

Academic Year: (2020 / 2021)

Review date: 28-07-2020

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: LEDESMA LARREA, PABLO

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Solution of AC electrical circuits using phasors (e.g. Electrical Power Engineering Fundamentals in UC3M)

OBJECTIVES

By the end of the term, students will be able to:

1. know and understand the scientific and mathematical principles underlying the analysis and design of power systems
2. systematically understand the key aspects and concepts of power system operation
3. apply their knowledge and understanding to identify, formulate and solve power system problems using established methods
4. apply their knowledge and understanding to design power systems that meet specified requirements
5. demonstrate computer skills applying software tools to the analysis of power systems
6. combine theory and practice to solve power system problems

DESCRIPTION OF CONTENTS: PROGRAMME

Transmission and distribution grids

Transmission voltages

Meshed and radial grids

Power quality

Basic mathematical models of lines, transformers, loads and generators

Per unit quantities

Power lines

Conductors

Insulators

Pylons

Mechanical tension

Mathematical models of a line

Power flow and voltages in a line

Corona effect

The power flow problem

Power flow equations

Newton-Raphson method

Modified N-R methods

Voltage control

Shunt-connected coils and capacitors

Automatic voltage regulation in power plants

Tap changer transformers

Ferranti effect

Voltage control in a distribution system

Voltage control in a transmission system

Substations

Disconnectors

Circuit breakers

Measurement transformers

Substation configurations

Frequency control

Primary regulation

Secondary regulation

Tertiary regulation

Protection systems

Characteristics of a protection system

Time/current relay

Fault clearing time and transient stability

Emerging technologies in power systems

Energy load management

Electric vehicles

Smart meters

Smart grid

LEARNING ACTIVITIES AND METHODOLOGY

Practical work in the computer laboratory

Theoretical classes

Solution of practical problems in class

Individual tutorials

ASSESSMENT SYSTEM

The continuous assessment will take into account:

- Assignments
- Quizzes
- Attendance and participation

Ordinary call:

- Continuous assessment 60%
- Final exam 40%

Extraordinary call:

Most favorable option between

- Continuous assessment 60%
- Final exam 40%

and

- Final exam 100%

% end-of-term-examination: 40

% of continuous assessment (assignments, laboratory, practicals...): 60

BASIC BIBLIOGRAPHY

- Grainger, Stevenson Power System Analysis, McGraw-Hill.
- P. Kundur Power System Stability and Control, EPRI.
- Pieter Schavemaker; Lou van der Sluis Electrical Power System Essentials, John Wiley & Sons, 2008