



LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (GSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

HEAT TRANSFER LABORATORY

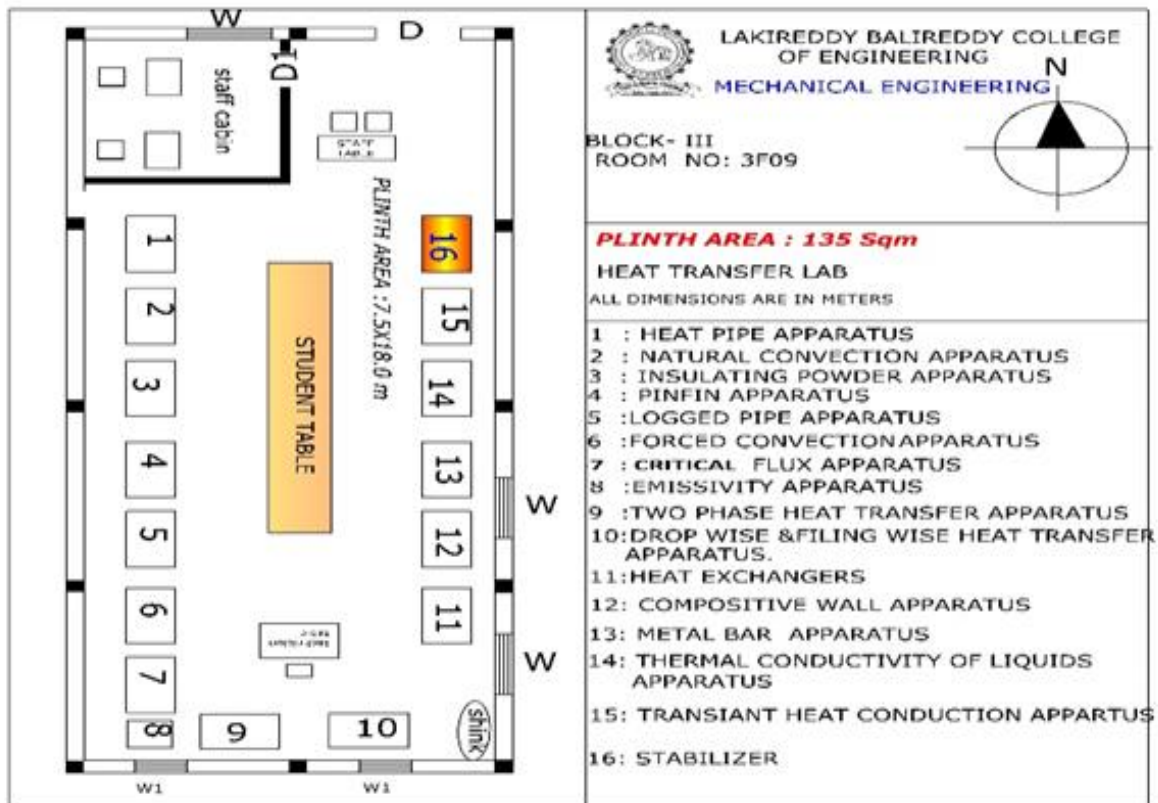
INTRODUCTION: The objective of this lab is to understand the concepts of conduction, convection and radiation practically in various thermal systems to under graduate and Post graduate students through a series of experiments. Students have a fairly good understanding of the theory underlying the experiments and the entire lab course is designed such that classroom lectures precede the lab work. The Heat Transfer Laboratory is equipped with test facilities for doing research with in internal combustion engines for energy conversion.

Course Educational Objective: The objective of this course is to understand the modes of heat transfer for different heat transfer equipment.

Course Outcomes: After completion of the lab students are able to:

- CO1: Estimate the thermal conductivity of different materials and powders.
- CO2: Experiment both free and forced convection to predict heat transfer coefficient.
- CO3: Validate the Stefan Boltzmann Constant and estimate emissivity of grey body.
- CO4: Compare parallel and counter flow heat exchanger performance characteristics

Lab Layout:



Equipment details in Heat Transfer Laboratory:

