BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
HYDERABAD CAMPUS

FIRST SEMESTER 2021-2022
(COURSE HANDOUT: PART-II)

Date: 20/08/2021

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 C461 & F461**
Course Title: **Refrigeration and Air-conditioning**
Instructor-in-charge: **SANTANU PRASAD DATTA**

Scope and Objective: The course is designed to give an in-depth study of theory of refrigeration and air-conditioning and their applications. The techniques of analysis and design of refrigeration and air-conditioning systems will also be discussed.

Text Book: Arora C.P. 'Refrigeration and Air-conditioning', 3rd Ed Tata McGraw Hill Co, 2000

Reference Books:

1. Roy J. Dossat, 'Principles of Refrigeration', 4th Ed, Pearson Education Asia, 2002
2. W. F. Stocker and J. W. Jones, 'Refrigeration and Air Conditioning', 2nd Ed, McGraw Hill Education (India) Pvt. Ltd., 2014
3. Edward G. Pita, 'Air Conditioning Principles and Systems', 4nd Ed, Pearson Education Asia, 2003
4. John W. Mitchell, James E. Braun, 'Principles of Heating, Ventilation, and Air Conditioning in Buildings', 1st Ed, Wiley, 2013.
5. Jan F. Kreider, Peter S. Curtiss, Ari Rabl, 'Heating and Cooling of Buildings: Design for Efficiency', 2nd Ed., CRC Press, 2010.

Course Plan:

Lect No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1	Introduction & Review	Introduction, the second law interpretation, the Carnot principle	1,2
2-5	Gas cycle refrigeration	Limitation of Carnot cycle, reversed Brayton cycle, Air craft refrigeration, Analysis of Gas cycle refrigeration	11
6-9	Vapor compression system	Modification in reversed Carnot cycle, Vapour compression cycle, Vapour compression system calculation, etc	3
10-	Multi-pressure	Multi stage compression, Multi	5

12	systems	evaporative systems	
13-15	Compressors	Principle & performance of reciprocating compressor, scroll compressor, screw compressor	6
16-17	Condensers	Types, Heat transfer in condensers	7
18	Evaporators	Types, Heat transfer in evaporators	8
19	Expansion Valves	Types of expansion devices	9
20	Refrigerants	Refrigerants nomenclature, selection of refrigerant, comparative study	4
21-24	Vapor absorption system	Vapor absorption system	12
25-28	Psychrometry of air-conditioning processes	Psychrometric properties, Basic processes in conditioning of air, Psychrometric processes in air-conditioning equipment's, Summer & Winter air-conditioning	14,15
29-31	Load Calculations – Cooling & Heating	Design conditions, solar radiations, heat transfer through building structure	17,18,19
32-33	Design of air-conditioning systems	Heat and moisture transfer in air-conditioning equipments	20
34-35	Transmission and distribution of air	Friction loss, dynamic losses in ducts, Air flow through simple duct system, air duct design	21, 22
36-40	RACE Lab Visits and Software Simulation	• Frequent visit to RACE Lab during the entire duration of the course • Building simulation using 'REVIT', a Autodesk software	

Evaluation Scheme:

EVALUATION COMPONENT	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Semester Exam	90 Minutes1	30%	19/10/2021 1.30 - 3.00PM	Open book
Class Assessment	Continuous	15%	-	Open book
Project & Viva	Continuous	15%	-	Open book
Comprehensive Examination	120 Minutes	40%	15/12 AN	Open book

Chamber Consultancy Hour: To be announced by the instructor in the class.

Notices: All the notices concerning this course will be displayed on *Mechanical Engineering Department* notice board.

Make-up Policy: Make-up for the tests shall be granted only for the genuine cases with sufficient evidence. Request for the make-up tests, duly signed by the students, should reach the under signed well before the scheduled test.

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 F461