

## **Faculty of Engineering & Technology**

#### **Induction Machines**

#### Information:

Course Code: EPR 445 Level: Undergraduate Course Hours: 3.00- Hours

**Department:** Specialization of Electrical Power Engineering

Instructor Information :			
Title	Name	Office hours	
Professor	Hany Mohamed Hasanien Mohamed	2	
Assistant Lecturer	Ahmed Moreab Hussien Mohamed	7	
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen		

## Area Of Study:

### **Description:**

3-ph Induction Motors: Construction, theory of operation, equivalent circuit, voltage, current, power and torque equations, Load (Torque/Slip) characteristics, Circle diagram, Starting methods, Speed control, Testing and experiments, and Double cage IM. 1-ph Induction Motors: Construction, theory of operation, equivalent circuit, voltage, current, power and torque equations, Load (Torque/Slip) characteristics, Starting methods, Testing and experiments. Induction generator, Induction regulator, Induction type phase shifter

Course ou	tcomes:
a.Knowled	lge and Understanding: :
1 -	Explain the construction, theory of operation, and equivalent circuit of 3-ph induction motors.
2 -	Demonstrate the main characteristics and performance of 3-ph induction motors.
3 -	Describe the starting methods of 3-ph induction motors.
4 -	Describe the speed control of 3-ph induction motors.
5 -	Explain the construction, theory of operation, equivalent circuit, main characteristics, and starting methods of 1-ph induction motors.
o.Intellect	ual Skills: :
1 -	Solve problems related to theory of operation, and equivalent circuit of 3-ph induction motors.
2 -	Evaluate the performance and operating conditions of 3-ph induction motors.
3 -	Analyze starting methods of 3-ph Induction Motors.

<sup>&</sup>quot;ÁDevelop the students' knowledge about the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations of 3-ph Induction Motors.

<sup>\*\*</sup>Repare students to establish the main characteristics and performance of 3-ph Induction Motors.

<sup>&</sup>quot;ÁDevelop the students' knowledge about the starting methods and speed control of 3-ph Induction Motors.

Abevelop the students' knowledge about the construction, theory of operation, equivalent circuit and the related equations, starting methods, speed control and main characteristics of each of 1-ph Induction Motors.

<sup>&</sup>quot;Árrain students to gain practical skills of testing of Induction Motors.



4 -	Analyze speed control of 3-ph Induction Motors.	
5 -	Evaluate the performance and starting methods of 1-ph induction motors.	
6 -	Choose among different solution alternatives.	
c.Professio	onal and Practical Skills: :	
1 -	c1. Perform the required experiments to get the load characteristics of 3-ph induction motors.	
2 -	c2. Perform the required experiments to get the load characteristics of 1-ph induction motors.	
d.General	and Transferable Skills: :	
1 -	Work coherently and successfully as a part of a team in the Lab.	
2 -	Work in stressful environment and within constraints.	
3 -	Communicate effectively.	
4 -	Manage tasks, time, and resources effectively.	

Course Topic And Contents :			
Topic	No. of hours	Lecture	Tutorial / Practical
Revision of 3-ph circuits, magnetic circuits and 1-ph Transformers.	10	6	4
3-ph Induction Motors: Construction: stator windings of AC machines, Rotor types.	10	6	4
theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and load characteristics.	15	9	6
Analysis using circle diagram.	5	3	2
Experimental determination of IM parameters.	5	3	2
Starting and speed control of Induction Motors.	10	6	4
Double cage IM.	5	3	2
1-ph Induction Motors: Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and load characteristics.	10	6	4
Testing of induction motors.	5	0	5

Teaching And Learning Methodologies :	
Interactive Lecturing	
Discussion	
Problem solving	
Report	
Experiential learning	

Course Assessment :			
Methods of assessment	Relative weight %	Week No	Assess What
″ÁFinal exam	40.00		
Mid- Exam I	15.00		
Mid- Exam II	15.00		
o Assignment	10.00		



o Lab	10.00	
o Quizzes	10.00	

# Recommended books:

- 1. Chapman, S. J., % lectric Machinery fundamentals Hamber Graw Hill Co., 5th edition, 2006 (Text Book).
- 2. M. E. El-Hawary, "Principles of Electric Machines with Power Electronic Applications", Wiley-IEEE Press, 2nd Edition, 2002.
- 3. Theodore Wildi, "Electric Machines, Drives and Power Systems", Prentice Hall, 6th Edition, 2006.
- 2. "Principles of Electric Machines with Power Electronic Applications", M. E. El-Hawary, McGraw-Hill, most recent edition.
- 3. "Electric Machines, Drives and Power Systems", Theodore Wildi, Prentice Hall, most recent edition.