University of Science and Technology of Hanoi
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COURSE SYLLABUS

Subject: Electrical Circuits I **Academic field:** Energy

Lecturer: Dr. Nguyen Xuan Truong

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Academic year: 2016-2017

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	
Recommended background knowledge	Knowledge of physics; Differential Equations, General mathematics	
Subject 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	
Objectives & Out-come	• Analyze AC steady state behaviour of a circuit • Calculate power in AC circuits • Determine the power supplied and distributed in three-phase systems • Use Laplace Transform for circuit analysis • Apply Differential Equation Approach and Laplace method to determine transient reponse of second order circuits	
Evaluation	Attendance/Attitude	10 %
	Practical	20 %
	Midterm Exam	30 %
	Final exam	40 %

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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

COURSE CONTENTS & SCHEDULE

Lecture	Contents	Hours			Ref./Resources	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					
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	**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	**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					
5	**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					

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	5.7. Initial-Value and Final-Value Theorems					
6	**APPLICATION OF THE LAPLACE TRANSFORM TO CIRCUIT ANALYSIS** 6.1. Laplace Circuit Solutions 6.2. Circuit Element Models 6.3. Analysis Techniques 6.4. Transfer Function 6.5. Poles-Zero Plot/Bode Plot Connection 6.6. Steady-State Response					
7	**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)					

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