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Manufacturing and construction of electronic equipment

Academic Year: (2022 / 2023)   **Review date: 20-05-2022**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: FERNANDEZ HERRERO, CRISTINA

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Fundamentals of Electronic Engineering
- Analog Electronics I
- Digital Electronics

OBJECTIVES

By the end of this subject, students will be able to have:

1.   Coherent knowledge of their branch of engineering including some at the forefront of the branch in the fabrication and implementation of electronic systems.

2.   The ability to apply their knowledge and understanding of design, simulation and manufacturing of electronic circuits to identify, formulate and solve engineering problems using established methods.

3.   The ability to apply their knowledge and understanding to analyse engineering production, processes and methods to manufacture electronic systems.

4.   The ability to apply their knowledge and understanding to develop and realise designs of electronic circuits to meet defined and specified requirements.

5.   An understanding of design methodologies, and an ability to use them to perform different simulation of electronic systems.

6.   The ability to design and conduct appropriate experiments, interpret the data and draw conclusions, comparing the measurement results with those achieved by simulation or theoretical analysis.

7.   Workshop and laboratory skills to test the manufactured electronic circuits.

8.   The ability to select and use appropriate equipment, tools and methods for the simulation and fabrication of electronic circuits.

9.   The ability to combine theory and practice to solve problems of designing electronic equipment and systems.

10.   An understanding of applicable techniques and methods in the design of electronic equipment and systems, and of their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to CAD
          1.1. Introduction and history
          1.2. Virtual prototyping
          1.3. Design cycle
          1.4. Commercial CAD tools
2. Description of CAD tools for electronic circuits
          2.1. Schematic capture
          2.2. Lay-out editor
          2.3. Library manager
          2.4. Simulators
3. Schematics
          3.1. Basic rules
          3.2. Example of inverse engineering
4. Manufacturing PCBs
          4.1. Introductions
          4.2. Terminoloby
          4.3. Manufacturing processes
                    4.3.1. Materials
                    4.3.2. Methods
                    4.3.3. Component assembly
                    4.3.4. Soldering

5. Design of PCBs using CAD tools
      5.1. Parameters
      5.2. Placing components
      5.3. Routing the design
      5.4. Post-processing
      5.5. Desing criteria
6. Simulation of electronic circuits
      6.1. Introduction
      6.2. Basic techniques
      6.3. Hierarchical design
      6.4. Subcircuits
      6.5. Behavioural library
      6.6. Digital and analog mixed simulation
      6.7. Simulator engine

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures oriented to introduce Power Electronics concepts.
- Lectures oriented to problems resolution.
- Laboratory.

ASSESSMENT SYSTEM

- Laboratory (compulsory) (30%): design, simulation, PCB design and test of an electronic circuit.
- Tests during the course (30%): practical problems of simulation and PCB design.
- Final test (40%, minimum grade required): test about the basic concepts of the subject, and practical test about simulation and PCB design.

% end-of-term-examination: 40

% of continuous assessment (assigments, laboratory, practicals…):   60

BASIC BIBLIOGRAPHY

- Dennis Fitzpatrick Analog Design and Simulation Using OrCAD Capture and PSpice, Newnes, 2012

- Mark I. Montrose Printed Circuit Board Design Techniques for EMC Compliance¿A Handbook for Designers, IEEE The Institute of Electrical and Electronics Engineers, 2000
- Muhammad H. Rashid Introduction to PSpice Using OrCAD for Circuits and Electronics, Prentice Hall, 2003

- Peter Wilson The Circuit Designer's Companion, Newnes, 2012

ADDITIONAL BIBLIOGRAPHY

- Kraig Mitzner Complete PCB Design Using OrCAD Capture and PCB Editor, Newnes, 2009