



IDENTIFYING DATA

Electrical engineering

Subject	Electrical engineering			
Code	V12G320V01401			
Study programme	Grado en Ingeniería Eléctrica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Mandatory	2nd	2nd
Teaching language	Spanish			
Department				
Coordinator	Míguez García, Edelmiro			
Lecturers	Míguez García, Edelmiro Moreira Meira, Julio César			
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General description	<p>The matter of Electrotechnics has like general aim complete the training of the students that go to *cursar the Degree of Electrical Engineering in Theory of Circuits with the end to supply him specific tools that allow him tackle, analyse and evaluate the behaviour of the electrical circuits so much in diet *estacionario as in transitory diet. The matter is conceived to supply knowledges, aims and competitions that are necessary to tackle with guarantees other matters of the courses 3º and 4º. For a *aprovechamiento suitable of this matter and that do not suppose a *sobreesfuerzo additional for the student, would owe to have *cursado previously the matters of Foundations of Theory of Circuits and Electrical Machines and Calculation I and II since we will give by given basic knowledges of both matters that serve of starting point for the development of the Electrotechnics.</p>			

Training and Learning Results

Code	
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C10	CE10 Knowledge and use of the principles of circuit theory and electrical machines.
D2	CT2 Problems resolution.
D10	CT10 Self learning and work.
D14	CT14 Creativity.
D17	CT17 Working as a team.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
Comprise the basic appearances of the behaviour of the electrical circuits in front of a change of conditions	B3	C10	D2 D10 D14 D17
Dominate the available current technicians for the analysis of electrical circuits *trifásicos balanced and unbalanced	B3	C10	D2 D10 D14 D17
Know the technicians of measure and register of data in the real electrical circuits	B3	C10	D2 D10 D14 D17
Purchase skills on the process of analysis of electrical circuits in diets of fault	B3	C10	D2 D10 D14 D17

Contents

Topic

SUBJECT I: CIRCUITS IN TRANSITORY DIET

The aim that pretends reach with this subject is that the student know to analyse the answer of the electrical circuits in *régimen transitory, differentiating clearly between the permanent answer and the transitory and the identification of the same in the circuits considering the performance of the initial conditions and of the sources. It begins with simple circuits of first order, *incidiéndose on the behaviour of the distinct elements of the circuit and the typification of the answers. It explains also the difference between the natural answer and the forced, that is to say, the answer owed the initial conditions imposed by the elements *almacenadores of energy and the answer owed the sources of independent excitation. It extends the study to circuits of second order, and explain technicians of analytical resolution and by means of the transformed of Laplace. They enter new technicians of resolution so much temporary (method *discretizado) like *frecuenciales (application of the transformed of Laplace).

- Types of answers and diets in the linear circuits.
- Methods to obtain the answer of circuits in transitory diet.
- Linear circuits of first order.
- Linear circuits of second order.
- Resolution by the method *discretizado

SUBJECT II: CIRCUITS OF THAT TRIPHASES. MEASURES. COMPENSATION.

With this subject, intends that the student know to analyze circuits triphases so much balanced how unbalanced. It initiates the subject with the basic concepts stop the analysis of circuits balanced. It continues with the unbalanced circuits, the different methods to measure the power and the compensation of power reactivates as well as the methods to determine the sequence of phases. It finalizes with an introduction to the symmetrical components.

- Introduction: Introduction: Generators, cargos and circuits triphases.
- Circuits triphases balanced. Tensions and intensities.
- Conversion of sources and triphases charges.
- Analysis of circuits triphases balanced.
- Power in circuits triphases balanced. Compensation.
- Analysis of circuits triphases unbalanced.
- Determination of the sequence of phases and measure of power and energy.
- Symmetrical components.

SUBJECT III: ANALYSIS OF *CORTOCIRCUITOS IN ELECTRICAL CIRCUITS.

The aim that pretends reach with this subject is that the student know and know to analyse the different types of *cortocircuitos that can present in circuits and electrical networks using methods of suitable analyses to each situation as well as know the application of norms for his determination.

- Introduction to the *cortocircuitos.
- Analysis of *cortocircuitos *trifásicos balanced.
- Networks of sequence. Connection of networks of sequence.
- *Cortocircuitos Unbalanced.
- Norms for the calculation of *cortocircuitos.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	30	60	90
Problem solving	28.8	2.88	31.68
Autonomous problem solving	0	54.32	54.32
Practices through ICT	20	20	40
Essay questions exam	3	0	3
Essay questions exam	3	0	3
Essay questions exam	3	0	3

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	The professor exposes in class of big group the contents of the matter
Problem solving	In the classroom the professor resolves problems and exercises of the *temario and arouse to the student similar exercises for his resolution with other mates.
Autonomous problem solving	The student will have to resolve by his account a series of exercises and questions of the matter proposed by the professor.

