

DIE-IND-511 Control of Electric Power Systems

SEMESTER: Spring

CREDITS: 6 ECTS (4 hrs. per week, 46h Theory + 14h Lab)

LANGUAGE: Spanish

DEGREES: MII

Course overview

Deep analysis of the frequency-power control (F-P) and voltage-reactive (V-Q) power control in a power system is made. Power flow techniques, security issues and state estimation in power systems are studied to support F-P and V-Q control concepts.

Prerequisites

- Circuit theory and resolution knowledge
- Electric Machines

Course contents

Theory:

1. Introduction.
2. Load-Frequency Control of Power Systems (f/P Control)
3. Elements of Power Systems (Lines, Transformers, Generators, Loads)
4. Power Flow Computation
5. Voltage Control of Power Systems (V/Q Control)
6. Steady State Security Assessment of Power Systems
7. State Estimation

Laboratory:

- P1. Single Area Load-Frequency simulation (with Matlab-Simulink) – 2h
- P2. MultiArea Load Frequency simulation (with Matlab-Simulink) – 2h
- P3. Power flow analysis (with PSS/E) - 2 h
- P4. Steady State Security Assessment (with PSS/E) - 2h
- P5. Security analysis in Distribution Networks (with PSS/E) – 2 h
- P6. State Estimation (with Excel) -2-
- P7. Lab Exam – 2h

Lab units P1 and P2 will take place after completion of Theory Unit 2. Lab units P3 and P4 will take place after Theory Unit 5. Lab unit P5 will take place after theory unit 6 and Lab Unit P6 after theory unit 7

Textbooks

- “Análisis y Operación de Sistemas de Energía Eléctrica”. Coordinador A. Gómez Expósito. Ed. McGraw-Hill.
- “Power Generation Operation & Control”. Wood, A.J. - Wollenberg, B.C. John Wiley.
- “Electric Energy Systems Theory. An introduction”. O.I. Elgerd. Ed. McGraw-Hill

Grading

The overall grade is obtained as follows:

- Theory (75%)+Lab 25%
- Theory
 - Mid-term exam accounts for 30 %
 - Final Exam accounts for 70 %
- Lab
 - 50 % lab reports
 - 50 % lab exam