Electric power stations I

Academic Year: (2020 / 2021) **Review date: 03-11-2020**

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: ORDUÑEZ DEL PINO, MIGUEL ANGEL

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Magnetic circuits and transformers.
- Alternating current electrical machines.
- Electric power systems.
- Electric power stations I.

OBJECTIVES

The objectives of this course are to provide a sound basis in the electrical side of a generation power plant. In particular all issues related with one line and three line diagrams, selection of transformers for the power plant, grounding calculation, generator circuit breaker selection, and design & setting of the protection system.

At the end of the course, the student will be able to:
- Identify the electrical system of a generation power plant.
- Selection of the proper values to buy transformers for connection with the network and for connection with the ancillary system.
- Grounding Assessment for generator power plant.
- Definition of the protective system.
- Evaluation of the monitoring and maintenance procedures.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Types of Generation Power plants. History and main characteristics. Demand supply.
2. Power Plant Operation and Maintenance.
3. Cost analysis. LCOE procedure to assess costs for Nuclear, Coal and Combined Cycle technologies.
4. Generation power plant general scheme. Project stages. One line and three line diagrams.
5. Pumping power plants. Types and characteristics.
6. Functional characteristics of a Generator. Grounding method for generators.
7. Isolated phase busbar. Generator circuit breaker. Main power transformer.
8. Auxiliary services for generator power plants. Loads and voltage level.
9. Short-circuit currents and voltage drop in the different parts of the power plant. Criteria for auxiliary transformer assessment.
10. Protection relay introduction. Faults and abnormal condition in generators.
11. Specific generator protection criteria.
12. Generator regulation. Voltage and velocity regulation. F-P regulator.
13. Control system. Introduction to 61850.
14. Power Electronics in Power Stations. International connections. DC Technologies (HVDC).

LEARNING ACTIVITIES AND METHODOLOGY

- Magisterial classes to explain the main theoretical concepts of the subject and presentations from pupils.
- Reduced groups to solve problems by the teacher.

ASSESSMENT SYSTEM

Continuous assessment based on working groups tasks presented to the classmates, papers, class participation and partial tests to check the knowledge and abilities acquired during the course.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- A.K. Raja; Amit Prakash Srivastava; Manish Dwivedi Power Plant Engineering, NEW AGE INTERNATIONAL PUBLISHERS, 2005
- Stan Kaplan POWER PLANT CARACTERISTICS AND COSTS, Nova Science Publishers, 2009