

Course Code	Course Name	Credits
MEL501	Thermal Engineering	01

Objectives:

1. To familiarize the concept of various modes of heat transfer through experimental approaches.
2. To make conversant of concept of heat transfer mechanisms in various engineering applications.
3. To acquaint with the various methods for measurement of engine performance and emission parameters.

Outcomes: Learner will be able to...

1. Estimate thermal conductivity of engineering materials.
2. Evaluate performance parameters of extended surfaces.
3. Analyze heat transfer parameters in various engineering applications.
4. Analyze engine performance and emission parameters at different operating conditions.

List of Experiments

Group A (any five)

1. Measurement of thermal conductivity of metal rod/ liquids/insulating powder.
2. Measurement of thermal conductivity of composite wall.
3. Performance analysis of extended surfaces under free and force convection.
4. Measurement of heat transfer coefficient for flow over flat surface in free/forced convection.
5. Measurement of heat transfer coefficient for flow through tubes in free/forced convection.
6. Verification of Stefan Boltzmann Law.
7. Measurement of emissivity of Grey surface.
8. Determination of time constant of different materials under unsteady state heat transfer.
9. Estimation of overall heat transfer coefficient and effectiveness of heat exchanger.

Group B (Any four)

1. Study of performance and emissions characteristics of a Single Cylinder, Four-Stroke, Petrol Start, Kerosene Engine at constant speed (Load Test).
2. Study of performance and emissions characteristics of a Single Cylinder, Four- stroke Diesel Engine at constant speed (With Electrical/ Rope Brake Dynamometer) (Load Test) along with Heat Balance Sheet.
3. Study of performance and emissions characteristics of a Single Cylinder/Multi Cylinder, Two/Fourstroke petrol Engine at constant Speed/Load.
4. Study of performance and emissions characteristics of a Single Cylinder/ Multi Cylinder, Two/Four stroke petrol Engine at constant Speed along with heat balance sheet.
5. Determination of frictional power and mechanical efficiency of the Multi-cylinder Petrol Engine by Morse test.
6. Study of performance and emissions characteristics of a Single Cylinder, Four- stroke Diesel Engine at constant speed along with Heat Balance Sheet (With Electrical/ Rope Brake Dynamometer) (Load Test) using alternative fuels.
7. Study of performance and emissions characteristics of a Single Cylinder/Multi Cylinder, Four-stroke Petrol Engine at constant speed/load along with Heat Balance Sheet (With Electrical/ Rope Brake Dynamometer) (Load Test) under dual fuel mode.

Assessment:

Term Work

Term work shall consist of the experiments as mentioned in group A and group B.

The distribution of marks for term work shall be as follows:

1. Laboratory work (Experiments): 20 marks
2. Attendance: 05 marks

Virtual Lab

<https://mfts-iitg.vlabs.ac.in/> - Fluid and Thermal Sciences Lab, IIT Guwahati

<https://vlab.amrita.edu/index.php?sub=1&brch=194> - Heat & Thermodynamics Virtual Lab, Amrita Vishwa Vidyapeetham

<http://vlabs.iitkgp.ernet.in/rtvlas/#> - Virtual Lab on Automotive Systems