Circuit Analysis Technique

General Information

- Course name: Circuit Analysis Technique
- Course numbers: 010153105
- Credits: 3
- Lecturers
  - Dr. Pisit Vanichchanunt: Part 1
  - Assist. Prof. Dr. Preecha Thongdit: Part 2
  - Assist. Prof. Dr. Ruslee Sutthaweekul: Part 3

Objectives

- Be able to use the following techniques for solving linear circuits.
  - Fourier series and Fourier transform
  - One-sided Laplace transform
  - Two-port networks
- Be able to model and analyze linear circuits using the concept of Linear Time-Invariant (LTI) systems.
- Be able to analyze linear circuits in both time and frequency domains.
- Be able to model and analyze magnetically coupled circuits.

Objectives

- Be able to explain the meaning of the following terms.
  - Complex frequency
  - Convolution
  - Frequency response
  - Transfer function
  - Poles and Zeros
  - Impulse response
  - Parseval theorem
  - Energy spectral density (Energy per unit bandwidth)

Objectives

- Be able to explain the meaning of the following terms.
  - Resonance
  - Quality factor
  - Bode plot
  - Filters: low-pass filters, high-pass filters, bandpass filters, bandstop filters, and notch filters
  - Transformers: linear transformer, step-up transformer, and step-down transformer

Reference Textbook

- William H. Hayt, Jr., Jack E. Kemmerly, and Steven M. Durbin, *Engineering Circuit Analysis*, 8 & 9th Editions, McGraw-Hill, New York, NY.

Further Reading

- Additional Textbooks
  - Richard C. Dorf and James A. Svoboda, *Introduction to Electric Circuits*, 8th Edition, John Wiley & Sons, Inc., 2011.
  - J. David Irwin and R. Mark Nelms, *Basic Engineering Circuit Analysis*, 9th Edition, McGraw-Hill.
  - Charles K. Alexander and Matthew N. O. Sadiku, *Fundamentals of Electric Circuits*, 3rd Edition, McGraw-Hill, New York, NY, 2007.

Teaching Plan (First Part)

Week	Chapter/ Section	Topics
1		Introduction
2	14.1 – 14.4	Complex frequency analysis
3	14.5 – 14.7	Laplace Transform
4	15.1 – 15.4	Circuit analysis in the s-domain
5	15.5 – 15.8	Convolution and the complex-frequency plane
Test 1	14, 15	

Teaching Plan (Second Part)

Week	Chapter/ Section	Topics
6	13.1 – 13.2	Magnetically coupled circuits
7	13.3 – 13.4	The linear and ideal transformer
8	17.1 – 17.4	Two-port networks
9	17.5 – 17.6	Two-port networks
Test 2	13, 17	

Teaching Plan (Final Part)

Week	Chapter/ Section	Topics
10	16.1 – 16.4	Frequency response
11	16.5 – 16.7	Scaling, Bode diagrams and filters
12	18.1 – 18.4	Fourier series and complete response
13	18.5 – 18.7	Fourier transform
14	18.8 – 18.10	System function
15		Course summary
Final Exam	16, 18	

Marks/Scores

- Test 1 30%
- Test 2 30%
- Final Examination 30%
- Attendance & Class Activities 5%
- Assignment 5%
- Total 100%

Grading Criteria (Approximately)

Grade	Score Range
A	80 – 100
B+	72 – 79
B	65 – 71
C+	57 – 64
C	50 – 56
D+	42 – 49
D	35 – 41
F	0 – 34