Thermal systems design

Academic Year: (2019 / 2020) **Review date: 29/04/2020 16:32:54**

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: LIZARTE MAYO, RAQUEL

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Thermodynamics
Heat transfer

OBJECTIVES

By the end of this subject, students will be able to have:
1. A systematic understanding of the key aspects and concepts of the vapour compression refrigeration systems for buildings and freezing chambers.
2. Coherent knowledge in the buildings air-conditioning field, including some at the forefront of vapour compression refrigeration systems.
3. The ability to apply their knowledge and understanding to identify, formulate and solve thermal load problems and vapour compression refrigeration systems for buildings using established methods;
4. The ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements according to the Thechnical building Code, the air-conditioning requirements in buildings and refrigeration freezing chambers.
5. The ability to design and conduct appropriate experiments, interpret the data and draw conclusions;
6. The ability to select and use appropriate equipment, tools and methods for the air-conditioning of buildings and the refrigeration of freezing chambers.
7. The ability to combine theory and practice to solve engineering problems related to the overall heat transfert coefficient of a building, thermal loads, vapour compression refrigeration systems for buildings and freezing chambers.
8. Function effectively as an individual and as a member of a team;
9. Demonstrate awareness of the health, safety and legal issues and responsibilities of the thermal efficiency for buildings and vapour compression refrigeration systems, the impact they have in a societal and environmental context, and commit to professional ethics, responsibilities and norms in the air-conditioning field.

DESCRIPTION OF CONTENTS: PROGRAMME

The subject is divided into three main blocks:
Block 1: Regulations. Technical building Code. Energy Certification of buildings. Thermal loads. Energy demand.
Block 2: Vapour compression air-conditioning systems. Heat pumps. Freezing chambers. Two-stage compression systems.
Block 3: Environmental impact of vapour-compression systems. Refrigerants: Ozone Depletion, Global Warming Potential.

LEARNING ACTIVITIES AND METHODOLOGY

The learning methodology includes:
1. Lectures covering the main topics of the course. In order to facilitate the learning process the student will receive support material and information to let them focus on the relevant topics.
2. Resolution of problems at class with the student´s participation, to consolidate their newly acquired knowledge.
3. Exercises solved by the student to self-assess their knowledge and acquire the necessary skills.

4. Lab sessions: Team-work and preparation of reports.
   - Determine thermal loads
   - Freezing chamber. Operational parameters.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

A continuous evaluation system will be carried out where the following will be evaluated.
1. Problem solving. Resolution will be carried out individually.
2. Team work: Lab sessions. Elaboration of reports.
3. Final exam. Evaluation of students learning.

BASIC BIBLIOGRAPHY

- Fco Javier Rey, Eloy Velasco Bombas de calor y energías renovables en Edificios, Paraninfo, 2005

- Michael J. Moran, Howard N.Shapiro Fundamentals of Engineering Thrmodynamics, John Wiley&Sons,InC, 2004