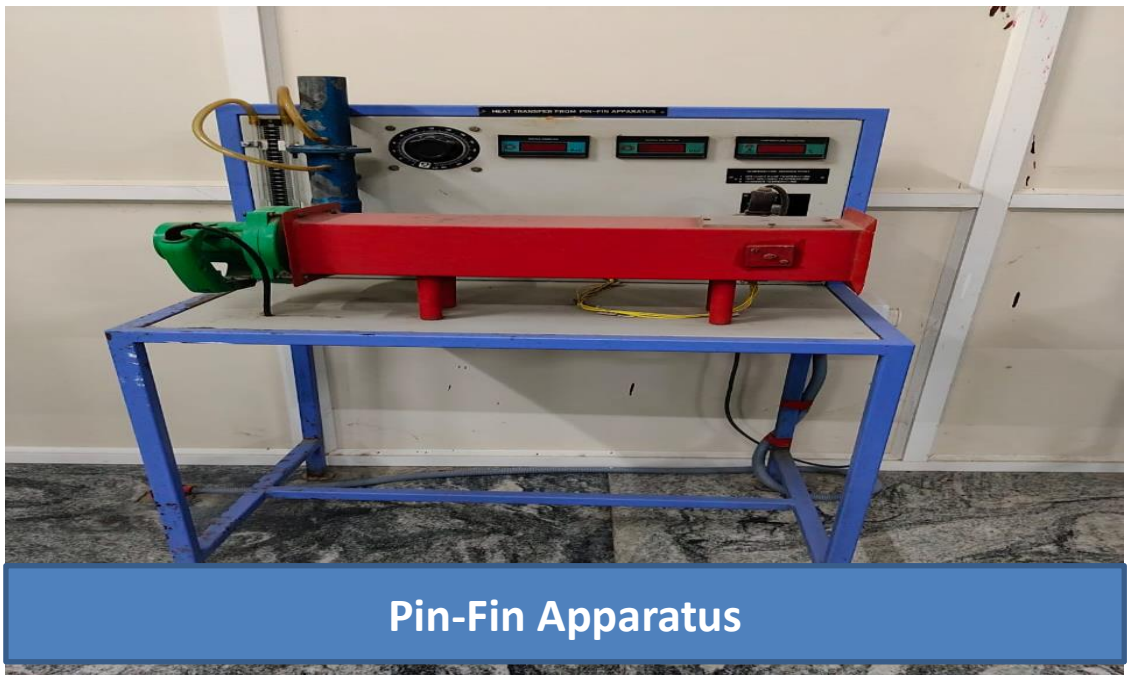
Specifications:

- Inside diameter of the tube : 40 mm
- Orifice diameter : 20 mm
- Co-efficient of discharge of orifice : 0.62
- Length of the test specimen : 300 mm

Experiments that can be conducted:

1. To determine the connective heat transfer co-efficient for a horizontal Pipe through which air flows under forced convection.
2. To find the theoretical heat transfer for the above condition and to Compare with experimental value

