

Academic Year: ( 2020 / 2021 )

Review date: 06/09/2020 12:42:15

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: CASTRONUOVO , EDGARDO DANIEL

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

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

Electrical Engineering Fundamentals.

## OBJECTIVES

- Skill: To identify the main technical components of the electricity sector.
- Skill: To analyze the characteristic of transmission lines in ac and dc.
- Skill: To specify the effects of a short circuit in the electrical system.
- Skill: To design simple circuits with electrical wires.
- Skill: To compose both switching and protection equipments in an electrical network.

## DESCRIPTION OF CONTENTS: PROGRAMME

Dear Student:

This course reviews the main components of the electrical system. We study how electricity is generated, as it is transported around the country, the way how it is distributed in the cities, the design of commercial, industrial and home installations and some characteristics of the energy demand. Also, we analyze how the system detects and reacts to short circuits.

Six thematic groups can be summarized:

1. The electricity system, with a characterization of its main components.
  - 1.1. Power system structure: generation, transmission and distribution.
  - 1.2. The generation mix in Spain.
  - 1.3. Main characteristics of transmission and distribution grids.
  - 1.4. Load estimation.
  - 1.5. Per unit calculation.
2. Overhead transmission lines.
  - 2.1. Physical configuration of overhead transmission lines.
  - 2.2. Characteristics and models for ac and dc transmission lines.
3. Analysis of symmetrical short circuits.
  - 3.1. Types of short circuits.
  - 3.2. Symmetrical Short circuit calculations.
4. Planning of electric systems with insulated conductors.
  - 4.1. Selection criteria for insulated cables.
  - 4.2. Approximate calculation of voltage drops in short lines.
  - 4.3. Maximum current criterion in short circuit and normal situations.
5. Switchgears: switching and measurements.
  - 5.1. Switchgears characterization.
  - 5.2. Switching connections in electric substations.

- 6. Protections in the electric system.
- 6.1. Protection elements and structures in electric grids.
- 6.2. Fuses and relays selection.

In the course, three lab's activities are executed.

#### LEARNING ACTIVITIES AND METHODOLOGY

In the course, introductory topics are presented, typical problems are solved and laboratory classes are followed. The problems are solved jointly between students and teacher, interactively. Laboratory lectures reinforce contents and skills of the students, allowing them interacting with electrical elements in a real form.

#### ASSESSMENT SYSTEM

<b>% end-of-term-examination/test:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

The continuous assessment is based on works, participation and assessment tests skills.

In both ordinary and special tests, a minimum of 20% of each exercise must be correctly answered, for approving.

ATTENTION:

\* Labs must be approved before the final tests.

#### BASIC BIBLIOGRAPHY

- M.E. El-Hawary Introduction to Electrical Power Systems, John Wiley & Sons, 2008
- N. Mohan First course on Power Systems, MNPERE, 2006

#### ADDITIONAL BIBLIOGRAPHY

- P. Montané Protecciones en las instalaciones eléctricas, evolución y perspectivas, P. Montané, 1991