

Electrical Circuit 3

Basic Course Information			
Course Number	21050593	Subject Category	Compulsory IM
Class Format	Lecture	Credit Type and Number of Credits	1
Department	Mechatronics	Student Category	Year 3
Period of Study	Semester 2	Classes per Week	2
Required Materials			
Instructor	Weschal Pattenatboon		

Course Objective

This course is three part as following.

- 1) In AC power analysis, normally after calculating voltage and current for each target device, we need to compute also that the power because it's important factor to estimate physical size of device before installing circuit. Also, we use that the power value or all of the power to design a circuit breaker, safety circuit or cost per mount, and so on, these are main reason why we have to learn AC power analysis.
- 2) Magnetic coupling circuit, we have known well the transformer place important rule for step up and down voltage in power system, and that principle is based on magnetic coupling theorem its main reason why we have to learn it because this class provide student are able to understand those transformer circuits. Also, students can calculate the first current loop in which it affect to the other loop by its magnetic.
- 3) Frequency response contains, in case of designing circuits, we need to test these circuits with wide frequency range, such as from 0-1MHz or 10MHz-10GHz and so on. This is to provide students understanding clear every electrical circuit never work well over frequency range. Moreover, the subject aim to give students can design parameters for work properly circuit under frequency range design.

Evaluation/Prubric	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
AC Power analysis	Demonstrates very good knowledge of AC Power analysis	Demonstrates good knowledge of AC Power analysis	Lacks the appropriate knowledge of AC Power analysis
Magnetic coupling circuit	Demonstrates very good knowledge of Magnetic coupling circuit	Demonstrates good knowledge of Magnetic coupling circuit	Lacks the appropriate knowledge of Magnetic coupling circuit
Frequency response	Demonstrates very good knowledge of Frequency response	Demonstrates good knowledge of Frequency response	Lacks the appropriate knowledge of Frequency response

Relationship with Learning Outcomes

MO2 Ability to design, propose and develop electrical and electronic systems for robotics/ mechatronic systems

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Teaching Method

Outline: Repeat of Explanation Drill

Class Format: Lecture and Drill

Please Note : Students are required to ask any questions after sufficient self-learning.

Course Plan	Semester 2	Contents and Method of Course	Goals	Related MCC
1st week		RMS value and Complex Power	Understand calculating RMS values of voltage and current as well as compute the basic AC power	V-C 1 7 V-C 1 8 V-C 1 9 V-C 1 14 V-C 1 15
2nd week		Conservation of AC Power	Analyze and evaluate the AC power in network circuits by using the conservation law.	V-C 1 8 V-C 1 11 V-C 1 22 V-C 5 50
3rd week		Power Factor Correction and Maximum Average Power Transfer	Able to improve the power factor for increasing efficiency as well as design the input impedance for achieving maximum power transfer	V-C 1 10 V-C 5 73
4th week		Applications and exercises	Able to apply the AC power concept to improve the power factor for increasing the system efficiency and so on.	V-C 1 21 V-C 1 22
5th week		Magnetic coupling circuit	Understand the magnetic coupling concept from mutual magnetic fields of two circuits or more than.	V-C 1 21 V-C 1 22 V-C 5 55
6th week		Magnetic coupling circuit for transformer model	Understand the idea transformer circuit that based on the magnetic coupling concept	V-C 1 21 V-C 1 22 V-C 5 55
7th week		review trial of midterm exam	Test student's understanding before the exam	
8th week		Midterm Examination	Test student understanding.	
9th week		Midterm Examination	Test student understanding.	
10th week		Return the exam sheet	Let students to conform their scores	V-C 7 94 V-C 7 95
11th week		Frequency response	Understand the circuit behaviors in wide frequency range by transfer function	V-C 3 46 V-C 3 47
12th week		Frequency response about low-pass, band-pass, high-pass filters	Able to design low, band, high pass filters for the required frequency range.	V-C 3 46 V-C 3 47
13th week		frequency response about low-pass, band-pass, high-pass filters with simulation software	Able to design low, band, high pass filters for the required frequency range by simulation software.	V-C 3 46 V-C 3 47 V-C 5 63
14th week		Basic Three-phase.	Understand the basic three phase	V-C 6 64 V-C 6 65
15th week		Possible connections of electric power source and load.	Understand possible connections of electric power source and load	V-C 6 67
16th week		Three phase for AC motor applications.	Analyze and evaluate the AC power of three phase induction motors.	
17th week		Review and test a trial of final exam	check student understanding.	
20th week		Final Examination	Test student understanding.	
21st week		Return Final exam	let student to check their scores	

Do not

	Evaluation	Quiz	Midterm Examinations	Report	Portfolio	Other
Basic Ability	0	0	0	0	0	0
Technical Ability	0	0	0	0	0	0
Interdisciplinary Ability	0	0	0	0	0	0