Name of the Equipment:	5) Pin-Fin Apparatus



Pin-Fin Apparatus

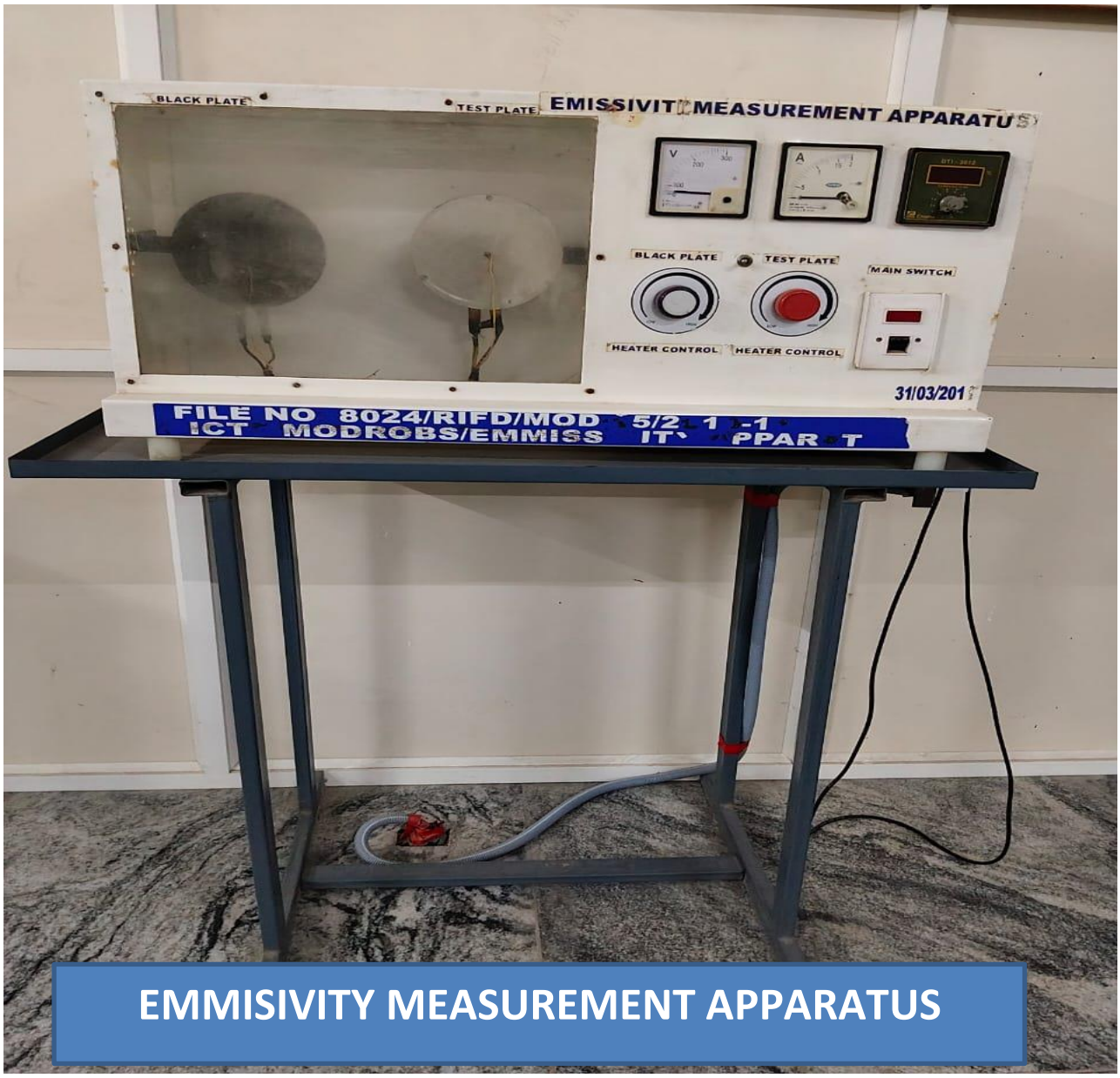
Specifications:

- Length of the fin = 150 mm
- Diameter of the fin = 12mm
- Thermal conductivity of the fin material (brass) = 110 W/mK
- Diameter of the orifice = 0.02 m
- Width of the duct = 0.15 m
- Breadth of the duct = 0.1 m
- Coefficient of discharge of the orifice = 0.61
- Density of monomeric fluid (mercury) = 13.6 *10^3 kg/m^3

Experiments that can be conducted:

1. To draw the variation of the temperature along the length of pin-fin under forced convection
2. To determine the value of heat transfer of heat transfer co-efficient under forced conduction and to find
   i) Theoretical values of temperature along the length of fin
   ii) Effectiveness and efficiency of the pin-fin for insulating and boundary condition.

