

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

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