

19AG216 THERMODYNAMICS, REFRIGERATION AND AIR CONDITIONING

Hours Per Week :

L	T	P	C
2	0	2	3

Total Hours :

L	T	P	WA/RA	SSH/HS	CS	SA	S	BS
30	-	30	10	45	-	-	-	-



Source :

http://4.bp.blogspot.com/-z5Gytxyj7oY/VGnj1J-7e_I/AAAAAAAAAw/xCFmS0-kUAw/s1600/heritage_refrigeration_0026_air_conditioning_fa37e896_f85a_5d54_5e5b_7d2858cf0004.jpg

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with the fundamentals of refrigeration and air conditioning. It also covers the various components and working of refrigeration and air conditioning units. The objective of this course is to enable the students to use different refrigeration systems to increase the shelf life of products and estimation of different loads after harvesting of crops and use of air conditioning system to minimize it.

COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand, discuss and describe different refrigeration systems, carnot cycle, refrigeration systems, cold storage and psychrometry.	---
2	Apply their knowledge and acquired principles on designing of different components towards industrial applications.	3
3	Analyse problems arising in air refrigerators following carnot cycle and find solutions for them.	4
4	Evaluate the trend and current scenario of industrial problems for vapor compression refrigeration and vapor absorption refrigeration system.	2,4
5	Creative and development of new equipments and machineries required for refrigeration based on psychrometric property.	9,11
6	Creative and development of new technology for air conditioning system and their parts also.	9

SKILLS:

- ✓ Assess the industrial air conditioning and requirements.
- ✓ Examine the effect of sub cooling and super heating - cycle analysis.
- ✓ Calculate COP for various air conditioning systems.

- UNIT - I** **L-6**
 Basics of thermodynamics: Thermodynamics properties, closed and open system, flow and non-flow processes, gas laws, laws of thermodynamics, internal energy. Application of first law in heating and expansion of gases in non-flow processes. First law applied to steady flow processes, Carnot cycle, Carnot theorem.
- UNIT - II** **L-6**
 Introduction of entropy and refrigeration: Entropy, physical concept of entropy, change of entropy of gases in thermodynamics process. Otto, diesel and dual cycles. Principles of refrigeration, - units, terminology, production of low temperatures, air refrigerators working on reversed Carnot cycle and Bell Coleman cycle.
- UNIT - III** **L-6**
 Vapor compression refrigeration and vapor absorption refrigeration system: Vapour refrigeration-mechanism, P-V, P-S, P-H diagrams, vapor compression cycles, dry and wet compression, super cooling and sub cooling. Vapour absorption refrigeration system. Common refrigerants and their properties. Design calculations for refrigeration system.
- UNIT - IV** **L-6**
 Cold storage and psychrometry: Cold storage plants. Thermodynamic properties of moist air, perfect gas relationship for approximate calculation, adiabatic saturation process, wet bulb temperature and its measurement, psychrometric chart and its use, elementary psychrometric process.
- UNIT - V** **L-6**
 Air-conditioning systems: Air-conditioning principles, Type and functions of air conditioning, physiological principles in air conditioning, air distribution and duct design methods, fundamentals of design of complete air conditioning systems humidifiers and dehumidifiers cooling load calculations, types of air conditioners and its applications.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

TOTAL HOURS: 30

1. Tutorials on thermodynamic air cycles.
2. Study and application of P vs. V and T vs. S chart in refrigeration.
3. Study and application of P vs. H chart (or) Mollier diagram in refrigeration.
4. Solving of numerical on air refrigeration cycle systems.
5. Solving of numerical on vapour compression cycle refrigeration system.
6. Study of domestic water cooler.
7. Study of domestic household refrigerator.
8. Study of absorption type solar refrigeration system.
9. Study of cold storage for fruit and vegetables.
10. Calculating the value of freezing load and time for food materials.
11. Determination of refrigeration parameters using refrigeration tutor - II.
12. Solving of numericals on design of air conditioning systems.
13. Study of window air conditioner.
14. Study on repair and maintenance of refrigeration and air-conditioning systems.
15. Visit to chilling or ice making and cold storage plants.
16. Practical examinations.

TEXT BOOK:

1. C.P. Arora, 2009, "Refrigeration and Air Conditioning", 3rd edition, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Manohar Prasad, 2002, "Refrigeration and Air Conditioning", 2nd edition, New Age International.
2. S.C. Arora and Domkundwar, 2009, "A Course in Refrigeration and Air Conditioning", 2nd edition, Dhanpatrai and Sons.
3. Khurmi R S. 1992, "Engineering Thermodynamics". S Chand and Co. Ltd., Ram Nagar, New Delhi.

WEB LINKS:

1. <http://nptel.ac.in/courses/112105129/>
2. <http://nptel.ac.in/courses/112105128/>