Name of the Equipment:	6) Emissivity Measurement Apparatus



Specifications:

- Diameter of the plates = 150 mm

Experiments that can be conducted:

- To determine the emissivity of a gray surface at different temperatures.

Name of the Equipment:	7) Stefan Boltzmann Apparatus

Stefan Boltzmann Apparatus

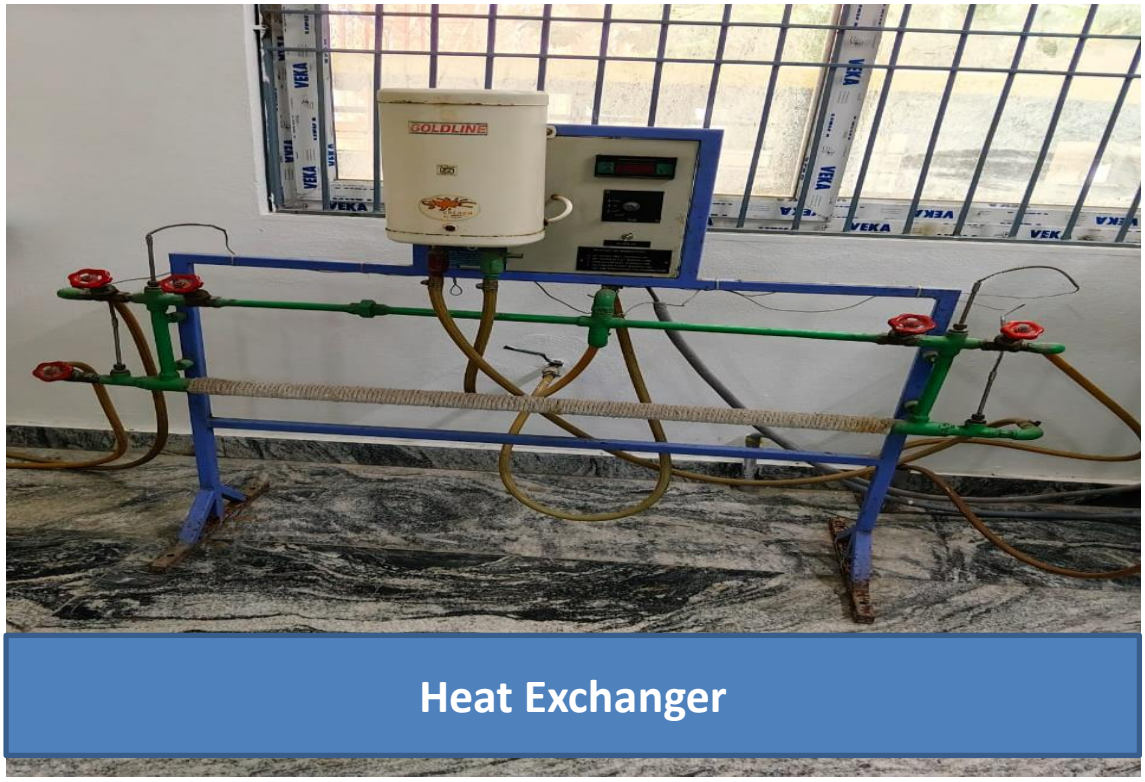
Specifications:

- Diameter of the disc (d) = 20 mm
- Thickness of the disc = 1.5 mm
- Mass of the disc (m) = 5 gms
- Specific heat of the test disc = 380 J/kg.k
- Inner diameter of the hemispherical surface=200mm
- Emissivity of the hemisphere = 0.072
- Emissivity of the copper disc = 0.072
- Specific heat of test disc copper = 380.3 J/kgk

Experiments that can be conducted:

- To determine the value of Stefan-Boltzmann constant for radiation heat transfer

Name of the Equipment:	8) Heat Exchanger



Heat Exchanger

Specifications:

- Inner tube material : Copper
- Inner diameter : 9.5 mm
- Outer diameter : 12.5 mm
- Outer tube material : G.I
- Inner diameter : 28.5 mm
- Outer diameter : 32.5 mm
- Length of heat exchanger : 1500 mm

Experiments that can be conducted:

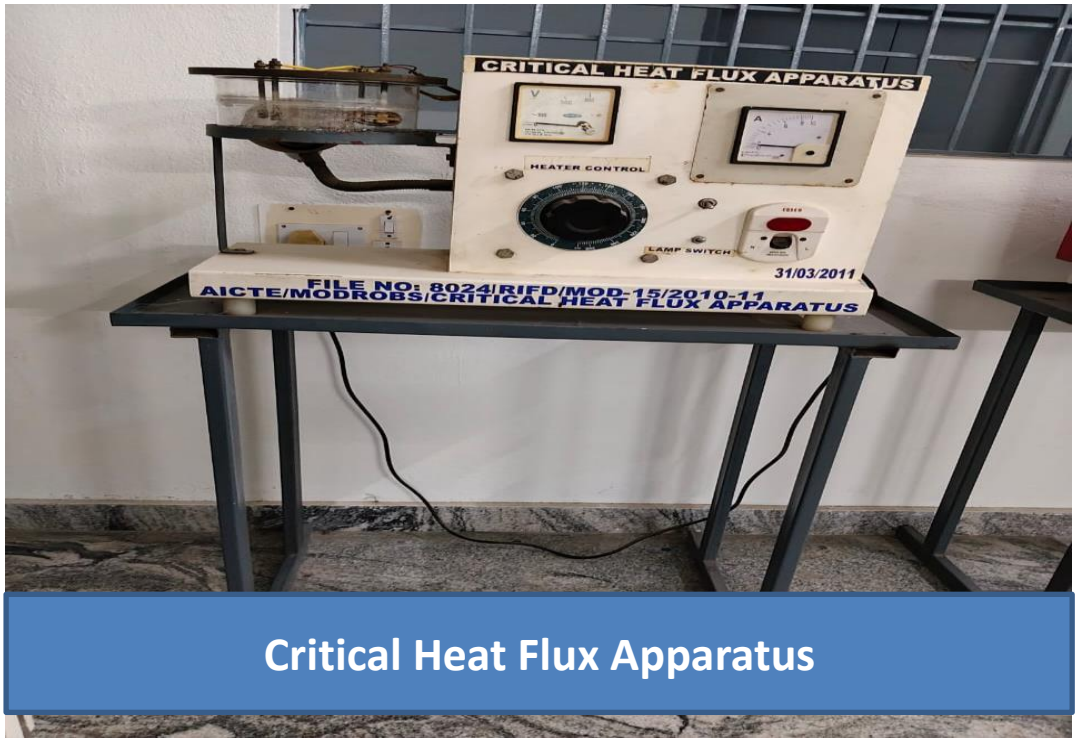
- To determine the following for (i) Parallel flow heat exchanger and (ii) Counter flow heat exchanger

ι) Log mean temperature difference (LMTD)

ιι) Overall heat transfer co – efficient (Experimental)

ιιι) Overall heat transfer coefficient (Theoretical)

Name of the Equipment:	9) Critical Heat Flux Apparatus



Critical Heat Flux Apparatus

Specifications:

- Heater for initial heating : Nichrome heater of 1 kw
- Nichrome wire size : Φ 0.18mm
- Length of test Heater :100 mm
- Thermometer : 0 to 100°C
- Voltmeter :0-100 V
- Ammeter :0-10 A
- Dimmerstat :10A, 230V
- Rotameter Range : 3.75-37.5 LPH

Experiments that can be conducted:

- To determine the experimental and theoretical value of critical heat flux in pool boiling of water.

