

BITS PILANI, DUBAI CAMPUS
INSTRUCTION DIVISION
FIRST SEMESTER 2015 – 2016

Course Handout (Part – II)

Date: 02.09.2015

In addition to Part I (General Handout for all courses appended to the Time Table) this portion further specific details regarding the course.

Course No. : ME F311 (3 1 4)
Course Title : Heat Transfer
Course Instructors : Dr. R. Udayakumar, Dr.C.Periasamy,
Instructor-in-charge : Dr. R. Udayakumar

Scope and objective of the course:

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 mass transfer 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.

Course Pre/Co- requisite (if any)& Catalogue / Bulletin Description: Given in the Bulletin 2014 – 2015

Study Material:

Text book [TB]:

- i. J.P. Holman, Heat Transfer, McGraw Hill, 2002, 9th Edition.

Reference book(s) [RB]:

- i. F. P. Incropera & D.P.Dewitt, Fundamentals of Heat and Mass Transfer, John Wiley & Sons, 2001, 5th edition. [RB1]
- ii. F. Kreith & M. S. Bohn, Principles of Heat Transfer, Brooks Cole, 2000, 6th edition. [RB2]

Course plan:

S.No.	Learning Objectives	Topics to be covered	Chapter No. [TB]	No. of Lectures
1	To revise the basic concepts of transport phenomena	Introduction to heat and mass transfer	Chap 1	1-2
2	To learn the basics of conduction heat transfer	Heat conduction equation	1.1 – 1.2	3-4
3	To understand the analysis of one-dimensional steady state heat conduction	1D steady state heat conduction	2.1 – 2.8	5-7
4	To understand the heat transfer from extended surfaces	Finned Surfaces	2.9 – 2.10	8-10
5	To do the analysis of multidimensional steady state heat conduction	Analytical and numerical methods	3.1 – 3.2 3.4 – 3.6	11-12
6	To learn heat transfer analysis of unsteady-state conduction	Lumped system analysis; analytical methods of analysis	4.1 – 4.5	13-15
7	To learn the principles of convection heat transfer	Concepts and basic relations in convection heat transfer	5.1-5.2	16-18
8	To understand the forced convection heat transfer for flow inside ducts	Analytical solutions and empirical relations	5.10, 5.11, 6.2	19-21
9	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	22-24
10	To understand the heat transfer analysis of natural convection systems	Analytical solutions and empirical correlation	7.2 – 7.12	25-26
11	To understand the basic laws of radiation	Basic laws and nature of thermal radiation	8.1-8.3	27-28
12	To learn the principles of radiation heat transfer	Radiation heat exchange between surfaces; radiation shields	8.4 – 8.8, 8.16 – 8.17	29-34
13	To learn the design and analysis of heat exchangers	Types of heat exchangers; LMTD and NTU method of analysis	10.1 – 10.6	35-38
14	To learn the principles condensation and boiling	Filmwise, dropwise condensation, pool boiling	9.1 – 9.6	38-42

List of Lab experiments:

1. THERMAL CONDUCTIVITY OF INSULATING POWDER
2. HEAT TRANSFER THROUGH COMPOSITE WALL
3. HEAT TRANSFER IN NATURAL CONVECTION
4. EMISSIVITY MEASUREMENT APPARATUS
5. UNSTEADY STATE HEAT TRANSFER
6. HEAT TRANSFER FROM A PIN FIN
7. VAPOR IN AIR DIFFUSION
8. SHELL & TUBE HEAT EXCHANGER
9. DROPWISE AND FILMWISE CONDENSATION
10. PARALLELFLOW AND COUNTERFLOW HEAT EXCHANGER

Evaluation Scheme:

EC No	Evaluation Components	Duration	Weightage	Date & Time	Venue
1	Test-I (Closed book)	50 minutes	15%	04-10-15 Su8	To be announced
2	Quiz-1 (Closed book)	20 minutes	5%	20-10-15 T2	
3	Test - 2 (Open Book)	50 minutes	15%	17-11-15 T8	
4	Quiz - 2 / Assignment (Closed book)	20 minutes	5%	09-12-15 W7	
5	Lab report & viva		15%	continuous	
6	Lab compre(Closed book)	2 hours	10%	To be announced	
7	Compre Exam (Closed book)	3 hours.	35%	03-01-16 AN	

Learning Outcomes:

1. At the end of this course the student would be able to explain the three modes of heat transfer and would be able to solve simple problems involving them
2. The student would be able to design simple heat exchangers such as condensers, evaporators etc.
3. The students would be able to formulate the heat transfer equations for the given physical situation and would be able to solve the equations.
4. The students are expected to design simple experiments for the equipments available in the lab.

Mid-Sem Grading:

Mid-sem grading will be displayed after two evaluation components. (Refer Academic calendar for schedule).

Note: A student will be likely to get "NC", if he / she doesn't appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-compre total.

Makeup and Attendance policies:

Make-ups: are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the Instructor-in-Charge (I/C). Students with less than 60% of attendance will not be allowed to avail the make-ups. The decision of the I/C in the above matter will be final.

Attendance: Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. A student should have a minimum of 60% of attendance in a course to be eligible to appear for the Comprehensive Examination in that course. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student which may be directly / indirectly related to grading.

General timings for consultation:

The chamber consultation hour is T3, during which the student can contact the instructor for consultation.

General instructions:

Students should come prepared for classes and carry the prescribed text book(s) or material(s) as advised by the Course Faculty to the class.

Notices:

All notices concerning the course will be displayed on the respective Notice Boards.

Instructor-in-Charge
ME F311

Contact details

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