Practices through ICT	The student in collaboration with other mates has to resolve diverse electrical settings using a computer software that allow him put in practice the knowledges purchased in the classes of classroom.
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Personalized assistance

Methodologies	Description
Lecturing	The doubts and questions that can arise during the classes and the personal work of the student will be resolved well in situ or during the time of *tutorías. Also it will be possible to attention by means of the email for the resolution of doubts.
Problem solving	The doubts and questions that can arise during the classes and the personal work of the student will be resolved well in situ or during the time of *tutorías. Also it will be possible to attention by means of the email for the resolution of doubts.
Practices through ICT	The doubts and questions that can arise during the classes and the personal work of the student will be resolved well in situ or during the time of *tutorías. Also it will be possible to attention by means of the email for the resolution of doubts.
Autonomous problem solving	The doubts and questions that can arise during the classes and the personal work of the student will be resolved well in situ or during the time of *tutorías. Also it will be possible to attention by means of the email for the resolution of doubts.

Assessment

	Description	Qualification	Training and Learning Results		
Essay questions exam	First continuous assessment test. The contents corresponding to the analysis of circuits in TRANSITORY REGIME are evaluated. This is a written test in which the student has to solve problems and/or theoretical-practical questions about this part of the subject. The exercise will be valued from 0 to 10 points, and it is necessary to obtain a minimum grade of 3 points to pass the subject.	25	B3	C10	D2 D10 D14 D17
Essay questions exam	Second continuous assessment test. The contents corresponding to the analysis of BALANCED AND UNBALANCED THREE-PHASE alternating current circuits are evaluated. This is a written test in which the student has to solve problems and/or theoretical-practical questions about this part of the subject. The exercise will be valued from 0 to 10 points, and it is necessary to obtain a minimum grade of 3 points to pass the subject.	40	B3	C10	D2 D10 D14 D17
Essay questions exam	Third continuous assessment proof. The contents corresponding to the analysis of unbalanced triphasic circuits by means of SYMMETRICAL COMPONENTS and the CALCULATION OF symmetrical and asymmetrical SHORT CIRCUITS are evaluated. This is a written test in which the student has to solve problems and/or theoretical-practical questions about this part of the subject. The exercise will be valued from 0 to 10 points, and it is necessary to obtain a minimum grade of 3 points to pass the subject.	35	B3	C10	D2 D10 D14 D17

Other comments on the Evaluation

Calculation of the final qualification

The final qualification in each of the two calls available in the course will be obtained as follows:

Let **M** be the weighted average of the results **N1**, **N2**, **N3** corresponding to the three continuous assessment tests:

$$M = 0.25 * N1 + 0.40 * N2 + 0.35 * N3$$

If all the results **N1**, **N2**, and **N3** are greater than or equal to 3.0, the final qualification N will be equal to the weighted average **M**:

$$M=N$$

However, if any of the results **N1**, **N2** or **N3** is less than 3.0, the final qualification N is obtained by the following expression:

$$N = \text{minimum}(M, 4.9)$$

It is necessary to obtain a final qualification **GREATER OR EQUAL TO 5.0** to pass the course.

Final exams

On the official dates established by the university for the first and second calls, a final exam will be held, to which those students who have renounced continuous assessment may take. It is a written exam, structured in three parts whose content and assessment criteria are the same as in the three continuous assessment tests.

Students who have not renounced continuous assessment may also take the final exam and take all or one of the three parts in which it is structured. To calculate the final qualification, the last result obtained in the final exam in each of the two calls will be taken into account in each part.

Ethical commitment

The student is expected to exhibit appropriate ethical behavior. In the case of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others) it will be considered that the student does not meet the necessary requirements to pass the course. In this case, the overall qualification for this academic year will be fail (0.0).

Sources of information

Basic Bibliography

V.M. Parra, A. Pérez, A. Pastor, J. Ortega, **Teoría de Circuitos**, 1991,

E. Estévez, C. Garrido, J. Cidrás, **Ejercicios resueltos de circuitos eléctricos**, 1999,

F. Barrero, **Sistemas de Energía Eléctrica**, 2004,

Complementary Bibliography

Recommendations

Subjects that continue the syllabus

Electrical installations 1/V12G320V01503

Electrical machines/V12G320V01504

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G320V01102

Physics: Physics 2/V12G320V01202

Mathematics: Calculus 1/V12G320V01104

Mathematics: Calculus 2 and differential equations/V12G320V01204

Basics of circuit analysis and electrical machines/V12G320V01304

Other comments

Requirements: To enrol in this matter is necessary to have surpassed or be enrolled of all the matters of the inferior courses to the course in that it is *emplazada this matter.