Name of the Equipment:	10)Lagged Pipe Apparatus

Lagged Pipe Apparatus

Specifications:

- Temperature indicator :0-300ºC
- Voltmeter :0-250 V
- Ammeter : 0-2 A
- Dimmerstat : Single phase 230 v AC Supply

Dimensions of the Pipes

- inside diameter : 6cm
- Diameter at centre : 8.5cm
- Outside Diameter : 10.7cm
- Length of pipe : 1m

Experiments that can be conducted:

1. To determine the thermal conductivity of lagging material by assuming the heater input to be the heat flow rate through lagged pipe
2. To determine heat flow rate through the lagged pipe and compare it with the heater input for known value of thermal conductivity of lagging material
3. To plot temperature distribution across the lagging material

Name of the Equipment:	11)Transient Heat Conduction Equipment

Transient Heat Conduction Equipment

Specifications:

- Test piece material : Copper & Mild Steel
- Diameter of test piece : 25 mm
- Length of test piece : 30 mm

Experiments that can be conducted:

1. To determine heat transfer coefficient and instantaneous heat transfer rate for transient heat conduction and draw the graph of temperature variation with time

Name of the Equipment:	12)Drop & Film Wise Condensation Equipment

Drop & Film Wise Condensation Equipment

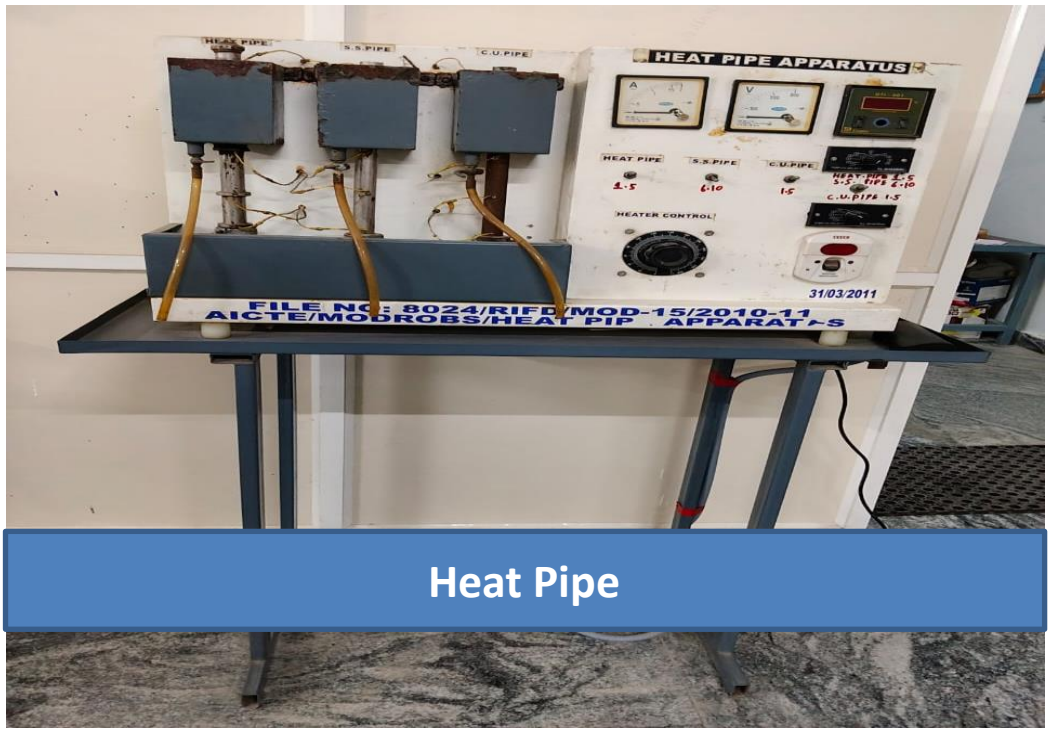
Specifications:

- Condenser material : Copper
- Flow rate in rotameter : 25-250 LPH
- Electric heater : 1.5 KW
- Digital thermometer : 0-300^0 C

Experiments that can be conducted:

- To determine the experimental and theoretical heat transfer coefficient for drop wise and film wise condensation.

