

In addition to part-I (general handout for all courses in the time-table), this handout provides the specific details regarding the course.

Course No.: ME F311

Course Title: Heat Transfer

Instructor-in-charge: N. JALAIHAH

Instructor(s): N. Jalaiah, P. Ankamma Rao, Y.S. Prasanna, Kalyani Panigrahi

1. Course Description: Fundamental concepts of heat transfer; steady-state and unsteady- state heat conduction; analytical and empirical relations for forced and free convection heat transfer; heat exchanger analysis and design; Heat transfer by radiation; associated laboratory.

2. Scope and Objective: This course is designed to make the students familiar with the concepts of heat transfer and the relevant applications in engineering. As a part of this course, the students shall perform a few experiments, thus to correlate the theoretical knowledge of the subject.

3. Text Book:

1. **J.P. Holman**, Heat Transfer, 9th Edition, McGraw Hill, 2002.
2. **M. Srinivas & R.K. Mittal**, Transport Phenomena-II Notes-EDD, 2003 (Data Book).

Reference Books:

1. **Y.A. Cengel & A.J. Ghajar**, Heat and Mass Transfer – Fundamentals and Principles, 5th Edition, McGraw Hill, 2015.
2. **F. Kreith, R. M. Manglik & M.S. Bohn**, Principles of Heat Transfer, 7th Edition, John Wiley – ISV, 2013.
3. **F.P. Incropera, D.P. Dewitt, T.L. Bergman & A.S. Lavine**, Principles of Heat and Mass Transfer, 7th Edition, John Wiley – International Student Version, 2013.

4. Course Plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1 – 3	To revise the basic concepts of transport phenomena and learn the basics of conduction heat transfer	Introduction to heat transfer, Heat conduction equation	1.1 – 1.4 (T1)
4 – 9	To understand the analysis of one-dimensional steady state heat conduction and the heat transfer from extended surfaces	1D steady state heat conduction, Finned surfaces	2.1 – 2.10 (T1)
10 – 13	To do the analysis of multidimensional steady state heat conduction	Analytical, graphical and numerical methods	3.1 – 3.6 (T1)
14 – 17	To learn heat transfer analysis of unsteady-state conduction	Lumped system analysis, Analytical and numerical methods of analysis	4.1 – 4.6 (T1)
18 – 22	To learn the principles of convection heat transfer	Concepts and basic relations in convection heat transfer	5.1 – 5.2, 5.4 – 5.9 (T1)
23 – 26	To understand the forced convection heat transfer for flow inside ducts and flow over bodies	Analytical solution and empirical relations for forced convection heat transfer for flows in tubes and for flow over flat plate, cylinders, spheres and tube banks	5.10 – 5.11, 6.1 – 6.4 (T1)
27 – 28	To understand the heat transfer analysis of natural convection systems	Analytical solutions and empirical correlation	7.1 – 7.12 (T1)
29 – 32	To learn the design and analysis of heat exchangers	Types of heat exchangers, LMTD and NTU method of analysis	10.1 – 10.6 (T1)
33 – 40	To understand the basic laws of radiation and learn the principles of radiation heat transfer	Basic laws and nature of thermal radiation, Radiation heat exchange between surfaces, Radiation shields	8.1 – 8.8, 8.16 – 8.17 (T1)
41 – 42	To learn the principles of condensation and	Filmwise, dropwise condensation, Pool	9.1 – 9.5 (T1)

Lecture Nos.	Learning Objectives	Topics to be covered	Chapter in the Text Book
	boiling	boiling and flow boiling basics	

5. Evaluation Scheme:

Evaluation Component	Duration (min)	Weightage (%)	Date & Time	Nature of the Component
Lab Report	---	10	Continuous	OB
Lab Viva	---	10	Continuous	OB
Quizzes	15	10	Lecture class	OB
Mid-Sem Test	90	30	01/03 3.30 -5.00PM	OB
Comprehensive Exam	120	40	03/05 FN	OB

6. List of Experiments:

1. Thermal Conductivity of Insulating Powder
2. Thermal Conductivity of Liquid/Gases
3. Thermal Conductivity of Insulating Slab
4. Heat Transfer in Forced Convection
5. Heat Transfer in Natural Convection
6. Heat Transfer from Pin Fin
7. Stefan's Boltzmann Apparatus
8. Emissivity Measurement Apparatus
9. Pool Boiling Apparatus
10. Vertical and Horizontal Condenser
11. Double Pipe Heat Exchanger
12. Convection Drying Equipment

7. **Chamber Consultation Hour:** To be announced in the classroom.

8. **Notices:** Students are advised to visit regularly **CMS** (institute's web based course management system) for updates and notices.

9. **Make-up Policy:** Make-up shall be given only to the genuine cases with prior intimation.

10. **Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
ME F311