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 2027	Academic year of realisation of subject	2026/2027
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Horiszny	
	Teachers		

Lesson types

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 skills in the use of integral Laplace transformation in the theory of electrical circuits for the analysis of circuits in the transient state, as well as skills in the use of the PSPICE simulation program for the analysis of electrical circuits.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U06] is able to analyse, model, simulate and design electrical systems	Creates a circuit model in PSpice. Performs simulation calculations of steady and transient states with constant and sinusoidally varying energization.	[SU4] Assessment of ability to use methods and tools
[K7_W01] has an extended and deepened knowledge of mathematics, including selected issues of numerical methods and knowledge useful for solving tasks in the field of electrotechnology and electrodynamics, has a general knowledge of technical sciences covering their fundamentals and applications	Determines initial conditions for a transient state. Creates an operator model of a circuit for a transient state. Describes the created model with algebraic equations and calculates the Lapalce transform of the required quantity. Calculates the inverse transform.	[SW3] Assessment of knowledge contained in written work and projects
[K7_K02] is aware of the impact of engineering activities on the environment, understands the the non-technical effects of those activities	Assesses the influence of transient processes in an electric circuit on its components.	[SK5] Assessment of ability to solve problems that arise in practice

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Lectures

Analysis of transient states using the operator method: basics of the Laplace transform, transform of a differential equation, calculation of free and forced response for first and second order equations, inverse transform, operator impedance, Kirchhoff's laws in the operator form, initial conditions in the operator method. Characteristics of the PSpice program

Course content – laboratory
1. Calculation of 1st and 2nd order initial conditions.
2. Calculation of the transient state in a 1st order circuit with DC supply.
3. Calculation of the transient state in a 1st order circuit with AC cupply.
4. Analysis of the operation of a single-pulse controlled rectifier.
5. Analysis of the operation of a single-phase AC controller.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of electrical circuits at the first degree level course.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>written exam</td><td>55.0%</td><td>70.0%</td></tr>
<tr><td>tasks for the laboratory</td><td>55.0%</td><td>30.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Bolkowski S.: Teoria obwodów elektrycznych. WNT Warszawa 2012.

2. Osiowski J., Szbatin J.: Podstawy teorii obwodów elektrycznych. WNT warszawa 1998.

3. Papoulis A.: Obwody i układy. WKiŁ Warszawa 1988</td></tr>
<tr><td>Supplementary literature</td><td>1. Chua L.O., Pen-Min Lin: Komputerowa analiza układów elektronicznych. WNT Warszawa 1981.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Calculate the transient current in a given RC, RL or RLC circuit powered by direct or sinusoidal voltage based on the solution of the differential equation using the operator method.
2. Calculate the transient current in a given RC, RL or RLC circuit powered by direct or sinusoidal voltage based on the Laplace equivalent diagram.
3. Expand the periodic current (voltage) waveform into a Fourier trigonometric series.
4. Expand the periodic current (voltage) waveform into a complex Fourier series.
5. Calculate the amplitude and phase spectrum of a continuous signal.
6. Calculate the amplitude and phase spectrum of a discrete signal.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.