

ME425 REFRIGERATION AND AIR CONDITIONING

Course Description & Objective:

To introduce history, importance and components of mechanical engineering, concepts of unit operations and unit processes, and current scenario of refrigerants & industrial applications.

Course Outcomes: .

1. Upon successful completion of this course, the student will be able to
2. Understand the difference between refrigeration and air conditioning
3. Describe the two methods of lowering the temperature of material
4. Identifying and describe the three methods of heat transfer
5. Understand what kind of refrigeration systems are available
6. Understand what kind of air refrigeration systems are available
7. Understand what kind of vapor refrigeration systems are available
8. Understand what causes matter to change its state

UNIT - I Air Refrigeration Systems:

Introduction to Refrigeration - Unit of refrigeration, Reversed Carnot Cycle, Bell-Coleman refrigeration system

Air Refrigeration: Actual air refrigeration system - Refrigeration needs of Aircrafts - Adoption of Air refrigeration, Justification - Types of air refrigeration systems - Problems.

Refrigerants: Desirable and undesirable properties - Common refrigerants used - Nomenclature.

UNIT - II Vapour Compression Refrigeration System:

Vapour Compression System. Wet Compression, Dry Compression, Superheated Compression Representation of cycle on T-S, P-H and H-S charts - effect of subcooling 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 - III KVapour Absorption Refrigeration System:

Basic vapour absorption system. Ammonia absorption system, Electrolux refrigeration system Li - Br system, Calculation of COP. Principle and

Operation of (i) Steam Jet Refrigeration System, (ii) Thermoelectric Refrigeration and (iii) Vortex tube or Hilsch tube.

UNIT - IV Psychrometry:

Psychrometric Properties and Processes, Need for Ventilation, Infiltration, Concepts of RSHF,ASHF, ESHF and ADP. Concept of human comfort and effective temperature, comfort Air conditioning,Industrial Air conditioning and Requirements.

UNIT - V 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.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Manohar Prasad, "Refrigeration and Air Conditioning", 3rd ed., New Age, 2015.
2. C.P. Arora, "Refrigeration and Air Conditioning", 3rd ed., Tata McGraw Hill 2009.

Data Book: C.P.Kodandaraman, "Refrigeration and Air Conditioning", 2nd ed., New Age, 2010.