

AE 422 AUTOMOTIVE AIRCONDITIONING**Course Description & Objectives:**

The subject aims to discuss principles and the various processes of air conditioning, the thermodynamics involved and optimal design of the various subsystems and methods to distribute conditioned air in the space.

Course Outcomes:

On successful completion of this course students will be able to:

1. understand the laws of thermodynamics and basic refrigeration cycles.
2. know about the refrigerants, refrigeration equipments.
3. understand the psychrometric tables and charts, processes, combinations and calculations.
4. have knowledge on heating and cooling load calculation.

UNIT – I: Review of Thermodynamics:

Laws, General equations, Processes, Equations applied to processes, definitions & methods of refrigeration. Basic Refrigeration Cycles: Carnot cycle, Reversed Carnot cycle, Simple Vapour compression cycle, sub-cooling, superheating, Liquid to suction vapour heat exchanger, Calculations and performance of above cycles, Actual vapor compression cycle.

UNIT – II: Refrigerants:

Classification, requirements of refrigerants like Thermodynamic, physical, & chemical. Comparison among commonly used refrigerants, Selection of Refrigerants, Effect on Ozone depletion and global warming, Alternative Refrigerants. Refrigeration Equipments: Compressor, Condenser, Evaporator, Expansion devices, Types & performance characteristics, selection, methods of charging and leak testing.

UNIT – III: Psychrometry:

Moist air as a working substance, Psychrometric properties of air, Use of Psychrometric tables and charts, Processes, Combinations and Calculations, ADP, Coil Condition line, Sensible heat factor, Bypass factor. Comfort: Thermal exchange between human body and environment, factors affecting comfort, effective temperature comfort chart, ventilation requirements, outside & inside design conditions.

UNIT – IV: Heating and Cooling Load Calculation:

Representation of actual air conditioning process by layouts and on psychrometric charts, Load analysis RSHP, GSHP, ESHP, Enumeration and

brief explanation of the factors forming the load on refrigeration and air conditioning systems, load calculation of automobile vehicle for comfort and transport air conditioning. Energy conservation in air conditioning systems.

UNIT – V: Air Distribution System:

Re-circulated air, Ventilation air, duct system, principle of duct sizing and air distribution, it's norms, diffusers, dampers, layout, duct systems.

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", 2nd ed., New Age, 2002.
2. C.P. Arora, "Refrigeration and Air Conditioning", 3rded., Tata McGraw Hill 2009.