S.No	Name of the Equipment	Date of Purchase	No.of Available	Total Cost In Rs/-
1	Thermal conductivity of Metallic Rod Apparatus	06-11-2000	01	20,719/-
2	Stefan Boltzmann Apparatus	06-11-2000	01	18,233/-
3	Critical Heat Flux Apparatus	06-11-2000	01	19,890/-
4	Composite Wall Apparatus	06-11-2000	01	18,233/-
5	Lagged Pipe Apparatus	06-11-2000	01	21,962/-
6	Forced Convection Apparatus	06-11-2000	01	29,835/-
7	Natural convection Apparatus	06-11-2000	01	18,233/-
8	Thermal Conductivity of Insulating Powder Apparatus	06-11-2000	01	21,962/-
9	Parallel and counter flow heat exchanger Apparatus	06-11-2000	01	20,719/-
10	Emissivity Measurement Apparatus	06-11-2000	01	21,962/-
11	Heat Pipe Apparatus	06-11-2000	01	21,962/-
12	Pin Fin Apparatus	06-11-2000	01	28,178/-
13	Drop wise and Film wise Condensation Apparatus	06-11-2000	01	45,582/-
14	5 KVA Servo Controlled Voltage Stabilizer	02-02-2002	01	12,880/-
15	Transient Heat Conduction Apparatus	27-06-2008	01	27,750/-
16	Two Phase Flow Apparatus	27-06-2008	01	52,031/-
17	Thermal Conductivity of Liquids	08-06-2015	01	55,125/-
18	Heat Pipe Apparatus	16-02-2019	01	84,960/-
		TOTAL AMOUNT		5,40,216/-

HEAT TRANSFER LAB OVER VIEW :

Area : 129.9 Sq.m

Established in the year : 2000

Total investment : Rs.5,40,216 /-

Major equipment : Thermal Conductivity of Liquids.
Two Phase Flow Apparatus.

Heat Transfer Lab Photographs:



Heat Transfer Lab View



Heat Transfer Lab View

Equipment in Heat Transfer Lab:



THERMAL CONDUCTIVITY OF INSULATING POWDER (ASBESTOS)

1. INNER SPHERE DIAMETER = 50 MM
2. OUTER SPHERE DIAMETER = 100MM



PIN FIN APPARATUS

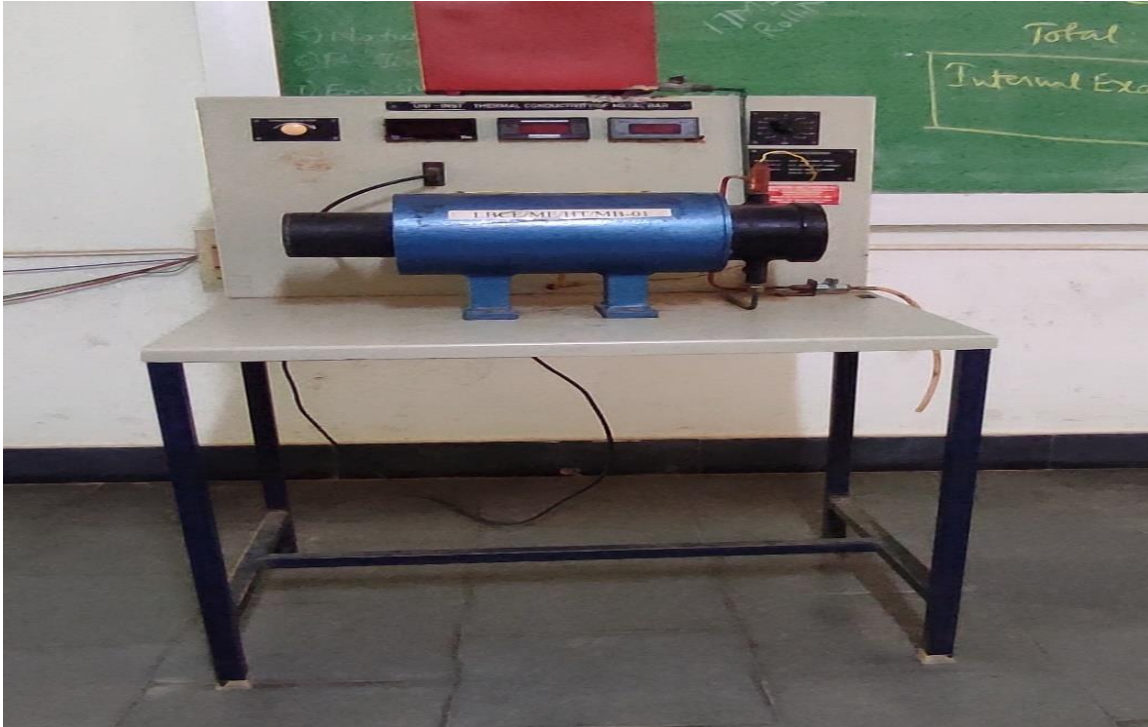
1. FIN DIAMETER = 0.012 M
2. LENGTH OF FIN = 0.15 M
3. WIDTH OF DUCT = 0.15 M
4. BREADTH OF DUCT = 0.10 M
5. DISTANCE BETWEEN EACH THERMOCOUPLE = 30 MM
6. ORIFICE DIAMETER= 0.02 M



