

SUBJECT TEACHING GUIDE

G280 - Fundamentals of Electrical Engineering

Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems			Type and Year	Compulsory. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Fundamentals of Electrical Engineering Module: Further Basic Training				
Course unit title and code	G280 - Fundamentals of Electrical Engineering				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA				
Name of lecturer	ALBERTO ARROYO GUTIERREZ				
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO PROFESOR (S2026)				
Other lecturers	GERARDO DIEZ CAGIGAL SERGIO BUSTAMANTE SANCHEZ				

3.1 LEARNING OUTCOMES

- Know and apply universal equations of the theory of electrical circuits and the equations that govern the behavior of linear circuit elements.
- Understand, implement and evaluate the problems associated with sinusoidal steady state and frequency response.
- Understand, implement and evaluate general methods of analysis in steady state circuits.
- Understand, implement and evaluate the theorems of circuits.

4. OBJECTIVES

The overall aim is that the student knows to analyze electrical circuits in any work system.

Specifically, in this subject:

- * Know and apply the main equations of the circuit elements.
- * Use methods of analysis in direct and altern current.
- * Analyze circuits in the frequency domain.
- * Be able to understand the connections and the use of the measurement equipments.

6. COURSE ORGANIZATION

CONTENTS

1	<p>BT 1: ELEMENTS OF LINEAR CIRCUITS</p> <p>1.1 Theoretical contents: Introduction. General circuits. Excitation waveforms / answers. Measuring devices. Two terminal passive elements. Association of passive elements. Independent active elements. Association of active elements. Generalized Ohm law. Dual elements and magnitudes.</p> <p>1.2 Problems of classroom: Approach and resolution strategies and implementation problems items.</p> <p>1.3 Activities of tutorial: Proposed items and problems / Clarification and resolution of doubts.</p> <p>1.4 Group work: Resolution, in groups of 2/3 students, and some of the items proposed problems.</p>
2	<p>BT 2: CIRCUITS IN SINUSOIDAL STEADY STATE</p> <p>2.1 Theoretical contents: Introduction. Analysis by undetermined coefficients of the D.E of the network. Phasor transform. Phasor or complex analysis. Power in sinusoidal state. Power measurement. Boucherot theorem: installations, the power factor. Real sources: features, power and efficiency, maximum power transfer.</p> <p>2.2 Problems of classroom: Approach and resolution strategies and implementation problems items.</p> <p>2.3 Activities of tutorial: Proposed items and problems of application / Clarification and resolution of doubts.</p> <p>2.4 Group work: Resolution, in groups of 2/3 students, and some of the items proposed problems.</p>
3	<p>BT 3: ANALYSIS OF THE FREQUENCY RESPONSE</p> <p>3.1 Theoretical contents: Introduction. Quality of coils and capacitors. Study of dipole RLC series: variation of impedance and current with frequency, bandwidth and quality factor, definition and properties of resonance. Study of GCL dipole by duality. Study of resonance in series and shunt impedances.</p> <p>3.2 Problems of classroom: Approach and resolution strategies and implementation problems items.</p> <p>3.3 Activities of tutorial: Proposed items and problems of application / Clarification and resolution of doubts.</p> <p>3.4 Group work: Resolution, in groups of 2/3 students, and some of the items proposed problems.</p>
4	<p>BT 4: METHODS OF CIRCUIT ANALYSIS</p> <p>4.1 Theoretical contents: Introduction. Elements of network topology. Analysis using Kirchhoff's laws. Mesh analysis: general and particular cases. Knots analysis: general and particular cases. Analysis with controlled sources. Reciprocity theorem. Linearity and superposition theorems. Thevenin and Norton theorems. Substitution rule. Frank theorem and its dual. Tellegen's theorem.</p> <p>4.2 Problems of classroom: Approach and resolution strategies and implementation problems items.</p> <p>4.3 Activities of tutorial: Proposed items and problems of application / Clarification and resolution of doubts.</p> <p>4.4 Group work: Resolution, in groups of 2/3 students, and some of the items proposed problems.</p>

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam: Contents of blocks 1 and 2 (9 points). Attendance to laboratory sessions is not mandatory but it is quantified up to 1 points.	Written exam	No	Yes	50,00
Written exam: Contents of blocks 1 and 2. Written exam: Contents of blocks 3 and 4. Attendance to laboratory sessions is not mandatory but it is quantified up to 1 points.	Written exam	Yes	Yes	50,00
TOTAL				100,00
Observations				
<p>For the purpose of continuous assessment, if exceeded (greater or equal to 4 out of 10) partial test may be performed on the final exam only the second part not assessed, having obtained her average rating of 5 out of 10 as a minimum to pass the course. Additionally, a grade greater than or equal to 4 points 10 must be obtained in the second part to pass the subject.</p> <p>If the partial test (less than 4 out of 10) is not exceeded, the final exam will be full.</p> <p>Correction criteria and qualification of exams:</p> <ul style="list-style-type: none"> - Objective test: they are taken into account the successes items, the fail items and items without answers. Without taking into account the approach. The valuation is performed according to: $A_c = A - E / 5$, wherein A = number of successful items, E = number of failed items. Therefore may be obtained a negative mark. - Problems: In the statement of each problem the maximum score for each section is indicated. The assessment of each paragraph is concerned-concept approach, standardization and formulation and numerical solution, with a distribution of 50% of the assigned mark. - Penalties: 1. Misconception mistakes, involving the null mark of the corresponding section. 2. The symbols of magnitudes must be correctly indicated. Each error or fault in any of these aspects, a reduction of 0.05 points. 				
Observations for part-time students				
The evaluation will be conducted with the same criteria as full-time students.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Material teórico-práctico suministrado por el profesor.

Eguíluz, L.I. et al. "PRUEBAS OBJETIVAS DE CIRCUITOS ELÉCTRICOS". EUNSA. Pamplona, 2001.

Sánchez, P. et al. "TEORÍA DE CIRCUITOS: PROBLEMAS Y PRUEBAS OBJETIVAS ORIENTADAS AL APRENDIZAJE". Pearson Educación. Madrid, 2007.

Pastor, A. et al. "CIRCUITOS ELÉCTRICOS". Volumen I. UNED. Madrid, 2004.

Pastor, A. et al. "CIRCUITOS ELÉCTRICOS". Volumen II. UNED. Madrid, 2005.

Nilsson, J.W. et al. "CIRCUITOS ELÉCTRICOS". Prentice Hall. México, 2001.