



Subject card

Subject name and code	Electric Circuits, PG_00045972						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Horiszny				
	Teachers		dr hab. inż. Jacek Horiszny dr inż. Mikołaj Nowak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		10.0		10.0	50
Subject objectives	Obtaining the ability related to selected problems in the theory of electrical circuits such as: linear transformations in three-phase systems, two-port analysis, reactance filter characteristics, non-linear circuits analysis , using Laplace transform for circuit analysis with the transition method, long-line properties in steady and transient states as well as skills from using the PSPICE simulation program to analyze electrical circuits.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_K02						
	K7_U06						
	K7_W01						
Subject contents	Linear transformations in three-phase systems: symmetrical components, Clarke and Parka transformations and their applications in technology. Non-linear circuits: oscillating systems, ferroresonance. Analysis of transient states by the operator method: Laplace transform bases, differential equation transform, calculation of free and forced response for 1st and 2nd order equations, inverse transform, operator impedance, Kirchhoff law in the operator form, initial conditions in the operator method. Active systems: ideal and real operational amplifier, basic work circuits. Crossovers: split of fours, impedance, admittance, chain, hybrid description, replacement diagrams of passive quadruples, types of four crossings, substitute diagrams of active four-links, joining of four crossings. Filters: classification of filters, reactance filters, low-pass RC filters, high-pass, bandpass, barrier filters. Calculating the frequency limits of filters. Long lines: long line description, long line in steady and transient state, substitute circuit method, long line properties.						
Prerequisites and co-requisites	Knowledge of electrical circuits at the first degree level course.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	written exam		55.0%		70.0%		
	tests		55.0%		30.0%		
Recommended reading	Basic literature		1. Bolkowski S.: Teoria obwodów elektrycznych. WNT Warszawa 2012. 2. Osiowski J., Szbatin J.: Podstawy teorii obwodów elektrycznych. WNT warszawa 1998.				
	Supplementary literature		1. Chua L.O., Pen-Min Lin: Komputerowa analiza układów elektronicznych. WNT Warszawa 1981.				

	eResources addresses	Adresy na platformie eNauczenie:
Example issues/ example questions/ tasks being completed	1. Calculate the one-phase (or two-phase) short-circuit current current in the given system using symmetrical components. 2 Calculate the transient current in the given RC (or RLC) DC circuit. 3. Calculate the transient current in the given RL (or RLC) circuit of the sinusoidal current. 4. Calculate the transmittance of the given active system. 5. Calculate the string parameters of the given cross-over. 6. Calculate the amplitude characteristic of the given filter. 7. Use the substitute circuit method to calculate and sketch voltage distributions in the given system established from long lossless lines. 8. Prove that in the given system containing non-linear inductance, vibrations may occur at frequencies lower and higher than the frequency of excitation.	
Work placement	Not applicable	

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