Techno College of Engineering Agartala

An Engineering College Approved by AICTE, MHRD, Govt. of India
Affiliated to Tripura University (A Central University),
Department of Mechanical Engineering

List of Laboratory Experiments

Heat Transfer Lab							
Course Code	**Hours / Week**				**Maximum Marks**		
PC ME-507	L	T	P	C	**CIA**	**SEE**	**Total**
	0	0	2	1	40	60	100
Number of classes: 20 Hours			**Prerequisites: Heat Transfer and Thermodynamics**				
Branch: ME			**Semester: V**				

Course overview:

The Heat Transfer Lab course provides hands-on experience in the fundamental modes of heat transfer: conduction, convection, and radiation. Students will conduct experiments that illustrate key principles, including thermal conductivity, convective heat transfer coefficients, and radiation heat exchange. Through practical application of theoretical concepts, the course aims to deepen understanding of energy transport mechanisms and enhance skills in data acquisition, analysis, and interpretation. Emphasis is placed on experimental design, use of modern instrumentation, and technical reporting to prepare students for real-world engineering challenges related to thermal systems.

Course objectives:

Here are several course objectives for a Heat Transfer Lab:

i. Understand Fundamental Principles: Reinforce and apply the basic principles of conduction, convection, and radiation through laboratory experiments.
ii. Develop Experimental Skills: Gain proficiency in setting up, conducting, and troubleshooting thermal experiments using standard lab equipment.
iii. Data Collection and Analysis: Learn to accurately collect, process, and analyze experimental data related to heat transfer phenomena.
iv. Compare Theory with Practice: Evaluate the agreement between theoretical predictions and experimental results, identifying sources of error.
v. Enhance Technical Communication: Improve skills in writing clear, concise technical reports and presenting experimental findings effectively.
vi. Use of Measurement Instruments: Become familiar with tools and instruments commonly used in thermal analysis, such as thermocouples, heat flux sensors, and data loggers.
vii. Teamwork and Safety: Promote effective teamwork and ensure adherence to safety procedures during laboratory work.

Course outcomes:

After completing this course, the students will be able to

CO Number	CO Description	K-level
CO-1	Explain the thermal conductivity of composite wall and other systems.	K-2
CO-2	Calculate the collected data for heat transfer coefficient under convections.	K-3
CO-3	Determine the emissivity and Stefan-Boltzmann Constant of a mass.	K-3

CO-4	Analyze the effectiveness of heat exchanger.	K-4
Sl. No.	**EXPERIMENT NAME**	**CO**
1.	Thermal conductivity measurement using guarded plate apparatus.	CO-1
2.	Thermal conductivity measurement of pipe insulation using lagged pipe apparatus.	CO-1
3.	Determination of heat transfer coefficient under natural convection from a vertical cylinder.	CO-2
4.	Determination of heat transfer coefficient under forced convection from a tube.	CO-2
5.	Determination of Thermal conductivity of composite wall.	CO-1
6.	Determination of Thermal conductivity of insulating powder.	CO-1
7.	Heat transfer from pin-fin apparatus (natural & forced convection modes)	CO-3
8.	Determination of Stefan – Boltzmann constant.	CO-3
9.	Determination of emissivity of a grey surface.	CO-3
10.	Effectiveness of Parallel / counter flow heat exchanger.	CO-4