

## Faculty of Engineering & Technology

### Electrical Machines

**Information :**

**Course Code :** EPR 340

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Mechanical Engineering

**Instructor Information :**

Title	Name	Office hours
Lecturer	Sayed Ahmed Zaki Ahmed	
Teaching Assistant	Ahmed Mohamed Abdelrahman Eid	

**Area Of Study :**

This course aims to:

- Understand the definitions and construction of magnetic circuit.
- Recognize the construction, theory of operation, equivalent circuit, (voltage, current) equations, basic characteristics and testing of 1-ph Transformers
- Empathize the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, basic characteristics and testing of DC Machines.
- Understand the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, basic characteristics and testing of 3-ph Synchronous Machines.
- Realize the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, basic characteristics and testing of 3-ph Induction Motors.
- Develop practical skills and perform the required experiments to get the equivalent circuit parameters and load characteristics of each of the previous machines.
- Share ideas and work in a team or a group.

**Description :**

Magnetic circuits. Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, basic characteristics, and experiments of each of the following machines: DC Machines, 1-ph Transformers, 3-ph Induction Motors, and 3-ph Synchronous Machines.

**Course outcomes :**

**a. Knowledge and Understanding: :**

1 -	Identify the magnetic circuit definitions and concepts.
2 -	Define knowledge and understanding of construction, theory of operation, equivalent circuit, and basic characteristics of 1-ph Transformers.
3 -	Recognize knowledge and understanding of construction, theory of operation, equivalent circuit, and basic characteristics of DC Machines.
4 -	Recognize knowledge and understanding of construction, theory of operation, equivalent circuit, and basic characteristics of 3-ph Synchronous Machines
5 -	Define knowledge and understanding of construction, theory of operation, equivalent circuit, and basic characteristics of 3-ph Induction Motors.

**b. Intellectual Skills: :**

1 -	Analyze and solve operating conditions of 1-ph Transformers.
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2 -	Employ and solve operating conditions of DC Machines.
3 -	Apply and solve operating conditions of 3-ph Synchronous Machines.
4 -	Illustrate and solve operating conditions of 3-ph Induction Motors.
5 -	Decide and chose among different solution alternatives.
6 -	Evaluate obtained results both individually or as a part of team.

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

1 -	Explore practical skills and perform the required experiments to get the equivalent circuit parameters of 1-ph Transformers.
2 -	Develop practical skills and perform the required experiments to get the load characteristics of DC Machines.
3 -	Develop practical skills and perform the required experiments to get the equivalent circuit parameters of 3-ph Synchronous Machines.
4 -	Apply practical skills and perform the required experiments to get the load characteristics of 3-ph Induction Motors.

**d. General and Transferable Skills: :**

1 -	Write technical reports in accordance with standard scientific guidelines.
2 -	Work in a self-directed manner.
3 -	Work coherently and successfully as a part of a team in the Lab.
4 -	Analyze problems and use innovative thinking in their solution.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Electric power system components	4	2	2
3 phase systems	4	2	2
Magnetic circuits	8	4	4
1- phase transformer & 3-phase transformer	8	4	4
D. C. Machines	10	6	4
AC Machines	14	6	8
Lab session for DC Machine and Transformer	8	4	4
Lab session for AC Machines	4	2	2

**Teaching And Learning Methodologies :**

Interactive Lecturing
Problem solving
Experiential learning

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Assignments, Participation, & Quizzes	30.00		

Final Exam	40.00	16	
Mid-Term Exam 1	15.00	6	
Mid-Term Exam 2	15.00	11	

**Recommended books :**

Schaum's Electric Machines and Electromechanics - 5<sup>th</sup> Edition by Syed A. Nasar. Nasar