

Academic Year: ( 2020 / 2021 )

Review date: 02-09-2020

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: BURGOS DIAZ, JUAN CARLOS

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

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

Physics II

Electrical Power Engineering Fundamentals

**DESCRIPTION OF CONTENTS: PROGRAMME**

Topic 1: REVIEWING BASIC CONCEPTS ON ELECTRICITY AND MAGNETISM. Maxwell equations. Core losses. Dielectric losses. Magnetic circuits. Self and mutual inductances.

Topic 2: CONSTITUTION OF POWER TRANSFORMERS. Magnetic core, windings, insulation system. Transformer refrigeration. Basic concepts on maintenance.

Topic 3: 1-PHASE TRANSFORMERS. No load performance. On-load performance. Overloads. Equivalent circuit. Efficiency. Voltage drop. Parallel operation. Short circuit currents. Inrush current.

Topic 4: 3-PHASE TRANSFORMERS. Types of transformers. Phasor groups. No-load performance. Transformer performance under balanced and un-balanced loads. Zero-sequence impedance. Tertiary windings. Interconnected star windings. Three winding transformers. Autotransformers. Tap changers. Application of the different transformer types and phasor groups.

**LEARNING ACTIVITIES AND METHODOLOGY**

The learning methodology includes:

- Lectures covering the main topics described within the course outline.
- Case study and problem solving lectures, where some issues are addressed from a practical point of view.
- Laboratory sessions

**ASSESSMENT SYSTEM**

One writing exercise for each topic of the subject. With a score upper than 5.0 the exercise is passed. Those students with one or various failed exercises must perform a final exam of those failed exercises.

**% end-of-term-examination:** 60

**% of continuous assessment (assignments, laboratory, practicals...):** 40

**BASIC BIBLIOGRAPHY**

- Kulkarni, S.V.; Khaparde S.A. Transformer engineering. Design and Practice, Marcel Dekker, 2012

**BASIC ELECTRONIC RESOURCES**

- Juan Carlos Burgos . OCW Circuitos Magnéticos y Transformadores: <http://ocw.uc3m.es/ingenieria-electrica/circuitos-magneticos-y-transformadores>