Industrial Electronics

Academic Year: (2020 / 2021) **Review date: 20-07-2020**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: FERNANDEZ HERRERO, CRISTINA

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Fundamentals of Electronic Engineering
Fundamentals of Electrical Engineering

OBJECTIVES

- Learn and use the most common electronic components in the field of Power Electronics.
- Learn and identify the most common topologies corresponding to three
- Identify the most characteristic circuits related with Power Electronics as well as the most common applications.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Power Electronics.
    1.1. Fundamentals on Power Electronics.
    1.2. Typical applications.
2. Basic electric concepts.
    2.1. Passive components: resistor, inductor, capacitor.
    2.2. Average and rms of periodic signals.
    2.3. Fourier series of a periodic non-sinusoidal signal.
    2.4. Average and rms using Fourier series.
    2.5. Active, reactive and apparent power.
    2.6. Measuring the quality of a signal: ripple factor, power factor, harmonic distortion.
3. CA-CC conversion: rectifiers.
    3.1. Diodes
    3.2. Basic circuits with diodes.
    3.3. Non-controlled mono-phase rectifier.
        3.3.1. Resistor load.
        3.3.2. Capacitor filter.
        3.3.3. Inductor-capacitor filter.
    3.4. Controlled mono-phase rectifier.
        3.4.1. Resistor load.
        3.4.2. Highly inductive load.
    3.5. Controlled three-phase rectifier.
        3.5.1. Resistor load.
        3.5.2. Highly inductive load.
4. CC-CA conversion: inverters.
    4.1. Introduction and basic concepts.
    4.2. MOSFET and IGBT.
    4.3. Single phase, full bridge.
        4.3.1. Square wave.
        4.3.2. Phase shift control.
        4.3.3. Sinusoidal PWM.
    4.4. Three phase inverters.
        4.4.1. Square wave.
        4.4.2. Sinusoidal PWM.
5. CC-CC conversion.
    5.1. Introduction to power supplies.
    5.2. Analysis of dc-dc converters.
    5.3. Topologies without galvanic isolation.
    5.4. Topologies with galvanic isolation.

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures oriented to introduce Power Electronics concepts.
- Lectures oriented to problems resolution.
- Laboratory.
- Additional classes to solve doubts.

ASSESSMENT SYSTEM

- Laboratory (compulsory) (20%).
- Tests during the course (20%).
- Final test oriented to problems (60%, a minimum mark will we required).

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

BASIC BIBLIOGRAPHY

- D. W. HART Power Electronics, Prentice Hall, 2001.
- N. MOHAN, T.M. UNDELAND, W.P. ROBBINS Power electronics, converters, applications and design, John Wiley & Sons, 2003.
- R.W. ERICKSON, D. MAKSIMOVIC Fundamentals of Power Electronics, Kluwer Academic Publishers, 2001.