GDAŃSK UNIVERSITY OF TECHNOLOGY

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 eNauczanie:
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	