

**Faculty of Engineering & Technology**

**Electrical Machines**

**Information :**

**Course Code :** EPR 441

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Specialization of Electronics & Communication

**Instructor Information :**

Title	Name	Office hours
Professor	Naser Mohammed Bayoumy AbdelRahim	
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen	4

**Area Of Study :**

This course aims to:

- Develop the students' knowledge about the definitions and construction of magnetic circuit.
- Prepare students to recognize the construction, theory of operation, equivalent circuit, of DC Machines, 1-ph Transformers, 3-ph Induction Motors, and 3-ph Synchronous Machines
- Prepare students to recognize the basic characteristics and testing of DC Machines, 1-ph Transformers, 3-ph Induction Motors, and 3-ph Synchronous Machines
- Develop student's practical skills and perform the required experiments to get the equivalent circuit parameters and load characteristics of each of the previous machines.

**Description :**

Magnetic circuits. Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, basic characteristics, performance: efficiency and voltage regulation or speed regulation, and testing (experiments) and 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 -	a1- Identify the magnetic circuit definitions and concepts.
2 -	a2- Recognize the fundamentals of construction, theory of operation, equivalent circuit, and basic characteristics of DC Machines.
3 -	a3- Define principles of construction, theory of operation, equivalent circuit, and basic characteristics of 1-ph Transformers.
4 -	a4- Define principles of construction, theory of operation, equivalent circuit, and basic characteristics of 3-ph Induction Motors
5 -	a5- Recognize principles, theory of operation, equivalent circuit, and basic characteristics of 3-ph Synchronous Machines.

**b. Intellectual Skills: :**

1 -	b1- Perform basic calculations of magnetic circuits.
-----	--

2 -	b2- Analyze the operating conditions of DC Machines.
3 -	b3- Analyze the operating conditions of 1-ph Transformers.
4 -	b4- Analyze and operating conditions of 3-ph Induction Motors.
5 -	b5- Analyze the operating conditions of 3-ph Synchronous Machines.
6 -	b6- Decide between among different solution alternatives.

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

1 -	c1- Perform the required experiments to get the equivalent circuit parameters of DC Machines.
2 -	c2- Perform experiments to get the load characteristics of 1-ph Transformers.
3 -	c3- Develop practical skills to get the equivalent circuit parameters of 3-ph Induction Motors.

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

1 -	d1. Work coherently and successfully as a part of a team in the Lab.
2 -	d2. Work in stressful environment and within constraints.
3 -	d3. Communicate effectively.
4 -	d4. Effectively manage tasks, time, and resources.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Electric power system components	5	3	2
3 phase systems	5	3	2
Magnetic circuits	10	6	4
D. C. Machines	15	9	6
1- phase transformer.	10	6	4
3-ph Induction Motors.	15	9	6
3-ph Synchronous Machines.	10	6	4
Lab session for AC Machines	5	3	2

**Teaching And Learning Methodologies :**

Interactive Lecturing
Discussion
Problem Solving
Report
Experiential Learning

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
• Final exam	40.00		
o assignments	10.00		
o In Class Quizzes	10.00		

---

o Lab	10.00		
o Mid-Term exams	30.00		

**Recommended books :**

- 1-"Electric Machinery fundamentals", Chapman, S. J., McGraw Hill Co., 4th edition, 2005. (Text Book).
- 2- "Principles of Electric Machines with Power Electronic Applications", M. E. El-Hawary, McGraw-Hill, most recent edition.
- 3-"Schaum's Electric Machines and Electromechanics", by Syed A. Nasar