University of Science and Technology of Hanoi
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COURSE SYLLABUS

Subject: Electrical Circuits II

Academic field: Energy/ Electrical Engineering

Lecturer: Dr. Nguyen Xuan Truong

Phone: 0968-456-006

E-mail: nguyen-xuan.truong@usth.edu.vn

Academic year: 2019-2020

COURSE DESCRIPTION

Credit points	04	
Level	Undergraduate	
Teaching time **Location**	University of Science and Technology of Hanoi	
Time Commitment	Lecture	30 hrs
	Exercises	10 hrs
	Practice	8 hrs
	Total	48 hrs
Prerequisites	Electrical Circuits I, Calculus	
Recommended background knowledge	Knowledge of physics; Differential Equations, General mathematics	
Course description:	• Alternating Current (AC) electrical circuits • AC Steady-State Circuits Analysis • Power in AC Circuits • Three-Phase Circuits • Laplace Transform • Circuit Analysis in the s-Domain	
Course objectives	• To know the single-phase sinusoidal circuit behaviour • To know the average & complex power in single-phase sinusoidal circuits • To be familiar with the balanced three-phase circuit analysis • To be familiar with the Laplace transform • To be able to solve circuits applying the Laplace transform • To be able to apply Differential Equation Approach and Laplace method to determine transient response of second order circuits	

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Course Learning Outcomes(LO)	Having successfully completed this course, students will be able: • To analyze single-phase sinusoidal circuits • To claculate the average and complex power in single-phase sinusoidal circuits • To analyze balanced three-phase circuits applying single-phase equivalent circuit • To find the functional and operational Laplace transform of different functions • To apply the Laplace transform in electric circuit analysis	
Evaluation	Attendance/Attitude	10 %
	Practical/ Exercises	20 %
	Midterm Exam	30 %
	Final exam	40 %
Prescribed Textbook(s)	[1] J. David Irwin, R. Mark Nelms, **Basic Engineering Circuit Analysis**, 2008 John Wiley & Sons Inc. [2] John O'Malley, **Schaum's Outline of Theory and Problems of Basic Circuit Analysis**, Second edition, McGraw-Hill	

EXPERIMENTAL COURSE CONTENTS

Laboratory 1: Which effect does a diode have in an AC electric circuit?

Laboratory 2: RLC Circuit (impedance of parallel and series tuned circuits as a function of frequency; phase displacement between current and voltage for the series tuned circuit);

Laboratory 3: RLC measuring bridge (Wheatstone bridge circuit operated on AC)

Lecture notes: https://moodle.usth.edu.vn/course/view.php?id=337

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COURSE CONTENTS & SCHEDULE

Lecture	Contents	Hours			Assignment(s)
		Lect.	Exr.	Prc.	
1	**INTRODUCTION** 1.1. Sinusoids 1.2. Circuit theorems in Sinusoidal Steady-State Analysis 1.3. Phasor - Domain Circuit 1.4. Phasor - Diagrams	3.5	3.5		
2	**AC STEADY-STATE CIRCUITS ANALYSIS** 2.1. Nodal method 2.2. Mesh method 2.3. Superposition 2.4. Source Transformation 2.5. Thevenin, Norton equivalent circuits	3	3		
3	**POWER IN AC CIRCUITS** 3.1. Introduction 3.2. Circuit Power Absorption 3.3. Wattmeters 3.4. Reactive Power 3.5. Complex Power and Apparent Power	4	4		
4	**Midterm**	1			
5	**THREE-PHASE CIRCUITS** 4.1. Introduction 4.2. Three-Phase Connections 4.3. Balanced Circuits 4.4. Power in the balanced circuits 4.5. Three-Phase Power Measurements	4	4		
6	**THE LAPLACE TRANSFORM** 5.1. Definition 5.2. Two Important Singularity Functions 5.3. Transform Pairs 5.4. Properties of the Transform 5.5. Inverse Transform 5.6. Convolution Integral 5.7. Initial-Value and Final-Value Theorems	3	3		
7	**APPLICATION OF THE LAPLACE TRANSFORM TO CIRCUIT ANALYSIS** 6.1. Laplace Circuit Solutions 6.2. Circuit Element Models	3.5	1.5		

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	6.3. Analysis Techniques 6.4. Transfer Function 6.5. Poles-Zero Plot/Bode Plot Connection 6.6. Steady-State Response				
8	**LABS** 7.1. Laboratory 1: Which effect does a diode have in an AC electric circuit? 7.2. Laboratory 2: RLC Circuit (impedance of parallel and series tuned circuits as a function of frequency; phase displacement between current and voltage for the series tuned circuit) 7.3. Laboratory 3: RLC measuring bridge (Wheatstone bridge circuit operated on AC)			6	2

Notes:

- *Abbreviation: Lect. (lecture), Exr. (Exercise), Prc. (Practise).*
- *Exercises may include assignment, reports, student's presentation, homework, class exercises ...for each class sessions*
- *Practicals mostly refer to Lab- work or outside practice such as field trip.*

Reference Literature:

[1] J. David Irwin, R. Mark Nelms, **Basic Engineering Circuit Analysis**, 2008 John Wiley & Sons Inc.
[2] John O'Malley, **Schaum's Outline of Theory and Problems of Basic Circuit Analysis**, Second edition, McGraw-Hill
[3] Charles K. Alexander, Matthew N. O. Sadiku, **Fundamentals of Electric Circuit**, fifth edition, McGraw-Hill