

Academic Year: ( 2019 / 2020 )

Review date: 30-06-2018

Department assigned to the subject: Department of Electrical Engineering

Coordinating teacher: BURGOS DIAZ, JUAN CARLOS

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 1

**STUDENTS ARE EXPECTED TO HAVE COMPLETED**

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.

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	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>