

Academic Year: ( 2022 / 2023 )

Review date: 20-05-2022

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: ALONSO MARTINEZ, MONICA

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Calculus I, Calculus II, Linear Algebra, Physics II

It is needed to follow, simultaneously, Electric Power Engineering Fundamentals.

**OBJECTIVES**

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

1. knowledge and understanding of the mathematical principles underlying their branch of engineering;
2. the ability to apply their knowledge and understanding to identify, formulate and solve mathematical problems using established methods;
3. a systematic understanding of the key aspects and concepts of electrical circuits;
4. the ability to apply their knowledge and understanding to identify, formulate and solve electrical circuits problems using established methods;
5. the ability to design and conduct appropriate experiments, interpret the data and draw conclusions;
6. workshop and laboratory skills.
7. the ability to combine theory and practice to solve electrical circuits problems;

**DESCRIPTION OF CONTENTS: PROGRAMME****TEMA 1:METHODS OF RESOLUTION OF DIFFERENTIAL EQUACIONES**

- 1.1. Resolution of D.E. in time domain.
- 1.2. Numerical methods to resolve D.E.
- 1.3. Using Laplace Transform to solve a D.E.

**TEMA 2: FIRST ORDER ELECTRICAL CIRCUITS**

- 2.1. Obtaining the free response and and the forced response.
- 2.2. Time constant

**TEMA 3: SECOND ORDER ELECTRICAL CIRCUITS**

- 3.1. Obtaining the free response and the forced response.
- 3.2. Natural frequency and damping. System stability.
- 3.3. Series resonance. Paralel resonance.
- 3.4. Modelling electrical transients by means of software tools.

**LEARNING ACTIVITIES AND METHODOLOGY**

Theoretical and practical lessons solving problems. Practical lessons using computers.

**ASSESSMENT SYSTEM**

Partial and final examination and practical assessment.

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

**BASIC BIBLIOGRAPHY**

- Allan Greenwood Electrical Transients in Power Systems, John Wiley and Sons.

- Fraile Mora, Jesús Electromagnetismo y circuitos eléctricos, McGraw-Hill.
- Paul J. Nahin Transient for Electrical Engineers Elementary Switched circuit Analysis in the Time and Laplace Transform Domains, Springer.
- R.K. Nagle Fundamentals of Differential Equations, Pearson.
- Usaola, Julio y Moreno, M<sup>a</sup>. Ángeles, Circuitos eléctricos. Problemas y ejercicios resueltos, Pearson Educación.