Faculty of Engineering & Technology
Master of Technology (M. Tech)
(W. E. F.: 2023-24)

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Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M. Tech)
Course Code	:	2MTE04
Course Title	:	Advanced Refrigeration Engineering
Type of Course	:	PE
Year of Introduction	:	2023-24

Prerequisite	:	Basic about Refrigeration system
Course Objective	:	To understand principle of refrigeration system
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Appraise refrigerants, their properties and applications.
	CO2	Discuss different air and vapour compression refrigeration systems and analyze them
	CO3	Estimate the refrigeration load and appraise applications of refrigeration.
	CO4	Discuss various control devices and tubing operation used in refrigeration.
	CO5	Analyze vapour absorption cycles.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
03	00	02	04	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage
1	UNIT 1 Introduction: Thermodynamics Properties of pure and Mixed Refrigerants and their selection. Vapor Compression System, Actual Vapor Compression System, Deviation from theoretical System, Multi-pressure System with Flash Chamber and Inter Cooling, Cascade system.	5	5%
2	UNIT 2 Refrigeration Equipments:	10	20%

	Compressors, Analysis and Thermal Design of Reciprocating, Centrifugal and Screw Compressors, Performance Characteristics & Capacity control.		
3	UNIT 3 Expansion Devices: Capillary, Automatic and Thermostatic Expansion Valve. Other Equipments: Liquid Receiver, Oil Separators, Liquid Line Strainers, Driers, Liquid Subcoolers.	10	25%
4	UNIT 4 Condenser & Evaporator: Types, performance & Their Controls.	7	20%
5	UNIT 5 Thermodynamics of Refrigerant: Absorbent Combinations, Analysis of simple and Industrial Vapor Absorption system using various working fluids Solar Powered Refrigeration & Heat Pump.	10	30%

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To compare and analyze advanced refrigeration cycles for different refrigerants.	02
2	Performance and analysis on heat pump system with different working conditions.	02
3	Performance analysis of VCR system using capillary tube as a throttling device.	02
4	Performance analysis of VCR system using thermostatic expansion valve as a throttling device.	02
5	Performance evaluation of cascade refrigeration system.	02
6	Design of a NH3-H2O vapour absorption refrigeration system for a particular application.	02
7	Design of a LiBr-H2O vapour absorption refrigeration system for a particular application.	02
8	To estimate the cooling load of a cold storage.	02
9	To estimate cooling load and star rating (energy efficiency rating) for any refrigeration application	02
10	To understand construction and working of Ice Plant and determine COP of it	02

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	VCR cycle test rig, Mechanical heat pump, psychrometric processes apparatus,
2	window/split air conditioners, air conditioning test rig
3	VCR cycle test rig, Mechanical heat pump, psychrometric processes apparatus,

Suggested Learning Websites

Sr. No.	Name of Website
1	https://nptel.ac.in

Reference Books

Sr. No.	Name of Reference Books
1	Refrigeration and air conditioning, C. P. Arora, McGraw Hill
2	ASHRAE Hand Book, (1) Fundamentals (2) Refrigeration
3	40 Lessons on Refrigeration and Air Conditioning IIT KGP
4	Principles of Refrigeration, R J Dossat, Pearson Education Asia