

16ME403 REFRIGERATION AND AIR CONDITIONING

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSR	CS	SA	S	BS
45	15	-	14	20	2	6	2	2



Course Description and Objective:

This course deals with psychrometry and various types of refrigeration and air-conditioning systems used for both domestic and industrial applications. The objective of this course is to impart knowledge about air and vapour compression refrigeration and to design air conditioning systems.

Course Outcomes:

The student will be able to:

- distinguish refrigeration and air conditioning
- analyze the refrigeration cycles and methods for improving their performance
- identify various kinds of refrigerants and their impact on environment
- estimate various psychrometric properties using analytical and graphical methods.
- recognize the components of refrigeration systems.
- distinguish VCR and VAR Systems
- analyze various types of air conditioning systems

SKILLS:

- ü *Design and fabricate air conditioning system for a specific cooling load.*
- ü *Draw the schematic of psychrometric charts*
- ü *Calculate COP of various refrigerators*
- ü *Analyze winter and summer air conditioning requirements*
- ü *Perform cyclic calculations for standard VCR systems.*

UNIT - 1**L-9; T-3**

AIR REFRIGERATION SYSTEM: Introduction to Refrigeration - Unit of refrigeration; History Reversed Carnot Cycle; Bell-Coleman refrigeration system.

AIR REFRIGERATION: Actual air refrigeration system - Boot strap and reduced ambient type refrigeration; DART Refrigerants: Desirable and undesirable properties - Common refrigerants used - Nomenclature.

UNIT - 2**L-9; T-3**

VAPOUR COMPRESSION REFRIGERATION SYSTEM: Vapour Compression System. Wet Compression; Dry Compression; Superheated Compression Representation of cycle on T-S; 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 –Problems System Components: Compressors - General classification - comparison - Advantages and disadvantages. Condensers - Classification - Working. Evaporators - Classification - Working. Expansion Devices - Types -Working.

UNIT - 3**L-9; T-3**

VAPOUR ABSORPTION REFRIGERATION SYSTEM: Basic vapour absorption system. Ammonia absorption system; Analysis of NH₃ vapour absorption Refrigeration and its Coefficient of performance. Electrolux refrigeration system Li - Br system; Calculation of COP. Principle and Operation of (i) Steam Jet Refrigeration System; (ii) Thermoelectric Generator and (iii) Vortex tube or Hilsch tube. Solar refrigeration system.

UNIT - 4**L-9; T-3**

PSYCHROMETRY: Psychrometric Properties and Processes; Need for Ventilation; Infiltration; Concepts of RSHF;ASHF; ESHF and ADP Types of cooling loads- Cooling Load calculations. Concept of human comfort and effective temperature; comfort Air conditioning; Industrial Air conditioning and Requirements. Year round air conditioning

UNIT - 5**L-9; T-3**

EQUIPMENT OF AIR-CONDITIONING SYSTEMS: Air cleaning and filters; Humidifiers and dehumidifiers; Fans and Blowers; Grills and Registers. Heat pump; different heat pump circuits - Application. Air conditioning Load Calculations. Air conditioning Duct design- Bernouli's theorem and design systems ; safety controls

TEXT BOOKS :

1. S.C. Arora and Domkundwar, "A Course in Refrigeration and Air Conditioning"; 2nd edition, Dhanpatrai and Sons, 2009.
2. Dossat, "Principles of Refrigerations", 2nd edition, Wiley Eastern, 2006.

REFERENCE BOOKS :

1. Manohar Prasad, "Refrigeration and Air Conditioning", 2nd edition, New Age Publications, 2002.
2. C.P. Arora, "Refrigeration and Air Conditioning", 3rd edition, Tata McGraw Hill 2009.

DATA BOOK:

1. Kothandaraman C.P, "Refrigerant Tables and Charts including Air Conditioning Data", 4th edition, New Age Publications, 2015.

WEB LINKS:

1. <https://www.ashrae.org/>
2. <http://ishrae.in/>
3. https://www.youtube.com/channel/UCGIWoFCiw_H5SW4sHWFzQSw
4. <https://www.youtube.com/watch?v=h5wQoA15OnQ>
5. <https://www.youtube.com/watch?v=27uCRQ3B8r4>