

ME305 Refrigeration and Air Conditioning

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0	2	4	DCC		15	25	20	40	-

Objective: To learn properties of different refrigerants, and thermodynamic cycles of refrigeration. To understand comfort parameters and air conditioning.

Syllabus		Contact Hours
Unit-1	Introduction to Refrigeration: Necessity and applications, unit of refrigeration and C.O.P., types of Ideal cycles of refrigeration, air-refrigeration, bell coleman cycle, open and dense air systems, actual air-refrigeration system problems, refrigeration needs of aircrafts, actual refrigeration system	8
Unit-2	Vapour Compression Refrigeration: Working principle and essential components of the plant, simple vapour compression refrigeration cycle - COP, Representation of cycle on T-S and p-h charts - effects of sub cooling and super heating - cycle analysis - Actual cycle, Influence of various parameters on system performance – necessity of multistaging, multistage compression system, and their analysis, necessity and working of cascading system	10
Unit-3	Refrigerants and Absorption Refrigeration: Desirable properties of refrigerants, classification of refrigerants used, nomenclature, ozone depletion, global warming, vapor absorption system, calculation of max COP, description and working of NH3 - water system and Li Br –water, three fluid absorption system and its salient features, steam jet refrigeration system - working principle, basic components and analysis, principle and operation of vortex tube or hilsch tube.	8
Unit-4	Air Conditioning: Psychometric properties & processes, comfort 8 air-conditioning, summer and winter air-conditioning, cooling & dehumidification systems, load calculation and applied psychrometry	8
Unit-5	Human Comfort: Requirements of human comfort and concept 6 of effective temperature, comfort chart, comfort air-conditioning, requirements of industrial air-conditioning, air-conditioning load calculations.	6
Unit-6	Evaporators and condensers: Study of different types of evaporators and condensers used in refrigeration and air-conditioning systems. Effects on performance of refrigeration and air-conditioning systems for different design features of evaporators and condensers.	2
	Total	42

Reference Books:

1	Refrigeration and Air Conditioning by C. P. Arora, Tata McGraw Hill, ISBN-9788120339156.
2	Refrigeration and Air Conditioning by A. R. Trott and T. C. Welch, Butterworth-Heinemann, ISBN-9780080540436.
3	Basic Refrigeration and Air Conditioning by P. N. Ananthanarayan, Tata McGraw Hill, ISBN-9789383286560.
4	Refrigeration and Air Conditioning by Wilbert F. Stoecker and Jerold W. Jones, Tata McGraw Hill, ISBN-007061623X.
5	Refrigeration and Air Conditioning by Richard Charles Jordan, Gayle B. Priester, Prentice hall of India Ltd, ISBN-9780406269313.
6.	ASHRAE Handbook – Refrigeration 2010 , ISBN- 9781933742922.

Course Outcomes

CO1	To define and illustrate the fundamental principles of refrigeration and air conditioning system
CO2	To understand cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
CO3	To demonstrate the working of vapour absorption refrigeration systems
CO4	To analyze the properties, applications and environmental issues of different refrigerants
CO5	To describe and calculate cooling load for air conditioning systems used for various
CO6	To apply and implement knowledge of the refrigeration and air conditioning systems in practical problems.

CO-PO/PSOMatrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2