Toyama College	Year	2019	Course Title	Electric Machine Ⅱ

Course Information

Course Code	0230	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Department of Electrical and Control Systems Engineering	Student Grade	5th
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	【教科書】「電気機器」，藤田宏著，森北出版／【関連図書】電気機械工学，電気学会編，オーム社		
Instructor	Sato Keisuke		

Course Objectives

At the compiletion of this cource, students will be able to
1)Explain the operation principle of the transformer and calculate the characteristics.
2)Explain the operation principle of the induction machine and calculate the characteristics.

Rubric

	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Students can explain how transformer works.	Can explain the operation principle of the transformer, and a vector diagram and an equivalent circuit can be obtained.	Can explain how transformer works.	Can't explain how transformer works.
Students can calculate the characteristics of the transformer.	Can do the actual transformer characteristics calculation.	Can calculate the characteristics of the transformer.	can't calculate the characteristics of the transformer.
Studens can explain how induction machine works.	Can explain the operation principle of the three-phase induction motor, and a vector diagram and an equivalent circuit can be obtained.	Explain how induction machine works.	Can't explain how induction machine works.
Students can calculate the characteristics of the induction machine.	Can calculate the characteristics of the three-phase induction motor. Also, maximum torque and output can be calculated.	Can calculate the characteristics of the induction machine.	Can't calculate the characteristics of the induction machine.

Assigned Department Objectives

学習・教育到達度目標 A-6
JABEE 1(2)(d)(1) JABEE 1(2)(e)
ディプロマポリシー 1

Teaching Method

Outline	We lecture on the theory and characteristics of transformers and induction machines which are often used in electrical equipment and others. Teaching materials and home-work learning materials are provided by the e-learning system. Since this class is an essential subject of the national examination of electric chief engineers, we provide information to take the qualification examination.
Style	Classes consist of lectures and home learning using e-learning learning materials.
Notice	The lesson plans may be changed according to the degree of understanding of students. It is necessary for students to understand the contents of electric circuits and electromagnetism in advance.

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	The principle of a transformer(1)	understand the basic laws of electromagnetics, the composition of transformers and induced electromotive force.
		2nd	The principle of a transformer(2)	Learn how to calculate excitation current and winding current.
		3rd	Equivalent circuit of transformer	Learn the equivalent circuit of the transformer and the calculation method of its circuit constant
		4th	Characteristics of transformer	Learn how to calculate the voltage fluctuation rate and efficiency of the transformer.
		5th	Transformer polarity and connection method	Understand how to determine the polarity of the transformer and how to wire it.
		6th	Three-phase transformer / Autotransformer	Understand the structure and principle of the three-phase transformer and the autotransformer.
		7th	Special transformer	Understand the structure and principle of the transformer, induction voltage regulator.
		8th	Intermediate test	
	2nd Quarter	9th	Principle and structure of induction machine	Understand the structure and principle of the three-phase induction motor.
		10th	Inductive electromotive force and current of induction machine	Learn how to calculate the induced electromotive force and current generated in the windings of the induction motor.
		11th	Equivalent circuit of induction machine	Understand the method of deriving the equivalent circuit of the three-phase induction motor.
		12th	Characteristics calculation method of induction machine	Learn how to calculate the characteristics of induction motors using equivalent circuits.

		13th	Control method of induction motor	Learn the starting control method, the speed control method and the braking method of the induction motor.
		14th	Single phase induction motor	Learn the operating principle and characteristics of single phase induction motors.
		15th	Final exam	
		16th	Answer to the final exam and a questionnaire	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	90	0	0	0	0	10	100
Basic Ability	0	0	0	0	0	0	0
Technical Ability	90	0	0	0	0	10	100
Interdisciplinary Ability	0	0	0	0	0	0	0