



NATIONAL INSTITUTE OF TECHNOLOGY MEGHALAYA
DEPARTMENT OF MECHANICAL ENGINEERING
THEORY OF MACHINES LABORATORY

List of experiments:

1) Test unit for Free and forced convection

- Study of free and forced convection
- Calculation of convective heat transfer at different geometries
 - a) flat plate
 - b) cylinder
 - c) tube bundle
- Calculation of typical characteristic variables of heat transfer
 - a) Nusselt number
 - b) Reynolds number

2) Shell and Tube Heat Exchanger

- Function and behaviour during operation
- Plotting temperature curves:
 - in cross parallel flow operation
 - in cross counter flow operation
- Calculation of mean heat transfer coefficient
- Comparison with other heat exchanger types

3) Tubular Heat Exchanger

- Function and behaviour during operation
- Plotting temperature curves:
 - in cross parallel flow operation
 - in cross counter flow operation
- Calculation of mean heat transfer coefficient
- Comparison with other heat exchanger types

4) Thermal radiation unit

- Lambert's cosine law
- Inverse-square distance law (Lambert)
- Stefan-Boltzmann constant
- Kirchhoff's laws
 - absorptivity
 - reflectivity
 - emissivity

5) Heat Conduction in Gases and Liquids

- Steady-state heat conduction in gases and liquids
- Determination coefficients of thermal conductivity at different temperatures

6) Radial and linear heat conduction

- Linear heat conduction (flat wall)-
 - Determination of temperature profiles with different materials
 - Determination of thermal conductivity
- Radial heat conduction-
 - Determination of the temperature profile
 - Determination of thermal conductivity

7) Simple compression refrigeration

- Fundamentals of a compression refrigeration circuit
- Key components of a refrigeration system
compressor, evaporator, condenser, expansion element
- Relationship between the pressure and boiling point of a liquid
- Operation of a refrigeration system / heat pump
- Developing a basic understanding of the thermodynamic cycle
- Simple energy balance

8) Absorption refrigeration system

- Demonstrate the basic principle of an absorption refrigeration system
- Absorption refrigeration system and its main components
- Operating behaviour under load

9) Oil Bath

- Used for reactions that requires heating/reflux temperatures up to 200 °C. Oil baths provide more uniform heat in comparison to other heating devices.

10) Computer based VCR Multi fuel engine

- To determine performance, combustion & emission characteristics of the multi fuel by varying compression ratios

11) Data Acquisition System

- Multifunction Switch/Measure Unit is a compact, economical, one-box solution for medium to high-density switch/measure applications in design verification, automated test and data acquisition.

12) Air velocity, temperature & humidity meter

- To measure air velocity, its temperature and humidity levels

13) Pyranometer

- Demonstrations and experiments at various measurement points to understand the solar power generating structure
- Learn how to assess the solar energy potential of a site using a pyranometer.
- Find the GHI using the pyranometer and assess the feasibility of a concentrating solar power system in the area

14) Flue gas analyser

- Measures and displays the products of combustion from both domestic and commercial fossil fuelled appliances