GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electric Circuits II, PG_00024115		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2021/2022
Education level	first-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	2	ECTS credits	5.0
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 inż. Joanna Wołoszyn	
	Teachers	dr inż. Joanna Wołoszyn	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	0.0	60

E-learning hours included: 0.0

Adresy na platformie eNauczanie:

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	60	8.0	57.0	125

Subject objectives

Mastering the properties and methods of analysis of the phenomena in coupling magnetic circuit. Mastering the properties and methods of analysis of nonlinear circuits DC. Mastering the properties and methods of analysis of active circuits containing operational amplifiers. Knowledge properties and mastery of methods of analysis of three-phase circuits, symmetrical and non symmetrical , including systems for power and energy measurement. Mastering properties and methods of analysis the periodic non-sinusoidal circuit.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U04	Is able to provide and apply the method and method of mathematical description of the analyzed electrical system.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
K6_W03	He can solve exemplary tasks from electrical circuits and evaluate the correctness of the solution.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
K6_K05	Is able to assess the threat resulting from the condition and parameters of the electrical system.	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice

Subject contents	LECTURES The air-core transformers and transformers with ferromagnetic core. Electrical circuits containing transformers. The analysis of nonlinear circuits DC. Circuit active. Feedback. Operational amplifier. The basic functional circuits with operational amplifiers. The analysis of circuits with operational amplifiers. Three-phase circuits the methods of analysis. The power in the three-phase symmetrical circuits. The methods of power and energy measurements in symmetrical circuits. . Solving symmetric three-phase circuits. Symmetrical three-phase short circuit. No symmetrical three-phase circuits the methods of analysis. The power in the three-phase no symmetrical circuits. Methods for power and energy measurements in no symmetrical circuits. Linear transformations in three-phase circuits - the method of symmetrical components 0,1,2. No sinusoidal periodical signals. Fourier transform and Fourier integrals. Simple and opposite transform. Characteristic of amplitude and phase. Parseval s theorems. Rms. The power in the periodical no sinusoidal signals. Develop a signal in the Fourier series. The electric circuit with periodic no sinusoidal sources. Frequency analysis. EXERCISES The calculation of the equivalent parameters of transformer with ferromagnetic core. Solving electrical circuits containing transformers. Solving of nonlinear circuits DC. Solving active circuits. Solving symmetric three-phase circuits. The execution of power circuits balance. The calculation of the symmetrical short-circuit currents. Solving no symmetrical three-phase circuits. The calculation of the no symmetrical transverse and longitudinal parameters by method of symmetrical components. The calculation of the Fourier series of periodical no sinusoidal signals. The calculation of average value and the effective signal. Solving electrical circuits with periodical no sinusoidal source.
Prerequisites and co-requisites	Knowledge of the subject Mathematics (04 11 10 02 08). Knowledge of the subject Electrical circuits (04 11 10 01 16)

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	60.0%	65.0%
Midterm colloquium	60.0%	35.0%

Recommended reading

Basic literature	1. Bolkowski S.: Teoria obwodów elektrycznych. WNT Warszawa 2009 2. Bolkowski S. i in. : Zbiór zadań z elektrotechniki teoretycznej. WNT Warszawa 2009 3. Cichocki A. i in. : Zbiór zadań z elektrotechniki teoretycznej. PWN Warszawa 1985 4.Horiszny J. i in. : Obwody elektryczne w stanie ustalonym. Zbiór zadań. Wydawnictwo PG. Gdańsk 2005. 5. Kurdziel R.: Podstawy elektrotechniki. WNT Warszawa 1973
Supplementary literature	1. Krakowski M.: Elektrotechnika teoretyczna. T. 1. PWN Warszawa 1999 2. Mikołajuk K., Trzaska Z.: Elektrotechnika teoretyczna - analiza i synteza elektrycznych obwodów liniowych. PWN Warszawa 1987
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Give the equivalent scheme of a transformer with a ferromagnetic core. Explain with which the physical phenomena in the transformer arise individual elements of the equivalent scheme.
2. What the ratings data are given for the transformer iron-core? For a given ratings data calculate a nominal transformer equivalent scheme parameters.
3. Solve the given nonlinear circuit DC. Determine of the static resistance, dynamic resistance and the linearized equivalent scheme of a nonlinear element at the point of work.
4. Give the scheme and derive the formula for the characteristic amplitude (ratio U2/U1) of the following systems containing operational amplifier: a) voltage controlled voltage source inverting and non-inverting, b) the differentiator, c) integrator.
5. For two basic circuits of a symmetrical 3-phase derive the relationship between the phase and wire currents and the phase and wire voltages. Provide the appropriate size of the phasor graphs.
6. Remove formulas for active power, reactive power and apparent powwer in a symmetrical 3-phase system.
7. Solve the given 3-phase symmetrical circuit.
8. Solve the given 3-phase symmetrical circuit, containing transformer and reactive power compensation.
9. Give examples of ways to solve of 3-phase asymmetrical circuit.
10. Solve the given 3-phase asymmetrical circuit.
11. Prove that Aron circuit correctly measure active power in 3-phase 3-wire system.
12. Take the average of the values of the patterns and the effective signal expressed by a Fourier series.
13 Calculate the coefficients of the Fourier series for a given periodic current.
14. Solve a given circuit, the force is expressed in the form of a Fourier series. Calculate the effective value of the specified waveform.

Work placement	Not applicable