COURSE CODE	REFRIGERATION AND AIR CONDITIONING	L	T	P	C
1152ME120		3	0	0	3

1. Preamble

This course will be helpful for the students to enhance their knowledge in Refrigeration and Air Conditioning.

2. Prerequisite

Thermal Engineering 1151ME112

3. Links to other courses:

Project Work

4. Course Educational Objectives

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

- Perform calculations relating to heat exchangers,
- About refrigeration and air conditioning cycles.
- Apply knowledge on various refrigeration cycles, system components and refrigerants to design refrigeration and air-conditioning systems.
- Factors which affect energy efficiency and total environmental warming impact.
- About thermal insulations

5. Course Outcomes

The students would be benefitted with the following outcomes:

COs	Course Outcomes	CO3. Level of learning domain (Based on revised Bloom's)
CO1	Understand the working principle of various refrigeration systems and solve the related problems.	K3
CO2	Understand the function of refrigeration components and its performance, properties of refrigerants and applications.	K3
CO3	Apply the concepts of psychometric process to solve the problems.	K3
CO4	Understand the estimation of cooling load and design of air distribution system.	K3
CO5	Explain the working principle of various air conditioning systems and its components.	K2

(K2- Understand)

6. Correlation of CO's with Programme Outcomes:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	L					L					L	M	L
CO2	H	L					L					L	M	L
CO3	H	L					L					L	M	L
CO4	H	L					L					L	M	L
CO5	H	L					L					L	M	L

H- High; M-Medium; L-Low

7. Course Content

UNIT I REFRIGERATION SYSTEMS AND THEIR CYCLES L- 9

Review of thermodynamic principles of refrigeration, Vapour compression cycle, actual vapour compression cycle, cascade system- cycle analysis and performance calculations. Aircraft refrigeration system. Vapour absorption refrigeration system. Ammonia water and Lithium Bromide water systems. Steam jet refrigeration system

UNIT II COMPRESSORS, REFRIGERANTS AND APPLICATIONS OF REFRIGERATION SYSTEMS L- 9

Compressors – reciprocating & rotary (element treatment) – condensers – evaporators. Refrigerants – properties – selection of refrigerants – refrigeration plant controls – testing and charging of refrigeration units Applications to refrigeration systems – ice plant – food storage plants – milk – chilling plants – refrigerated cargo ships – cryogenic in medicine and biological uses

UNIT III PSYCHOMETRY L-9

Review of fundamental properties of psychometric – use of psychometric charts – psychometric processes – Grand and Room Sensible Heat Factors – by pass factor – requirements of comfort air conditioning –factors governing optimum effective temperature, recommended design conditions and ventilation standards.

UNIT IV COOLING LOAD ESTIMATION L - 9

Types of load – design of space cooling load – Heat transmission through building. Solar radiation – infiltration – internal heat sources (sensible and latent) – outside air and fresh air load – estimation of total load – duct design – air distribution system

UNIT IV AIR CONDITIONING SYSTEMS L- 9

Domestic, commercial and industrial systems – central air conditioning systems – applications: car, industry, stores, and public buildings. Air conditioning equipments – air cleaning and air filters – humidifiers – dehumidifiers – air washers – Thermal insulation of air conditioning systems.

TOTAL: 45 periods

8. TEXT BOOKS

1. Arora, S. C. and Domkundwar, S., A course in Refrigeration and Air conditioning, Dhanpat Rai (P) Ltd., New Delhi, 1997
2. Khurmi R.S., and Gupta, J. K., A text book of Refrigeration and Air Conditioning, Eurasia Publishing housing (P) Ltd, New Delhi, 2002

9. REFERENCES

1. Manohar Prasad, Refrigeration and Air conditioning, New Age International (P) Ltd, New Delhi, 1999.
2. Ashrae Hand Book', 4 Vol., Current Ed., Carrier Air Conditioning Co., 'Hand Book of Air Conditioning', Prentice Hall of India, 1974