

Faculty of Engineering & Technology

Electrical Circuits 1

Information :

Course Code : EPR 261

Level : Undergraduate

Course Hours : 4.00- Hours

Department : Department of Electrical Engineering

Instructor Information :

| Title | Name | Office hours |
|---------------------|-------------------------------|--------------|
| Associate Professor | Moneer Mohamed Ali Abu-Elnaga | 2 |
| Teaching Assistant | Ahmed Elsayed Awad Fayed | |

Area Of Study :

The Main Goals of this course are:

- To understand the fundamentals of electrical circuits.
- To know the main components used of electrical circuits.
- To analyze DC/AC electrical circuits using different techniques and theorems.
- To develop practical skills of testing electrical components.
- To share ideas and work in a team or a group.

Description :

Basic electrical quantities, Ohm's Law and Kirchhoff's Laws, resistance and source combinations, voltage and current division. Techniques of solving DC electric circuits: nodal and mesh analysis, source transformation. Theorems: superposition, and Thévenin's theorem. AC sinusoidal sources, time domain and frequency domain, voltages and currents phasor diagrams, inductance and capacitance: the between voltage and current relationships, impedance and admittance, Techniques of solving AC electric circuits: nodal and mesh analysis, source transformation. Theorems: superposition, and Thévenin's theorem. Steady state power analysis is described for sinusoidal sources.

Course outcomes :

a.Knowledge and Understanding: :

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| 1 - | By the end of this course the student should be able to: a1. Demonstrate knowledge and understanding functions of components and concepts electrical circuits including Ohm's Law, Kirchhoff's Laws, resistance and source combinations, and voltage and current division. |
| 2 - | Illustrate solving techniques of electrical circuits including nodal and mesh analysis and source transformation. |
| 3 - | Describe theorems for solving electrical circuits including superposition, and Thévenin's theorem. |
| 4 - | Illustrate the characteristics of inductance and capacitance. |
| 5 - | Define the impedance, admittance, and phasors for AC electric circuits. |
| 6 - | Illustrate solving techniques and theorems of solving AC electric circuits. |

b.Intellectual Skills: :

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| 1 - | b1. Ability to apply different techniques and theorems for solving electric circuits. |
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| 2 - | b2. Choose among different solution alternatives. |
| 3 - | b3. Compare between solutions of AC and DC circuits. |
| c. Professional and Practical Skills: : | |
| 1 - | c1. Testing electrical components. |
| 2 - | c2. Implementation for simple electrical circuits. |
| 3 - | c3. Applying solution techniques on simple circuits in the lab. |
| d. General and Transferable Skills: : | |
| 1 - | d1. Work coherently and successfully as a part of a team in the Lab. |
| 2 - | d2. Communicate effectively. |
| 3 - | d3. Effectively manage tasks, time, and resources. |

Course Topic And Contents :

| Topic | No. of hours | Lecture | Tutorial / Practical |
|---|--------------|---------|----------------------|
| Basic concepts, components of Electric Circuits. | 6 | 3 | 3 |
| Basic laws , and voltage and current division. | 12 | 6 | 6 |
| Techniques of DC circuit analysis. | 12 | 6 | 6 |
| Theorems of DC circuit analysis. | 12 | 6 | 6 |
| AC sinusoidal sources, Time domain and frequency domain | 6 | 3 | 3 |
| Phasor and impedance | 12 | 6 | 6 |
| Inductance and Capacitance | 12 | 6 | 6 |
| Techniques and Theorems of AC circuit analysis | 12 | 6 | 6 |

Teaching And Learning Methodologies :

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| Lectures |
| Tutorials |
| E-Learning Program. |
| Laboratories |

Course Assessment :

| Methods of assessment | Relative weight % | Week No | Assess What |
|-----------------------|-------------------|---------|---|
| Attendance | 10.00 | 1 | to assess the attendance of the students |
| Final Written exam | 40.00 | 15 | to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied. |
| Laboratory Tutorials | 10.00 | 6 | to assess the ability of implementing a simple electric circuit that shows knowledge and understanding of different technical issues. |
| Mid Term Exam 1 | 15.00 | 7 | to assess the skills of problem solving, understanding of related topics. |

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| Mid Term Exam 2 | 15.00 | 14 | to assess the skills of problem solving, understanding of related topics. |
| Quiz & Assignment 1 | 5.00 | 9 | to assess the skills of problem solving, understanding of related topics. |

Books :

| Book | Author | Publisher |
|-----------------------------------|------------------|-------------|
| Fundamentals of Electric Circuits | Alexander Sadiku | McGraw Hill |

Course Notes :

1. Fundamentals of Electric Circuits", C.K. Alexander and M.N.O. Sadiku, McGraw Hill, 4th edition, 2009. Students Lecture Notes (Text Book).

Recommended books :

Electric Circuits", James W. Nilsson and Susan A. Riedel, Addison Wesley, most recent edition. Ramsey
2. "Basic Engineering Circuit Analysis", J. D. Irwin, Fourth edition, Macmillan, most recent edition.

Periodicals :

2. "Basic Engineering Circuit Analysis", J. D. Irwin, Fourth edition, Macmillan, most recent edition.