

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE-PILANI - HYDERABAD CAMPUS  
FIRST SEMESTER 2019 - 2020  
(COURSE HANDOUT PART II)

01/08/2019

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, Jeevan Jaidi, M. Srinivas

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, 9<sup>th</sup> Edition, McGraw Hill, 2002.
  2. **M. Srinivas & R.K. Mittal**, Transport Phenomena-II Notes-EDD, 2003 (Data Book).

**Reference Books:**

1. **C.P. Kothandaraman & S. Subramanyan**, Heat and Mass Transfer Data Book, 8<sup>th</sup> Edition, New Age International, 2014.
2. **Y.A. Cengel & A.J. Ghajar**, Heat and Mass Transfer – Fundamentals and Principles, 5<sup>th</sup> Edition, McGraw Hill, 2015.
3. **F. Kreith, R. M. Manglik & M.S. Bohn**, Principles of Heat Transfer, 7<sup>th</sup> Edition, John Wiley – ISV, 2013.
4. **F.P. Incropera, D.P. Dewitt, T.L. Bergman & A.S. Lavine**, Principles of Heat and Mass Transfer, 7<sup>th</sup> 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 – 8	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)
9 – 12	To do the analysis of multidimensional steady state heat conduction	Analytical, graphical and numerical methods	3.1 – 3.6 (T1)
14 – 16	To learn heat transfer analysis of unsteady-state conduction	Lumped system analysis, Analytical and numerical methods of analysis	4.1 – 4.6 (T1)
17 – 20	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)

21 – 25	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)
26 – 28	To understand the heat transfer analysis of natural convection systems	Analytical solutions and empirical correlation	7.1 – 7.12 (T1)

Lecture Nos.	Learning Objectives	Topics to be covered	Chapter in the Text Book
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 boiling	Filmwise, dropwise condensation, Pool boiling and flow boiling basics	9.1 – 9.5 (T1)

#### 5. Evaluation Scheme:

Evaluation Component	Duration	Weightage (%)	Date & Time	Nature of Component
Lab Reports	---	10	Continuous	<b>OB</b>
Lab Viva	---	5	Continuous	CB
Lab Compre & Viva	120 min	5	To be announced	CB
Surprise Tests	15 min each	5	Lecture Class	<b>OB</b>
Tutorial Tests	15 min each	15	Tutorial Class	<b>OB</b>
Mid Semester Test	90 min	20	01.10.2019 3.30 PM – 5.00 PM	CB
Comprehensive Exam	180 min	40	07.12.2019 AN	CB

- 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 shall be announced at the beginning of laboratory session.
- Chamber Consultation Hour:** To be announced in the classroom.
- Notices:** All notices concerning this course shall be displayed on the Mechanical Engineering Notice Board. Students are advised to visit regularly **CMS** (institute's web based course management system) for updates and notices.
- Make-up Policy:** Make-up shall be given only to the genuine cases with prior intimation. No make-up will be given for the surprise and tutorial tests.
- 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