Exercises in Electric Circuits

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1. Course Description

Electrical circuits are background in understanding electronics and designing electronic circuits. The aim of this course is to help students acquire an understanding of the fundamental principles of electric circuits. We will practice problems so that you can imagine the meaning of physical quantities of voltage and current and the function of elements such as resistors and capacitors.

Since it is a flipped classroom style, knowledge acquisition will be done at the individual pace of each student.

Specifically, we will acquire necessary skills and knowledge on DP4E.

2. Course Objectives

1. Students be able to use Ohm's law to determine the appropriate resistance value when designing a circuit.
2. Students be able to solve circuit calculations using Feng-Thevenin's theorem.
3. Students be able to explain the calculation method of the AC circuit.
4. Students be able to explain the phase relationship between the voltage and current of an AC circuit using a phasor.

3. Grading Policy

Evaluate with test (50%) and task (50%).

An example of the answer for Test 1 will be explained in the 9th class, and an example of the answer for Test 2 will be posted on the LMS. It will be give feedback on test answers that are important to the evaluation.

It is will explain each task next class.

4. Textbook and Reference

Textbook

The teaching materials will be posted on the LMS by the teacher. The materials will be posted on the LMS at least 2 days before class.

Reference

Chihiro Ishibashi (ISBN-13:978-4485119419) Japanese.   Denkishoin co., ltd.

5. Requirements(Assignments)

The materials used in the class will be posted on the LMS at least two days in advance, so please prepare the teaching materials thoroughly before attending the class. (about 1 hour)

Please work on the exercises to review the lessons and see the level of understanding of each lesson. (about 2 hours)

6. Note

Since it will be a flipped classroom or flipped learning style, knowledge acquisition will be at the individual pace of each student. Preparation will be important.

Student need to take both tests 1 and 2. Absences without contact will not be credited.

Since the lesson content has changed recently, it may be reviewed depending on the situation.

7. Schedule

[1]   Guidance. Ohm's law.
[2]   Kirchhoff's Law: how to formulate a circuit equation.
[3]   Thevenin's theorem: calculations for complex circuits
[4]   Superposition theorem: solution of multi-power supply circuit
[5]   Maximum power issue: maximum power supply, matching
[6]   Bridge circuit: Y-Δ transform and equilibrium conditions
[7]   Test 1 (lesson from 1st to 7th), Summary.
[8]   AC circuit calculation: basics of AC circuit calculation. Explanation of test 1.
[9]   Sine wave alternating current: amplitude, mean, measured value
[10]   Resonance frequency: series resonant circuit and parallel resonant circuit
[11]   Phasor 1: phase and effective value
[12]   Phasor 2: basic relational expression of AC circuit
[13]   Phasor 3: complex calculation of AC circuit
[14]   Feedback on each report, and exercises in composite exam.
[15]   Test 2 (lesson from 9th to 14th), Summary.