Name of the Equipment:	13)Heat Pipe



Heat Pipe

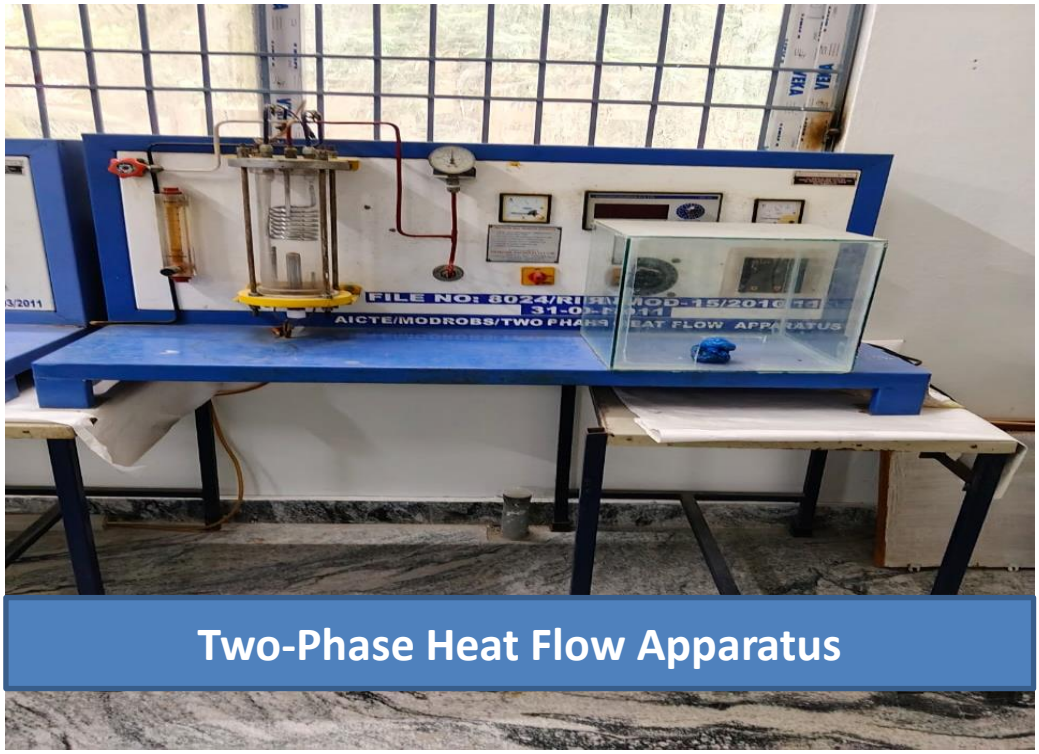
Specifications:

- Pipe outer diameter : 25 mm
- Length of the pipe : 400 mm

Experiments that can be conducted:

- To find out the longitudinal distribution of temperature for copper pipe, SS pipe and heat pipe comparing with time intervals.

Name of the Equipment:	14)Two-Phase Heat Flow Apparatus



Specifications:

- Boiling or condensation cylinder : 300*75 mm
- Heater capacity : 400 W
- Temperature indicator : 0-300^0 C
- Voltmeter range :0-300V
- Ammeter :0-5A
- Dimmerstat :0-2A
- Rotameter range :3.75-37.5 LPH

Experiments that can be conducted:

- To visualize the process of Nucleate and Film boiling on the heater and Condensation on Water Cooling Coil.

Name of the Equipment:	15) Composite Wall Apparatus

Composite Wall Apparatus

Specifications:

- Temperature indicator : 0-200^{0}C
- Voltmeter : 0-200 V
- Ammeter : 0-2 A

Experiments that can be conducted:

1. To determine the total thermal resistance and thermal conductivity of composite wall.
2. To plot temperature gradient along composite wall surface.