DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Thermal conductivity of Lagged Pipe using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	The concept of double and single lagging can be studied easily Effects of different insulating material combinations can be seen. Easy to operate and Ideal for group studies & demonstration.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR THERMAL CONDUCTIVITY OF A LAGGED PIPE

- Before switch on the equipment the dimerstat at zero position.
- The input voltage can be adjusted to a suitable level, which in turn will vary the input heat.
- The heater supplies heat to the inner pipe, which in turn passes through the insulating Powder to the outer pipe.
- Thermocouple readings are noted frequently till consecutive readings are same indicating steady state has been reached.
- After establishing the steady state, the input voltage is reduced and the power supply is switched off.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment.

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, Two Slab guarded hot plate method apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	Compact and free standing , Investigation into heat transfer theory Self-contained unit except for electricity supply, Full instrumentation at convenient height ™ Rapid selection of thermocouples , Easy read out and Digital temperature indicator with 0.1Oc
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR TWO SLAB GUARDED HOT PLATE METHOD APPARATUS

- Before switch on the equipment the dimerstat at zero position
- Check the cooling water circuit and allow 0.5 to 0.75 lpm of water.
- Switch on the power supply, Move the inner heater dimmer stat knob and adjust to some desired input.
- Move the inner heater dimmer stat knob, so that the temperature of inner heater is equivalent to the temperature of outer heater at steady state condition.
- After steady state condition is reached, note the temperature readings. i.e. T_1 to T_8 .
- After steady state condition, note the corresponding Voltage, Ampere and Temperature T_1 to T_8.
- Tabulate the reading and calculate thermal conductivity of the specimen

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record.

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING

17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Composite wall apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	To gain knowledge in various heat transmissions systems and modes viz, conduction, convection and radiation. Experimental training of Composite Wall to obtain various parameters similar like Voltage, Current and Temperature.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR COMPOSITE WALL APPARATUS

- Before switch on the equipment the dimerstat at zero position
- The Heater is switched on after making sure that hand press applies sufficient pressure on the slabs so that they make proper contact with each other.
- The Heating value can be adjusted to a suitable level.
- Thermocouple readings are taken at regular intervals till consecutive readings are same indicating that steady state has been achieved.
- After establishing the steady state, the readings are tabulated and the power supply to the equipment is switched off.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Pin – Fin apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	Temperature distribution along the length of the fin can be studied in natural and forced convection conditions. Theoretical temperature distribution can be obtained and compared with the experimental results. Fins of different materials can be tested. A range of experiments can be performed in natural and forced convection conditions. Digital Voltmeter & Ammeter Are Used For Accuracy In Readings
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR PIN – FIN APPARATUS

- **Natural Convection**: Before switch on the equipment the dimerstat at zero position
- Switch on the power supply & adjust the dimerstat to set the required input.
- Observe temperature readings and start tabulating the values after 10 – 15 minutes.
- Note down the temperature readings of all thermocouples (T_1, T_2, . ….T_5) at a constant frequency until steady state conditions are reached. Calculate the theoretical & experimental free convective heat transfer coefficients.
- **Forced convection**: Before switch on the equipment the dimerstat at zero position
- Switch on the power supply and adjust the dimerstat to set the required input.
- Switch on the blower to activate forced convection mode. Using the gate valve adjust the air flow rate.
- Observe temperature readings and start tabulating the values after 10 – 15 minutes.
- Note down the temperature readings of all thermocouples (T_1, T_2, . ….T_5) at a constant frequency until steady state conditions are reached. Observe the manometer readings to calculate the air flow measurement.
- Calculate the theoretical & experimental free convective heat transfer coefficients.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes. In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Forced Convection Apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	Compact and free standing Investigation into heat transfer theory, Self-contained unit except for electricity supply Full instrumentation at convenient height, Rapid selection of thermocouples and Easy read out
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR FORCED CONVECTION APPARATUS

- Before switch on the equipment the dimerstat at zero position.
- Switch on the power supply and adjust the dimerstat to set the required input.
- Switch on the blower to activate forced convection mode. Using the gate valve adjust the air flow rate.
- Observe temperature readings and start tabulating the values after 10 – 15 minutes.
- Note down the temperature readings of all thermocouples at a constant frequency until steady state conditions are reached.
- Observe the manometer readings to calculate the air flow measurement.
- Calculate the theoretical & experimental free convective heat transfer coefficients.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING

