

# Heat Transfer Lab

## Subject overview:

Heat transfer is the study of energy movement in the form of heat which occurs in many types of processes. The transfer occurs from the high to the low temperature regions. Therefore a temperature gradient has to exist between the two regions for heat transfer to happen. It can be done by conduction (within one solid or between two solids in contact), by convection (between two fluids or a fluid and a solid in direct contact with the fluid), by radiation (transmission by electromagnetic waves through space) or by combination of the above three methods.



## Composite Wall Apparatus:

In this system; walls have a layer of bricks, a layer of thick insulation and plaster of both the sides. The treatment of conductive heat flow in such structures is the extension of single wall structures and known as composite walls or composite structures.



### Heat Flux Apparatus :

Apparatus consists of a wire which is surrounded by water in a trough. The surface temperature of test wire is heated by passing current through it. Due to the temperature difference between the wire surface and surroundings the different regimes are observed till the burn out point.



### Thermal Conductivity of Metal Rod :

Thermal conductivity is an important thermo - physical property of conducting materials, by virtue of which the material conducts the heat energy through it.



### **Thermal Conductivity of Insulating Powder :**

Conductivity Instrument consisting of Two Concentric Spheres, Insulating Powder and Control Panel with Voltmeter, Ampere meter, Digital Temperature Controller-cum-Indicator with selector switch, Dimer stat and Main On/ Off Switch.



### **Critical Radius of Insulating Material :**

The most important characteristics of any insulation material include a low thermal conductivity, low tendency toward absorbing water, and of course the material should be inexpensive. With the help of this setup; can understand the perfect insulation thickness in terms of radial thickness.



### Heat transfer in Natural convection :

The present experimental set up is designed and fabricated to study the natural convection phenomenon from a vertical cylinder in terms of the variation of local heat transfer coefficient along the length and also the average heat transfer coefficient and its comparison with the value obtained by using an appropriate correlation.



### Heat transfer in Forced convection :

The apparatus consists of a circular pipe, through which cold fluid, air is being forced. Pipe is heated by a band heater outside the pipe. Temperature of pipe is measured with thermocouples attached to pipe surface. Heater input is measured by a Voltmeter and Ammeter. Thus, heat transfer rate and heat transfer co-efficient can be calculated.



**Stefan Boltzman Apparatus :**

A copper test disc is fitted at the centre of jacket. The hot water is obtained from a hot water tank, fitted to the panel, in which water is heated by an electric immersion heater. The test disc is then inserted at the centre with thermocouple. Thermocouples are fitted inside hemisphere to average out hemisphere temperature. A timer with a small buzzer is provided to note down the disc temperatures at the time intervals of 5 seconds.

