

equivalent circuit, phasor diagram, effect of rotor resistance, torque equation, starting and speed control methods,

Unit V: Single Phase Induction Motor

Single phase induction motor: double field revolving theory, equivalent circuit, characteristics, phase split, shaded pole motors, disadvantage of low power factor and power factor improvement, various methods of single and three phase power measurement.

TEXT BOOKS:

1. Bimbhra, P.S.(1991). *Electrical Machinery*. Khanna Publishers., New Delhi.
2. Cotton, H. (1999). *Advanced Electrical Technology* (7 ed.). Wheeler Publishing.

REFERENCES:

1. Nagrath, Kothari. (2006) *Electric Machines*. Tata Mc GrawHill publishing company., New Delhi.
2. Theraja, A.K and Theraja, B.L (2002) *.A Textbook of Electrical Technology Vol.1)*. S.Chand
3. <http://nptel.ac.in/courses/108105017/>
4. <http://nptel.ac.in/courses/108106071/>

IV Year I - Semester

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ME425 Refrigeration and Air Conditioning

Course Description & Objectives:

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:

Upon successful completion of this course, the student will be able to:

1. *understand the difference between refrigeration and air conditioning*
2. *describe the two methods of lowering the temperature of material*
3. *identify and describe the three methods of heat transfer*
4. *understand the kinds of refrigeration systems available*
5. *understand kinds of air refrigeration systems available*
6. *understand types of vapor refrigeration systems available*
7. *understand reasons of phase change of matter*

Unit I : Introduction to Air Refrigeration and Refrigerants

Refrigeration - Unit of refrigeration, Reversed Carnot Cycle, Bell-Coleman refrigeration system. Actual air refrigeration system - Refrigeration needs of Aircrafts - Adoption of Air refrigeration, Justification. Types of air refrigeration systems - Problems. Desirable and undesirable properties - Common refrigerants used – Nomenclature, Environmental effects of refrigerants.

Unit II: Vapour Compression Refrigeration System

Compression System. Wet Compression, Dry Compression, Superheated Compression Representation of cycle on T-S, P-H and H-S 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. Compressors - General classification – comparison. Condensers - Classification - Working. Evaporators - Classification - Working. Expansion Devices - Types -Working.

Unit III: Vapour Absorption Refrigeration System

Basic vapour absorption system. Ammonia absorptionsystem, Li - Br system, Electrolux refrigeration system, Calculation of COP. Miscellaneous refrigeration systems: Steam Jet Refrigeration System, Thermoelectric Generator and Vortex tube or Hilsch tube – working principles

Unit IV: Psychometric

Psychrometric Properties and Processes, Need for Ventilation, Infiltration, Concepts of RSHF, GSHF, ESHF and ADP. Concept of human comfort and effective temperature, Comfort Air-conditioning – Applications – Summer, Winter & Year round Air Conditioning Systems & Load Calculations, 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 pumps - different circuits.

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.