FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Special Electrical Machines

Information :

Course Code :	EPR 542	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electrical Power Engineering

Instructor Information :

Title	Name	Office hours
Professor	Hany Mohamed Hasanien Mohamed	3
Professor	Hany Mohamed Hasanien Mohamed	3
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen	1

Area Of Study :

Upon successful completion of the course, the student should be able to:
ÅDevelop the students' knowledge about the construction, theory of operation, equivalent circuit, develop voltage, current, power and torque equations, and basic characteristics of single- and two-phase induction motors.
ÅDevelop the students' knowledge about the construction, theory of operation, and basic characteristics of universal motors, control motors, and variable speed synchronous motor drive systems.
ÅDevelop the students' knowledge about the construction, theory of operation, equivalent circuit, develop voltage, current, power and torque equations, and basic characteristics of: reluctance; permanent magnet; stepper, and brushless dc motors;
ÅTrain students to perform experiments on performance of the previous machines.

Description :

two-phase induction motors, windings and connections. Methods of starting of single-phase induction motors: Split phase motors; Capacitor-start motors; Two-value capacitor motors. Shaded pole motors: Construction and operation. Universal motors. Control motors. Synchronous motors, variable speed drive system. Reluctance motors; Permanent magnet motors. Stepper motors. Selecting motors for required operations.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Demonstrate the construction theory of operation, equivalent circuit, and characteristics of single- and two-phase motors
2 -	Describe the starting methods and speed control of single-phase induction motors.
3 -	Demonstrate the construction theory of operation, equivalent circuit, and characteristics of universal motors, control motors, and servo motors.
4 -	Demonstrate the theory of operation, equivalent circuit, and characteristics of synchronous motors, and performance of variable speed synchronous motor drive systems.
5 -	Develop equivalent circuit, and voltage, current, power and torque equations, and basic characteristics of reluctance, permanent magnet, stepper, and brushless dc motors.
b.Intellectual Skills: :	
1 -	Analyze operating conditions of single- phase and two-phase induction motors.

2 -	Analyze operating conditions of single- phase and two-phase induction motors.
3 -	Evaluate the performance of universal motors, control motors, and servo motors.
4 -	Evaluate the performance of synchronous motors, and variable speed synchronous motor drive systems.
5 -	Evaluate the performance of reluctance, permanent magnet, stepper, and brushless dc motors..
c.Professional and Practical Skills: :	
1 -	MATLAB simulations or research report on a topic assigned by the course instructor.
2 -	Implement an experimental set-up to evaluate the load characteristics a single-phase induction motor.
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 inductiom motors and synchronous machines.	4	3	1
Construction, theory of operation, equivalent circuit, and characteristics of single-phase and two-phase motors.	4	3	1
Starting methods and speed control of single-phase induction motors.	8	6	2
Construction, theory of operation, equivalent circuit, and characteristics of universal motors, control motors: DC and AC tachometers, and servo motors.	4	3	1
Characteristics and performance of synchronous motors and variable speed synchronous motor drive systems.	8	6	2
Reluctance motors: Construction, theory of operation, equivalent circuit, governing equations, and characteristics.	8	6	2
Permanent magnet motors: Construction, theory of operation, equivalent circuit, governing equations, and characteristics.	8	6	2
Stepper motors: Construction, theory of operation, equivalent circuit, governing equations, and characteristics.	8	6	2
Brushless dc motors: Construction, theory of operation, equivalent circuit, governing equations, and characteristics.	4	3	1
Testing of single-phase induction motor.	4		4

Teaching And Learning Methodologies :

Interactive Lecturing
Discussion
Problem solving
Report
Experiential learning

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
ÅFinal exam	40.00		
o assignment	10.00		
o In Class Quizzes	10.00		
o Mid-Term exams	30.00		
o Report(s)/computer Lab	10.00		

Recommended books :

1. Chapman, S. J., ñElectric Machinery fundamentalsò, McGraw 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.