Zarqa University

Faculty of Engineering Technology
Department: Electrical Engineering
Course title: *Electric Circuit-I* -0904211

Prerequisite: 0300122
Instructor: TBD
Lecture's time: TBD
Semester: TBD
Office Hours: TBD

Course description:

Basic Electric Components and Equivalent Circuit. Kerchief's laws (KVL and KCL). Circuit analysis techniques: Nodal analysis, mesh analysis, superposition, source transformations. Thevenin and Norton theorems, maximum power transfer. Unit step response of RL and RC circuit. Steady-state sinusoidal circuit analysis using phasor techniques

Aims/Course Learning Outcomes (CLOs):

By the completion of the course the student should be able to:

1. **Find** equivalent circuits of the basic series and parallel Circuits**, Δ↔** Y transformations for resistive Networks
2. **Apply** the Kerchief's laws (KVL and KCL) for basic resistive circuits.
3. **Calculate** current, voltage, or power associated with a resistive circuit using nodal analysis technique.
4. **Calculate** current, voltage, or power associated with a resistive circuit using mesh analysis technique.
5. **Calculate** current, voltage, or power associated with a resistive circuit using superposition, Thévenin, and Norton analysis technique.
6. **Determine** the unit step response of RL and RC.
7. **Calculate** current, voltage, or power associated with steady-state sinusoidal RLC circuits using the phasor technique.

Course structures:

	Topic	Topic	Ref. (Text)	Lect	CLO	Teaching Method
1	Basic components and electric circuits	Charge, Current, Voltage, and Power Voltage and Current Sources Ohm's Law	Ch.2	2	review	
2	Voltage and current laws	Nodes, Paths, Loops, and Branches	Ch.3.1	1	2	L*, T**
		KVL, KCL	Ch.3.2-3			
		Single-Loop Circuit, Single-Node-Pair Circuit	Ch.3.4-5	1		
		Series and Parallel connected Sources Resistors in Series and Parallel	Ch.3.6-7	1	1	L, T
		Voltage and Current Division	Ch.3.8	1	2	L, T
		Assign#1 Submission & Tutorial Session		1		T
3	Basic nodal and mesh analysis	Nodal Analysis 80 The Supernode 89	Ch.4.1 Ch.4.2	3	3	L, T
		Mesh Analysis 92 The Supermesh 98	Ch.4.3 Ch.4.4	2	4	L, T
		Nodal vs. Mesh Analysis: A Comparison	Ch.4.5	1	3&4	L, T

		Assign#2 Submission & Tutorial Session		1		T
		Computer application and simulation	Ch.4.6	1		T
4	Handy circuit analysis techniques	Linearity and Superposition	Ch.5.1	1	5	L, T
		Source Transformations	Ch.5.2	1		
		Thévenin and Norton Equivalent Circuits	Ch.5.3	2		
		Maximum Power Transfer	Ch.5.4	1		
		Delta-Wye Conversion	Ch.5.5	1	1	L, T
		Assign#3 Submission & Tutorial Session		1		T
		Midterm Exam				
5	Basic RL and RC circuits	The Source-Free RL, RC Circuit	Ch.8.1-3	3	6	L, T
		The Unit-Step Function	Ch.8.4	2		
		Assign#4 Submission & Tutorial Session		1		T
6	Sinusoidal steady-state analysis	Characteristics of Sinusoids Forced Response to Sinusoidal Functions The Complex Forcing Function	Ch10.1 Ch10.2 Ch10.3	2	7	L, T
		The Phasor Impedance and Admittance	Ch10.4-5	1		L, T
		Nodal and Mesh Analysis 394 Superposition, Source Transformations and Thévenin's Theorem 397	Ch10.6-7	5		L, T
		Assign#5 Submission & Tutorial Session		1		T
		Final Exam.				

(*) L: Lecturing
(**) T: Tutorial.

Textbook

" ***Engineering Circuit Analysis*** ", 8th ed., by W.H. Hayt, Jr., E. Kemmerly and S.M. Durbin, McGraw Hill, 2012.

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References:

1. Nilsson, J. W., and S. Riedel, Electric Circuits, 11th ed., Prentice-Hall, 2018.
2. Alexander, C. K., and M. N. Sadiku, Fundamentals of Electric Circuits, McGraw Hill, 2005.
3. Thomas, R. E., and A. J. Rosa, The Analysis and Design of Linear Circuits, Wiley, 2006.

Dorf, R.C., and J.A Svoboda, Introduction to Electric Circuits, 7th edition, Wiley, 2006.

Assessment Methods:

Methods	Grade	Date
Test 1	20	To be assigned
Test 2	20	To be assigned
Assignment + Quizzes	10	As given in the course structure
Final Exam	50	To be assigned