SUBJECT TEACHING GUIDE

G1893 - Analysis and Synthesis of Circuits for Telecommunications

Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA

Degree	Degree in Telecommunication Technologies Engineering		Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications			
Discipline	Speciality Optional Subjects			
Course unit title and code	G1893 - Analysis and Synthesis of Circuits for Telecommunications			
Number of ECTS credits allocated	6	Term	Semester based (1)	
Web				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	TOMAS FERNANDEZ IBAÑEZ
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Other lecturers	

3.1 LEARNING OUTCOMES

- The student learns to identify different types of networks, both in terms of topology and the feature's functionality.

- The student gains experience in choosing the most appropriate way to analyze a circuital network

- Learns the techniques of modeling linear devices, active and passive, based on matrix

- The students knows the basic techniques of passive synthesis of widely electrical networks used, filters, resonant circuits, transformers and matching networks.

- The student learns to use commercial simulators and to select the most appropriate type of analysis, depending on the circuit function.

4. OBJECTIVES
The main objective is that the student goes into the design and management of electrical networks that will be very useful to follow and understand electronics Telecommunications. To achieve this goal, the students are provided the techniques and tools of analysis of electronic networks based on the end use to which it is addressed, so that self- sufficiently, the studentacquires the necessary experience not onñu to analyze but also synthesize electronic networks for a specific application.
A parallel objective is that the student understands the basic techniques of analysis of circuit networks used by the vast majority of commercial software packages, so that it can address the design of a circuit for telecommunications using these software tools regardless of the company that provide the same.

6. COURSE ORGANIZATION	
CONTENTS	
1	TOPIC I. RLC RESONANT CIRCUITS. Introduction. Series resonant circuits. Characterization: Points of 3 dB power, bandwidth, quality factor . Parallel resonant circuits. Characterization: Points of 3 dB power, bandwidth, quality factor, overcurrent factor. Practical implementations of resonant circuits. Applications. TOPIC 2. TRANSFORMERS. Introduction. Ideal Transformer . Physical transformer. Real transformer
2	TOPIC 3. NETWORKS TWO PORTS: MATRIX REPRESENTATION. Introduction. Matrix X and Y , matrix H and G. transmission. Scatering parameters. Conversion matrices. Two ports networks serial / parallel conexion. TOPIC 4. MATRIX ELEMENTS SYNTHESIS. MATCHING Introduction. Simple elements. L , PI and T Networks. matching concept. Terms of matching. Gain power definiton.
3	TOPIC 5. FILTERS. Introduction. Prototype filter. Filter's Mathematical analysis: Butterworth, Chevyshev, Cauer and Bessel. Obtaining elements of the prototype filter. Scaling and frequency scaling impedances

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam with practical exersices concerning Topics 1 and 2.	Written exam	No	Yes	22,50
Written exam with practical exersices concerning Topics 3 and 4.	Written exam	No	Yes	40,00
Written exmanination with practical exersices concerning Topic 5	Written exam	No	Yes	22,50
Evaluation of computer practical exersices.	Laboratory evaluation	No	No	15,00
Final written exam.	Written exam	Yes	Yes	0,00
TOTAL				100,00

Observations
The final grade for the subject in the ordinary call is calculated by the weighted average of the partial marks obtained (3 written exams plus assessment of practices). To make this media is a necessary condition to have obtained at least 3/10 in each partial mark The aim of the final examination is to retake the written examinations that have not been passed during the course.. The realization of the practices is compulsory and can't be retaken.

Observations for part-time students
Teaching and evaluation methods, compatible with the personal circumstances that the student accredits,. will be proposed.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
José Espí Lopez, Gustavo Camps Valls, Rafael Magdalena Benedito, "Síntesis de redes: Impedancias y Filtros", Editorial Delta Publicaciones
G. Zelinger, "Basic Matrix Analisis and Synthesis", Ed. Pergamon Press
M. E. Van Valkenburg, "Análisis de Redes", Editorial Limusa
Arthur B. Willians, "Electronic Filter Design Handbook", Ed. McGraw Hill.