

MME: Heat transfer Lab

Programme: B.Tech. (MME)
Course : Core

Year: 2017-18
Credits : 1

Semester: V sem, Even
Hours:2 (per week)

Course Context and Overview (100 words):

The objective of the Lab is to provide the students with practical knowledge of fundamentals of the heat transfer like conduction, convection and radiation. In addition to that the detail study of the equipment's like heat exchanger etc. related with heat transfer. This will help the students to develop the skill in understanding the working principles, mechanisms and applications of the basic elements or components of heat transfer.

The further detailed objectives are as following:

1. To learn various heat transfer laws e.g. Fourier's law, Stefan Boltzmann law etc.
2. To learn the working principle, applications and design criterion of some thermal equipment's.

Prerequisites Courses: Thermodynamics and Fluid mechanics (It has prior requirement of the theory part of HT to be completed)

Course outcomes (COs):

On completion of this course, the students will have the ability to:	
CO1 Understand the calculation of some thermal properties	Experiments 3, 4, 5, 6
CO2 Apply the analytical techniques to determine the important performance parameters of thermal devices through experiments.	Experiments 1, 2, 7, 9
CO3 Solve the thermal problems of the energy devices through simulation and experiments.	Experiments 7, 8, 9, 10, 11
CO4 Conduct the tests to determine and prove some heat transfer laws through experiments.	Experiments 1, 2, 5
CO5 Conduct the experimental studies on the heat transfer machines e.g., heat exchanger etc.	Experiments 6, 7

S.No.	Name of the experiment	No. of classes (2 hrs each)	Student development
1	To conduct the heat transfer experiment for natural convection on a cylinder	1	Employability and Skill Development
2	To conduct the heat transfer experiment for forced convection on a cylinder	1	Employability and Skill Development
3	To determine the thermal conductivity of a metallic rod	1	Employability and Skill Development
4	To determine the thermal conductivity of a liquid	1	Employability and Skill Development
5	To determine the Stefan Boltzmann coefficient in radiation	1	Employability and Skill Development
6	To determine the emissivity of a metallic plate in radiation	1	Employability and Skill Development
7	To conduct the experiment on a parallel and counter flow heat exchanger	1	Employability and Skill Development
8	To conduct the experiment on a heat pipe set up	1	Employability and Skill Development
9	To study the critical heat flux in pool boiling experiment.	1	Employability and Skill Development
10	To study two phase boiling heat transfer.	1	Employability and Skill Development
11	To study film and dropwise condensation.	1	Employability and Skill

Course Topics: (List of Experiment for Heat transfer lab)**Textbook references (IEEE format):****Text Book:**

1. Nag P. K, "Heat & mass transfer", TMH, Latest Edition.
2. Dewitt and Incropera, Principles of Heat and Mass transfer, Wiley Publications
3. Holman J. P, "Heat Transfer (in SI units)", TMH, Latest Edition.

Reference books:

1. Moran, M. J and Shapiro H. N, "Fundamentals of Engineering Thermodynamics", John Wiley, 6th ed. 2010.
2. Sachdeva R. C, "Fundamentals of Engineering Heat and Mass Transfer", New Age International Publishers, Latest Edition

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):**Evaluation Methods:**

Item	Weightage (%)
Internal sessional assessment (Lab work with report)	40
Midterm (Quiz & Viva)	20
End term practical Examination	40

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