

III B. Tech – I Semester
(20ME5635) HEAT POWER ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	4

Pre-Requisites: Thermodynamics

Course Objectives:

The Students will acquire the knowledge

- To interpret the concepts of air refrigeration system.
- To discuss the Vapour compression refrigeration system.
- To outline the suitability of various refrigerants.
- To discuss working of vapour absorption system and steam jet refrigeration system.
- To outline the working principles of various air-conditioning systems.

UNIT – I: Introduction to Refrigeration:

Necessity and applications – UNIT of refrigeration and C.O.P. Mechanical refrigeration – types of ideal cycles of refrigeration. air refrigeration: Bell Coleman cycle - open and dense air systems – refrigeration systems used in air craft's and problems.

UNIT II: Vapor Compression Refrigeration:

Working principle and essential components of the plant –simple vapor compression refrigeration cycle – COP – representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – actual cycle influence of various parameters on system performance – use of p-h charts – numerical problems.

UNIT – III:

Refrigerants – Desirable properties – classification - refrigerants used – nomenclature – ozone depletion – global warming

VCR System Components: Compressors – general classification – comparison – advantages and disadvantages. Condensers – classification – working principles evaporators – classification – working principles expansion devices – types – working principles

UNIT – IV:

Vapor Absorption System: Calculation of maximum COP – description and working of NH₃ – water system and Li Br –water (Two shell & Four shell) System, principle of operation three fluid absorption system, salient features.

Steam Jet Refrigeration System: Working Principle and basic components of steam jet refrigeration system. Principle of operation of (i) thermoelectric refrigerator (ii) vortex tube.

UNIT – V:

Introduction to Air Conditioning: Psychometric properties & processes – characterization of sensible and latent heat loads — need for ventilation, consideration of infiltration – load concepts of RSHP, GSHP- problems, concept of ESHF and ADP temperature.

Requirements of human comfort and concept of effective temperature - comfort chart – comfort air conditioning – requirements of industrial air conditioning, air conditioning load calculations.

Air Conditioning Systems: Classification of equipment, cooling, heating humidification and Dehumidification, filters, grills and registers, fans and blowers. heat pump – heat sources – different heat pump circuits.

Course Outcomes:

After successful completion of the course, the students will be able to:

S. No	Course Outcome	BTL
1.	Illustrate the concepts of air refrigeration system.	L2
2.	Explain the Vapour compression refrigeration system.	L2
3.	Summarize the suitability of various refrigerants.	L2
4.	Describe the theory of working of vapour absorption system and steam jet refrigeration system.	L3
5.	Outline the working principles of various air-conditioning systems.	L3

Correlation of COs with POs& PSOs:

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

Text Books

1. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai
2. Refrigeration and Air Conditioning / CP Arora / TMH.

References:

1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration /Dossat / Pearson Education.
3. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / TMH