HEAT EXCHANGER APPARATUS

1. INNER PIPE DIAMETER= 9.5 MM
2. OUTER PIPE DIAMETER= 12.5 MM

3. LENGTH OF PIPE= 1500 MM



THERMAL CONDUCTIVITY OF METAL BAR (BRASS)

1. BAR DIAMETER = 20MM
2. LENGTH OF BAR = 460MM
3. DISTANCE BETWEEN EACH THERMOCOUPLE=50MM



HEAT PIPE APPARATUS

1. LENGTH OF THE HEAT PIPE = 450MM
2. DISTANCE BETWEEN EACH THERMOCOUPLE = 50MM



NATURAL CONVECTION APPARTUS

1. LENGTH OF CYLINDER = 450MM
2. CYLINDER DIAMETER=45MM



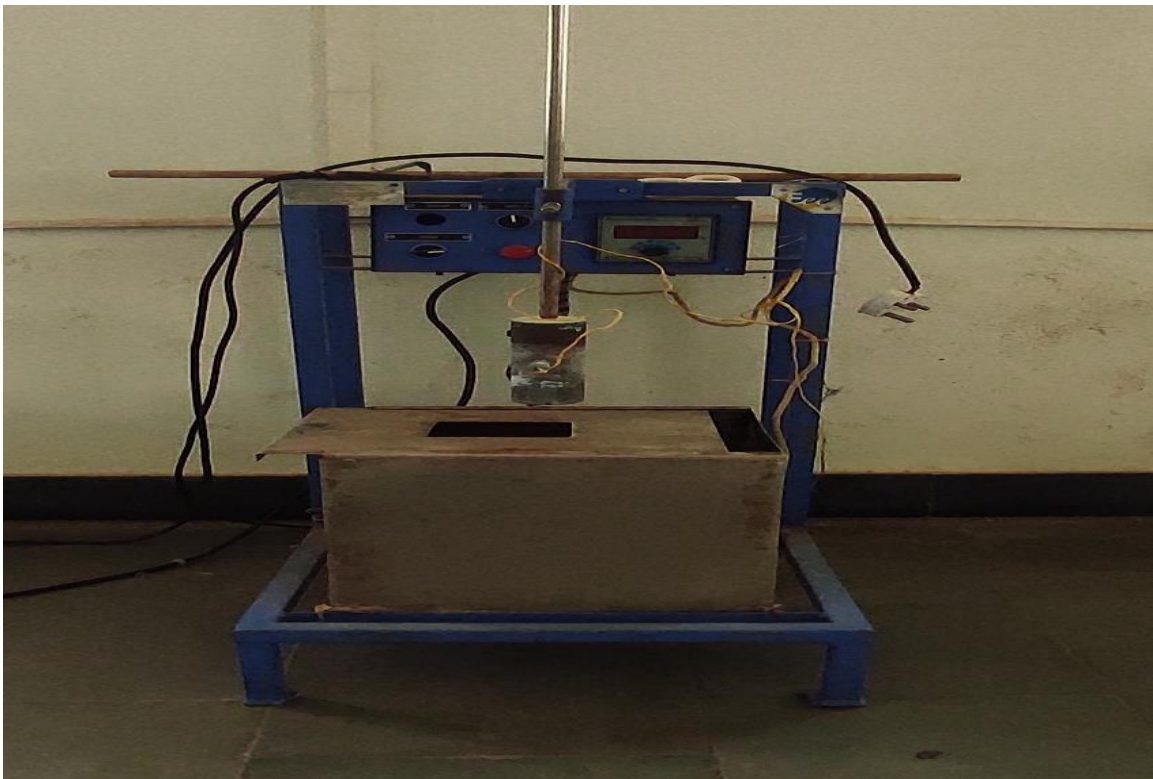
EMISSIVITY APPARTUS

1. DIAMETER OF DISC PLATES = 150MM



THERMAL CONDUCTIVITY OF LAGGED PIPE (GLASSWOOL)

