Power Electronics Converters

Academic Year: (2023 / 2024) **Review date: 28-04-2023**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: ZUMEL VAQUERO, PABLO

Type: Compulsory ECTS Credits : 3.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Power Electronics

OBJECTIVES

By the end of this subject, students will be able to have:
1. a systematic understanding of the key aspects and concepts of their branch of engineering in power electronics converters;
2. coherent knowledge of their branch of engineering including some at the forefront of the branch in power electronics converters;
3. the ability to apply their knowledge and understanding of power electronics converters to identify, formulate and solve engineering problems using established methods;
4. the ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements;
5. an understanding of design methodologies, and an ability to use them.
6. workshop and laboratory skills.
7. the ability to select and use appropriate equipment, tools and methods;
8. the ability to combine theory and practice to solve problems of power electronics converters;
9. an understanding of applicable techniques and methods in power electronics converters, and of their limitations;

DESCRIPTION OF CONTENTS: PROGRAMME

Brief survey of Power Semiconductor Devices. Power losses Analysis.
Fundamentals of design and selection of inductors, transformers and capacitors.
Basic overcurrent and overvoltage protections.
Heat-sink calculations.
Converter topologies analysis.
Fundamentals of Electromagnetic Compatibility.

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology will include:

Magisterial Classes, where the students will be presented with the basic knowledge they must acquire. Students will be supplied with lecture notes and key reference texts which will enable them to complete and acquire a more in depth knowledge of the subject.

Problems Classes, these are aimed at the solving of exercises and examples within the context of real case studies. These classes will be complimented with the resolution of practical exercises on behalf of the student.

Laboratory Practical Sessions

Group tutorials

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ASSESSMENT SYSTEM

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

FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course. 60 % of the final grade.

CONTINUOUS EVALUATION. Assesses the practical work (lab or computer room) along the course (total 40%). The assessment will be over material delivered after the practical session or during the practical session.

BASIC BIBLIOGRAPHY

- BARRADO, A. LÁZARO Problemas de Electrónica de Potencia, Pearson Prentice Hall, 2007

- 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. Second Edition, Kluwer Academic Publishers, 2002

ADDITIONAL BIBLIOGRAPHY

- A. I. PRESSMAN Switching Power Supply Design, McGraw-Hill, 1998

- CHRISTOPHE P. BASSO Switch-Mode Power Supplies Second Edition, Mc Graw Hill, 2014

- K. BILLINGS Switching power supply handbook, Mc Graw Hill , 2011

- W.G. HURLEY, W.H. WÖLFLE Transformers and Inductors for Power Electronics, Wiley, 2013