17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Natural Convection Apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	Heat transfer coefficient in natural convection conditions can be calculated. Variation of focal heat transfer coefficient over the entire length of vertical cylinder can be studied. Average value of heat transfer coefficient can be obtained from suitable correlation and can be compared with the experimental values. A range of experiments can be performed for various values of heat input. Ideal for group studies and demonstration.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR NATURAL CONVECTION APPARATUS

- Before switch on the equipment the dimerstat at zero position.
- Switch on the power supply & adjust the dimerstat to set the required input.
- Observe temperature readings and start tabulating the values after 10 – 15 minutes.
- Note down the temperature readings of all thermocouples at a constant frequency until steady state conditions are reached.
- Calculate the theoretical & experimental free convective heat transfer coefficients.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Emissivity Apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	To gain knowledge in various heat transmissions systems and modes viz, conduction, convection and radiation. Experimental training of Emissivity to obtain various parameters similar like Voltage, Current and Temperature.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR EMISSIVITY APPARATUS

- Before switch on the equipment the dimerstat at zero position.
- Switch on the power supply and adjust the dimerstat to set the required input.
- Switch on the power supply to put grey body side and some input is given to the grey body heater, which can be read on the wattmeter.
- Then the switch is changed to the black body and same heat input is given to the black body.
- The use of single wattmeter ensures that wattmeter error remains constant for the two cases.
- The temperature of the black body and the grey body will increase. The temperatures can be seen on the solid State temperature indicator.
- It may be observed that for the same heating value the black body temperature will be lower than that of the grey body temperature due its higher capacity for radiation.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes, In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Heat Exchanger apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	Performance and working of heat exchangers can be studied easily. Both parallel and counter flow arrangements can be studied on the same set- up with simple operations of valves. Wide range of experiments can be performed with varying flow rates on hot and cold side, Ideal for group studies.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR HEAT EXCHANGER APPARATUS

- Switch on the heater and allow the water to heat.
- Open the valves V_2 and V_4 and arrange for parallel flow and open the valves V_1 and V_3 and arrange for counter flow.
- The gate valves of the geyser are opened and allow the hot water to flow through it.
- Adjust the flow rate of hot water in the range of 1.5 to 3 lit per min and the cold water in the range of 3 to 5 lit per min.
- Observe the thermocouple temperature at different points until it reaches steady state
- Measure the flow rate of hot and cold water.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING

17MECC89- HEAT TRANSFER LAB (UG)

STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Stefan Boltzmann's apparatus using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	The Phenomenon of heat transfer by radiation can be understood well. Stefan Boltzmann constant can be calculated. Ideal for group studies and demonstration, Digital temperature indicator.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR STEFAN BOLTZMANN'S APPARATUS

- Maintain proper amount of Water in the tank before switch on the equipment.
- Pour 7 liters of water in the upper tank and heat the water to 75-80 ºC.
- Open the control valve and allow the hot water to fill the bottom tank.
- Note down the temperature of four thermo couple fixed at the bottom surface of tank.
- Immediately, note down temperature (i.e. at zero line) and simultaneously start the stopwatch and record the disk temperature after every 10 seconds up to 180 seconds.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH

DEPARTMENT OF MECHANICAL ENGINEERING
17MECC89- HEAT TRANSFER LAB (UG)
STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Heat Transfer Lab
Purpose	To provide training for students, in Thermal conductivity of insulating powder using both experimental training set-up and Basic knowledge about Heat Transfer.
Scope	The concept of Thermal conductivity of insulating powder can be studied easily. Effects of different insulating material combinations can be seen. Easy to operate and Ideal for group studies & demonstration.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR INSULATING POWDER APPARATUS

- Before switch on the equipment the dimerstat at zero position.
- The input voltage can be adjusted to a suitable level, which in turn will vary the input heat.
- The heater supplies heat to the inner pipe, which in turn passes through the insulating powder to the outer pipe.
- Thermocouple readings are noted frequently till consecutive readings are same indicating steady state has been reached.
- After establishing the steady state, the input voltage is reduced and the power supply is switched off.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

HOD/MECH