



Course Title: REFRIGERATION AND AIR CONDITIONING

Credit Units: 04

Course Level: UG

Course Code: MAE305

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3		2	-	4

Course Objectives: The aim of this course is to provide the students with the understanding of the basic principles of Refrigeration and Air Conditioning such that they could build simple mathematical models representing the conditioned space and its components used to control environmental conditions. The application of thermodynamics, heat transfer, and fluid mechanics includes an understanding of refrigerants and refrigeration systems, psychometrics, human comfort and air quality, calculation of heating and cooling loads, and heat and mass transfer processes and associated R & AC components and systems.

Pre-requisites: The student should have basic knowledge of Laws and concepts of thermodynamics, heat transfer, and fluid mechanics

Course Contents/Syllabus:

	Weightage (%)
Module I: Refrigeration	20%
Descriptors/Topics 1. Air refrigeration systems 2. Air cycle refrigeration of aircraft 3. Various compression refrigeration cycles 4. Basic components of the plant.	
Module II	20%
Descriptors/Topics 1. Properties and choice of refrigerants 2. Eco-friendly refrigerants 3. Multiple compression and evaporation system 4. Cascading.	
Module III	20%

Descriptors/Topics <ol style="list-style-type: none"> 1. Vapour absorption cycle 2. Electrolux system 3. Steam jet refrigeration 4. Vortex tube 5. Application of refrigeration systems 6. Vapour absorption cycle 	
Module IV	40%
Descriptors/Topics <ol style="list-style-type: none"> 1. Psychometric processes 2. Applied psychometric 3. Comfort air-conditioning 4. Ventilation requirements 5. Cooling and dehumidification system 6. Estimation of cooling and heating loads 7. Air handling and Air distribution 8. Duct design 9. Industrial air conditioning. 	

Student Learning Outcomes:

On completion of the course the student will be able to:

1. Demonstrate knowledge of fundamental concepts of refrigeration and air conditioning.
2. Identify various components of refrigeration and air conditioning systems, perform basic operations and apply safety procedures.
3. Design and analyze problems relating to heating, refrigeration, and air conditioning systems and components.
4. Demonstrate awareness of Global Warming, Green House Gases Effect and Ozone Depletion as related to use of common Refrigerants.

Pedagogy for Course Delivery:

The course pedagogy will include lectures, numerical practice, case studies, seminars and presentations. It also includes discussion on real life problems and demonstrations of refrigeration and air conditioning devices and equipments.

Lab/ Practicals details, if applicable:

List of Experiments:

1. Study of refrigeration testing.
2. Study of Air-Conditioning testing.
3. To calculate the COP of Refrigerator.
4. Study of effect of superheating.
5. To calculate the efficiency of Compressor.
6. To calculate total Heat Load for Air-Conditioning unit.

7. To calculate the COP of Heat Pump.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75%	25%	100%

Theory Assessment (L&T):

	Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination	
Components (Drop down	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Text & References:

Text Books:

- CP Arora, Refrigeration and Conditioning, Tata McGraw Hill
- Manohar Prasad, Refrigeration and Conditioning , Wiley Eastern Limited

Reference Books:

- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India
- WF Stoecker, Refrigeration and Conditioning, McGraw Hill.
- Khurmi, Refrigeration and Air conditioning Tables, S.Chand

Any other Study Material:

- Refrigeration and Air Conditioning Lab Manual
- ASHRAE HVAC handbook
- Visit to a HVAC industry for students.