1. LENGTH OF LAGGED PIPE = 500 MM
2. INNER DIAMETER = 2.54×10^{-2} M
3. OUTER DIAMETER = 5.08×10^{-2} M



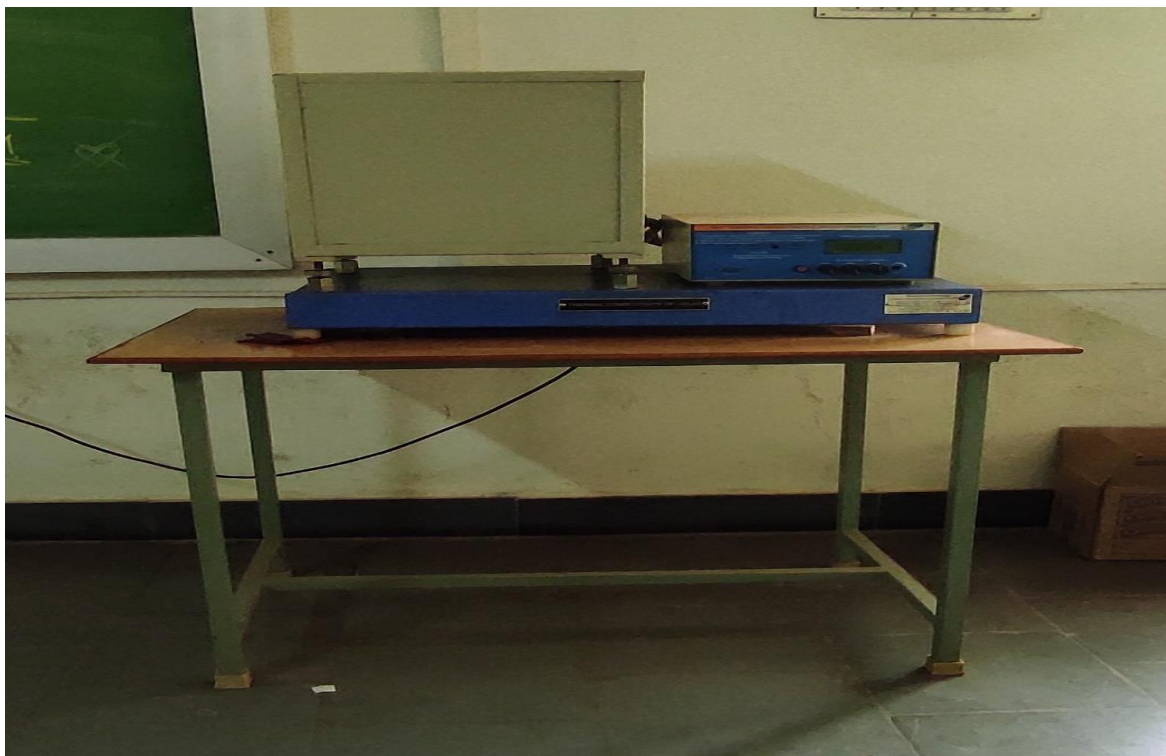
TRANSIENT HEAT CONDUCTION APPARTUS

1. LENGTH OF BRASS SPECIMEN = 150 MM
2. SPECIMEN DIAMETER = 50MM



FORCED CONVECTION APPARTUS

1. INSIDE DIAMETER OF TUBE = 40MM
2. OUTER DIAMTERE OF TUBE= 20MM
3. ORICIE COFFICIENT OF DISCHARGE = 0.62
4. LENGTH OF PIPE= 300MM



THERMAL CONDUCTIVITY OF LIQUIDS

1. MAIN HEATER DIAMETER = 0.11M
2. LIQUID SPACE DIAMETER=0.116M
3. SPACER THICKNESS =0.02M
4. SPACER DIAMETER=0.0083M

TWO PHASE HEAT TRANSFER

1. HEATER DIAMETER= 0.012M
2. LENGTH OF HEATER = 0.050M

Laboratory Utilization:

S. No	Laboratory Name	Branch(s)
1	Heat Transfer Lab	Mechanical Engg., VI Semester
2	Heat Transfer Lab	Aerospace Engg., V Semester
3	Thermal Systems lab	Mechanical Engg., (PG) II Semester
4	Mini Projects	Mechanical Engg., Aerospace Engg.
5	Major Projects	Mechanical Engg., Aerospace Engg.
6	Project based Lab Experimentation	Mechanical Engg., Aerospace Engg.

Faculty In-charge: Mr. K.Lakshmi Prasad, Asst. Professor

Sr. Technician: Mr. K. Prasada Reddy