

## Faculty of Engineering & Technology

### Electrical Circuits

#### Information :

**Course Code :** EPR 266

**Level :** Undergraduate

**Course Hours :** 4.00- Hours

**Department :** Department of Mechanical Engineering

#### Area Of Study :

- Develop the students' knowledge about the fundamentals and main components of electrical circuits.
- Prepare students to analyze DC electrical circuits using different techniques and theorems.
- Develop the students' knowledge about the characteristics of inductance and capacitance.
- Prepare students to analyze AC electrical circuits using different techniques and theorems.
- Prepare students to analyze steady state power in AC circuits and three phase systems.
- Develop student's practical skills on testing electrical circuits.

#### Description :

combinations, voltage and current division. Techniques of solving DC electric circuits: nodal analysis and mesh analysis, superposition theorem, and maximum power transfer. AC sinusoidal sources, time domain and frequency (phasor) domain, voltages and currents phasor diagrams, inductance and capacitance: voltage and current relationships, impedance and admittance, Techniques of solving AC electric circuits: nodal and mesh analysis, superposition theorem. Steady state power analysis: Real Power, complex power, and power measurement. Three phase circuits; connections: Y-Y, Y-delta, delta-Y, delta-delta, and power measurements.

#### Course outcomes :

##### a. Knowledge and Understanding: :

1 -	a1. Describe the fundamentals and main components of electrical circuits including Ohm's law, Kirchhoff's laws, resistance and source combinations, and voltage and current division.
2 -	a2. Illustrate techniques of electrical circuits including nodal and mesh analysis and source transformation
3 -	a3. Illustrate the characteristics of inductance and capacitance.
4 -	a4. Illustrate the characteristics of inductance and capacitance.
5 -	a5. Illustrate techniques and theorems of solving AC electric circuits.
6 -	a6. Describe steady state power in AC circuits.
7 -	a7. Compare between different schemes of three phase systems.

##### b. Intellectual Skills: :

1 -	b1. Apply basic laws for solving simple electric circuits.
2 -	b2. Apply different techniques for solving DC electric circuits.
3 -	b3. Apply different theorems for solving DC electric circuits.
4 -	b6. Analyze steady state power in AC circuits and different schemes of three phase systems.

**c. Professional and Practical Skills: :**

1 -	c1. Applying basic laws on simple circuits in the lab.
2 -	c2. Applying theorems for solving simple circuits in the lab.
3 -	c3. Practice basic experiments on 3-phase circuits.

**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. Manage tasks, time, and resources effectively.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Basic concepts, components of Electric Circuits, basic laws.	5	3	2
Resistors in Parallel, Voltage Divider, Current Divider, and Delta-Way Transformation	5	3	2
Techniques of DC circuit analysis.	10	6	4
Theorems of DC circuit analysis.	10	6	4
AC sinusoidal sources, Time domain and frequency domain	5	3	2
Inductance and Capacitance	5	3	2
Phasor and impedance	5	3	2
Techniques and Theorems of AC circuit analysis	10	6	2
Steady state power analysis for AC circuits.	10	6	2
Three phase circuits.	10	6	2

**Teaching And Learning Methodologies :**

Interactive Lecturing
Problem solving
Experiential learning

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00		
In Class Quizzes	10.00		
Mid-Term exams	30.00		
Participations	10.00		
Performance and Lab	10.00		

**Recommended books :**

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James W. Nilsson and Susan A. Riedel, %Electric Circuits, 9th Edition, Prentice Hall, 2011. Lecture notes on the course Moodle page, FUE website.

Charles K. Alexander and Matthew N. O. Sadiku, %Fundamental of Electric Circuits, 4th Edition, McGraw Hill, 2013.