



Course description:

The electric circuit components. Atoms, Current, Voltage and resistance. Types of resistors. Ohm's law. Power and energy. Energy losses and voltage drop. Series, parallel and series-parallel resistive circuits. Kirchhoff's current and voltage laws. Circuit analysis methods(branch current, mesh current, node voltage and super position principle). Thevenin and Norton theorems. Sine wave characteristics, connection and types. Capacitors and Conductors characteristics. R-L, R-C and R-L-C circuits. Complex numbers. Arithmetic of complex numbers. Resistance and Reactance in complex form. Total impedance in complex form. Complex analysis of reactive circuits. Frequency response to R-L, R-C and R-L-C circuits.

Aims of the course:

- Gain knowledge about the basic electric components such as: resistors, independent sources, dependent sources, etc.
- Select, identify L,R,C circuits elements, and build simple L,R,C circuits and carry out the required testing and measurements.
- Analyze the performance of R-C, R-L, R-L-C circuits using basic methods of linear circuit analysis.
- Use of phasor representation and complex method operations to analyze and design simple electric circuits such as passive filters.

Intended Learning Outcomes (ILOs):

- 1) Use Kirchhoff's laws, circuit theorems and node voltage methodology to solve simple DC as well as AC circuits.
- 2) Apply simple steady state sinusoidal analysis to circuits.
- 3) Demonstrate a basic understanding of phasors and phasor diagrams for AC circuit analysis.
- 4) Reflect a basic understanding of transformer operation, through analysis of transformer circuits.
- 5) Demonstrate basic proficiency in building basic electrical circuits and operating fundamental electrical engineering equipment.

Course structures:

Week	C. Hrs	ILOs	Topics	Teaching Procedure	Assessment methods
Week 1-3	9	1	Quantities, Units, Voltage, Current and Resistance. Ohm's law, power, series and parallel circuits. Branch, loop and nodal analysis.	Whiteboard	Homework – 1

Week 4-7	9	1	Circuit Theorems and conversations	Whiteboard	Homework – 2 Quiz - 1
Week 8-11	12	2	Alternating currents and standard waves. Capacitors and inductors in DC and AC circuits	Whiteboard	Homework – 3 Quiz - 2
Week 12-13	6	2,3	Circuit Theorems in AC analysis	Whiteboard	Homework – 4 Quiz - 3
Week 14-16	9	4,5	R-C, R-L and R-L-C circuit analysis 3-phase circuits	Whiteboard	Homework – 5 Quiz - 4

References:

- 1- Charls K. Alexander, Matthew N.O.Sadiku, (2013), “**Fundamental of Electric Circuits**”, 5th edition, MC Graw Hill
- 2- Thomas L.Floyd, (2014), “**Principles of Electrical Circuits - Conventional Current Version**”, 9nd edition, Prentice Hall
- 3- James W. Nilson, Susan A. Riedel, (2011),” **Electric circuits**” Prentice Hall.

Assessment Methods:

Methods	Grade	Date
Reports, Homeworks and/or Projects	10	
First Exam	20	11/4/2017
Second Exam	20	
Final Exam	50	

