

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI – HYDERABAD CAMPUS
INSTRUCTION DIVISION

FIRST SEMESTER 2016-2017

Course Handout (Part II)

Date: 02-08-2016

In addition to part-I (General Handout for all courses appended to the time table), this portion gives further specific details regarding the course.

Course No. : **ME F311**
Course Title : **Heat Transfer**
Instructor-in-charge : **SATISH K DUBEY**
Team of Instructors : **Khalid Anwar, Ramsankar V**

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; condensation and boiling; associated laboratory.

2. Scope and Objective:

This is an extension of the course Transport Phenomena I. This course is designed to make the students familiar with the concepts of heat and their applications in engineering. As a part of this course, students have to do the experiments through which they can correlate with their theoretical knowledge on the subject.

3. Text Books:

T1 : J.P. Holman, Heat Transfer, McGraw Hill, 2002, 9th Edition.
T2 : Mittal RK, Lab Manual, EDD Notes 2007.
T3 : Srinivas, M & R.K. Mittal Transport Phenomena-II Notes-EDD, 2003.

4. Reference Books:

R1 : F. P. Incropera & D. P. Dewitt, Fundamentals of Heat and Mass Transfer, John Wiley & Sons, 2001, 5th edition.
R2 : F. Kreith & M. S. Bohn, Principles of Heat Transfer, Brooks Cole, 2000, 6th edition.
R3 : J. R. Welty and others, Fundamental of Momentum, Heat and Mass Transfer, John Wiley & Sons, 2000, 4th edition.

5. Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap/Sec in Textbook/ Ref. Book
1	To revise the basic concepts of transport phenomena	Introduction to heat and mass transfer	Class notes
2 – 3	To learn the basics of conduction heat transfer	Heat conduction equation	1.1 – 1.2 (T1)
4 – 5	To understand the analysis of one-dimensional steady state heat conduction	1D steady state heat conduction	2.1 – 2.8 (T1)
6 – 8	To understand the heat transfer from extended surfaces	Finned Surfaces	2.9 – 2.10 (T1)
9 – 14	To do the analysis of multidimensional steady state heat conduction	Analytical and numerical methods	3.1 – 3.2 (T1) 3.4 – 3.6 (T1)
15 – 17	To learn heat transfer analysis of unsteady-state conduction	Lumped system analysis; analytical methods of analysis	4.1 – 4.5 (T1)
18-19	To learn the principles of convection heat transfer	Concepts and basic relations in convection heat transfer	5.1-5.2 (T1)
19-21	To understand the forced convection heat transfer for flow inside ducts	Analytical solutions and empirical relations	5.10, 5.11, 6.2 (T1)
22-25	To understand the forced convection heat transfer for flow over bodies	Analytical solution and empirical relations for forced convection heat transfer for flow over flat plate, cylinders, spheres and tube banks	5.4 – 5.9, 5.12, 6.3 – 6.5 (T1)
26-27	To understand the heat transfer analysis of natural convection	Analytical solutions and empirical correlation	7.2 – 7.12 (T1)

	systems		
28	To understand the basic laws of radiation	Basic laws and nature of thermal radiation	8.1-8.3 (T1)
29 – 35	To learn the principles of radiation heat transfer	Radiation heat exchange between surfaces; radiation shields	8.4 – 8.8; 8.16 – 8.17 (T1)
36– 39	To learn the design and analysis of heat exchangers	Types of heat exchangers; LMTD and NTU method of analysis	10.1 – 10.6 (T1)
40 – 42	To learn the principles condensation and boiling	Filmwise, dropwise condensation ,pool boiling	9.1-9.2,9.4-9.5 (T1)

6. Evaluation Schedule:

Component	Duration	Weightage (%)	Date & Time	Remarks
Test I	1 hrs	15	10/9: 8.30-9.30 Am	Closed Book
Test II	1 hrs	15	22/108.30-9.30 Am	Open Book
Tutorial Test	30 Minutes	10	Distributed & Surprise	Open Book
Lab reports		10		Open Book
Lab viva		10		Closed Book
Lab Compre and Viva	2 hours	10		Closed Book
Compre.	3 hrs	30	8/12 AN	Closed Book

7. Chamber consultation hours: To be announced in the class.

Notices: Notices pertaining to this course will be displayed on Mechanical Engineering notice board only. Besides this, students are advised to visit regularly CMS (institute's web based course management system) for latest updates and notices

8. List of Experiments:

The list of experiments and complete modalities of operation of the laboratory such as the exact titles of experiments, reports submission and evaluation methodology etc. shall be announced at the beginning of laboratory session.

Make-up Policy: Make-up for the tests shall be granted only for genuine cases. Requests for the make-up tests, duly forwarded by the instructors, should reach the IC well before the tests. For cases related to illness, proper documentary evidence is essential. No makeup for tutorial test

**Instructor-in-charge
ME C311**