Circuit theory I - course description

General information

Course name	Circuit theory I
Course ID	06.2-WE-ELEKTP-CT01-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Electrical Engineering
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2019/2020

Course information

Semester	2
ECTS credits to win	7
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. inż. Radosław Kłosiński, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Laboratory	30	2	-	-	Credit with grade
Class	30	2	-	-	Credit with grade

Aim of the course

To familiarize students with basic laws and terms regarding electrical circuits
Mastering the basic methods of analysis of electrical circuits in a steady state
Introduction to methods of description and analysis of circuits with non-sinusoidal waveforms, three-phase circuits and four-terminals
Introduce basic skills in circuit analysis
Introduce basic skills in the use of basic devices for measuring current and voltage and circuit parameters
Introduce basic skills in the design of simple electrical circuits

Prerequisites

Fundamentals of Electrical Engineering, Mathematical Analysis, Algebra, Physics

Scope

RLC resonance. Frequency characteristics, goodness of the circuit. Coils magnetically coupled.

Deformed signals. Non-sinusoidal, periodic, non-periodic and near-periodic signals. Fourier series. Linear time-invariant circuits with non-sinusoidal supply. Non-sinusoidal Power definitions. Parcevall's theorem.

Three-phase circuits. Star and triangular circuits. Three-phase sources and receivers. Multiphase symmetry. The symmetrical component method and its applications. Power in three-phase circuits.

Two-port elements. Equations for two-port elements. Two-port elements connections. Two-port element as a system for the transmission of signal and electricity. Differential and characteristic equations of Two-port elements.

Teaching methods

Lecture: conventional lecture, problem lecture, discussion.
Exercises: calculating exercises, consultations.
Laboratory: laboratory exercises, working with the source document, working in groups.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Uses basic hardware for measuring signals and parameters of electrical circuits.		• a quiz • an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Is capable of designing a simple electrical circuit of the chosen type.		• a quiz • an ongoing monitoring during classes	• Laboratory • Class

Outcome description	Outcome symbols	Methods of verification	The class form
Formulates equations and analyzes electrical circuits sinusoidally and non-sinusoidally powered in steady-state.		• an evaluation test • an exam - oral, descriptive, test and other • an ongoing monitoring during classes	• Lecture • Class
Student knows basic concepts and laws concerning electrical circuits.		• an evaluation test • an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Lecture: - exam - ability to solve tasks; Knowledge of laws, methods of description and analysis in the discussed scope.

Exercises: pass 3 colokwium or a final colokwium of the ability to solve tasks.

Laboratory: a condition of pass is to obtain positive grades from all laboratory exercises that are expected to be performed within the laboratory program.

Composition of the final grade: lecture: 40% + laboratory: 30% + exercises: 30%

Recommended reading

1. Blackwell W.A., Grigsby L.L.: Introductory network theory, PWS Publishers, 1985
2. Cichowska Z., Pasko M .: Tasks in theoretical electrical engineering. Script of Silesian University of Technology Gliwice 1994 (in polish).
3. Cichowska Z., Pasko M .: Lectures in theoretical electrical engineering. Cz. I Basic sections. Cz. II sinusoidally variable currents. Silesian University of Technology Gliwice 1998 (in polish).
4. Mikołajuk K., Trzaska Z .: A set of theoretical electrotechnical assignments. PWN Warsaw 1976 (in polish).
5. Osiowski J., Szabatin J .: Fundamentals of circuit theory. WNT Warszawa 1998 (in polish).
6. Osowski S., Siwek K., Śmiałek M .: Circuit Theory. OWPW Warsaw 2013 (in polish).
7. Siwczyński M .: Circuits and Signal Theory, cz. I. Electrical circuits. RWNT Zielona Góra 2002 (in polish).
8. Kłosiński R., Chełchowska L., Chojnacki D., Rożnowski E., Siwczynska Z., Rożnowski E .: Instructions for laboratory exercises, unpublished materials, Zielona Góra 1988-2015 (in polish).

Further reading

Oppenheim A.V., Willsky A.S., Nawab H.: Signals & Systems, Prentice Hall, 1997.

Notes

Modified by dr hab. inż. Radosław Kłosiński, prof. UZ (last modification: 04-11-2019 21:05)