Akashi College	Year	2023	Course Title	Electric Circuits Ⅱ B

Course Information

Course Code	5227	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	Academic Credit: 2
Department	Electrical and Computer Engineering	Student Grade	2nd
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	KAJIMURA Yoshihiro		

Course Objectives

Evaluation point 1: Understand and can explain the relationship between voltage and current in resistance, coils, and capacitor elements, and can use it in the calculation of an electrical circuit.
Evaluation point 2: Understand and can explain the instantaneous values, phaser, and complex number expressions, and can use them in the calculation of a sine wave AC circuit.
Evaluation point 3: Can explain the principle and method of measuring effective power, reactive power, and power factor, and calculate them.
Evaluation point 4: Can explain how mutual inductance circuits work, and calculate circuit voltages, currents, etc.
Evaluation point 5: Can explain and calculate voltages and currents (phase voltage, line voltage, line current) in three-phase AC.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand the relationship between voltage and current in resistance, coils, and capacitor elements, and can use it in the applied calculation of an electrical circuit.	Understand the relationship between voltage and current in resistance, coils, and capacitor elements, and can use it in the calculation of an electrical circuit.	Do not understand the relationship between voltage and current in resistance, coils, and capacitor elements, and cannot use it in the calculation of an electrical circuit.
Achievement 2	Understand and can explain the instantaneous values, phaser, and complex number expressions, and can use them in the applied calculation of a sine wave AC circuit.	Understand and can explain the instantaneous values, phaser, and complex number expressions, and can use them in the calculation of a sine wave AC circuit.	Do not understand and cannot explain the instantaneous values, phaser, and complex number expressions, and cannot use them in the calculation of a sine wave AC circuit.
Achievement 3	Can explain the principle and method of measuring effective power, reactive power, and power factor, and solve problems.	Can explain the principle and method of measuring effective power, reactive power, and power factor.	Cannot explain the principle and method of measuring effective power, reactive power, and power factor.
	Can perform applied calculations of voltages, currents, etc. in mutual inductance circuits, etc.	Can calculate voltages, currents, etc. in mutual inductance circuits, etc.	Cannot calculate voltages, currents, etc. in mutual inductance circuits, etc.
	Can perform applied calculations of voltages and currents (phase voltage, line voltage, line current) in three-phase AC.	Can calculate voltages and currents (phase voltage, line voltage, line current) in three-phase AC.	Cannot calculate voltages and currents (phase voltage, line voltage, line current) in three-phase AC.

Assigned Department Objectives

Teaching Method

Outline	The goals of this course are to be able to explain the meaning and application of physical quantities such as voltage, current, and impedance in the AC circuit theory, which is the basis of electrical and electronic engineering, and be able to calculate them. The class also involves practice problem exercises, etc. to help students learn them.
Style	Explanations will be given in line with the textbook. The class will be carried out using slides and worksheets. There will regularly be report assignments of problem exercises.
Notice	This course's content will amount to 180 hours of study in total. These hours include learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. The overall evaluation will be based 80% on periodic exams, and 20% on report assignments including worksheets done during class. The reports will be mostly made up of the questions at the end of each chapter. The minimum score for a pass will be 60%. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☑ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Complex power	Can calculate complex power.
		2nd	Vector diagrams	Can draw a vector diagram.
		3rd	Bridge circuits	Understand bridge circuits and can find equilibrium conditions.
		4th	Mutual inductance circuits	Can write the meaning of mutual inductance circuits, and draw an equivalent circuit.
		5th	Equivalent circuits of mutual inductance circuits I	Can calculate the current in an equivalent circuit of a mutual inductance circuit.

		6th	Equivalent circuits of mutual inductance circuits II	Can calculate the current in an equivalent circuit of a mutual inductance circuit.
		7th	Occurrence of polyphase AC and Star and Delta connections	Can explain the occurrence of polyphase AC, and Star and Delta connections.
		8th	Midterm exam	
	4th Quarter	9th	Symbol notion and phase rotation of polyphase AC	Can calculate the voltage and current in a polyphase AC.
		10th	Phase voltage and line voltage of a Y connection	Can calculate the phase voltage and the line voltage of a Y connection.
		11th	Phase current and line current of a Δ connection	Can calculate the phase current and line current of a Δ connection.
		12th	Δ and Y connections and Δ-Y conversions	Can calculate Δ and Y connections and Δ-Y conversions.
		13th	Polyphase AC electrical power	Can calculate polyphase AC electrical power.
		14th	Non-sine waves and the basis of the Fourier series	Can describe the meaning of non-sine waves and the Fourier series.
		15th	How to compute Fourier coefficients, and Fourier series expansion of an odd function wave	Can compute Fourier coefficients, and perform Fourier series expansion of an odd function wave.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Report	Portfolio	Other	Total
Subtotal	80	0	0	20	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	80	0	0	20	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0