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	2
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen	1

Area Of Study :

Upon successful completion of the course, the student should be able to:
1. Understand the construction, theory of operation, equivalent circuit, develop voltage, current, power and torque equations, and basic characteristics of each of single- and two-phase and linear induction motors.
2. Be familiar with the windings and connections of single- and two-phase and linear induction motors.
3. Understand the construction, theory of operation, equivalent circuit, develop voltage, current, power and torque equations, and basic characteristics of each of Permanent magnet, hysteresis, stepper, and universal motors.
4. Understand the construction, theory of operation of DC special purpose motors, variable speed drives, DC servomotors
5. Develop the ability to select suitable motor for required operations.

Description :

Theory of single-phase rotating machines, Two phase motors, Single-phase induction motors, Windings and connections, Split phase induction motors: Operation and protection, Capacitor start motors, Two value capacitor motors, Shaded pole motors, Drag-cup motors, Linear motors, Synchronous motors, Reluctance motors, Hysteresis motors, Permanent magnet motors, Inductor type motors, Stepper motors, Dc motors, Universal motors, Dc special purpose motors, Variable speed drive systems, Dc servomotors, Selecting motors for required operations.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	a1. Develop knowledge and understanding of the theory of operation, equivalent circuit, and characteristics of single- and two-phase, and linear induction motors.
2 -	a2. Able to identify windings and connections of single-, two-phase and linear induction motors
3 -	a3. Demonstrate the knowledge and understanding of the starting methods and speed control of single-phase induction motors.
4 -	a4. Develop knowledge and understanding of the operation, develop equivalent circuit, and voltage, current, power and torque equations, and basic characteristics of each of permanent magnet, hysteresis, stepper, and universal motors.
5 -	a5. Demonstrate the understanding of the theory of operation of DC special purpose motors, variable speed drives, DC servomotors
b.Intellectual Skills: :	
1 -	b1. Analyze operating conditions of single- and two-phase and limnear induction motors.

2 -	b2. Analyze starting methods and speed control of both single-phase induction motors.
3 -	b3. Evaluate the performance of Permanent magnet, hysteresis, stepper, and universal motors.
4 -	b4. Analyze and evaluate DC special purpose motors, variable speed drives, DC servomotors.
5 -	b5. Choose among different solution alternatives.
c.Professional and Practical Skills: :	
1 -	c1. Perform the required computer simulation programs to get the load characteristics of single- and two-phase induction motors using any appropriate software tool.
d.General and Transferable Skills: :	
1 -	d1. Work coherently and successfully as a part of a team in the research project.
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
Revision of 3-ph inductiom motors and synchronous machines.	8	8	2
Principles of operation of two- and single-phase induction motors	4	3	1
Single-phase induction motors: windindings and connection, equivalent circuit	7	6	1
Split phase induction motors: Operation and protection	5	3	2
Capacitor start motors, two value capacitor motors, hhaded pole motors, drag-cup motors	8	6	2
Linear motors, synchronous motors, reluctance motors, hysteresis motors	8	6	2
Permanent magnet motors, inductor type motors, stepper motors, DC motors, Universal motors	8	6	2
DC special purpose motors, variable speed drive systems, DC servomotors	8	6	2
Selecting motors for required operations	4	3	1

Teaching And Learning Methodologies :

- ÅLectures.
- ÅTutorials
- ÅReport(s)/Computer simulations

Course Assessment :

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

Recommended books :

1. Chapman, S. J, Electric Machinery fundamentals, McGraw Hill Co., 5th edition, 2011 (Text Book)
2. A.E. Fitzgerald, C. Kingsley, and S. D. Umans, Electric Machinery, McGraw Hill Co., 7th edition, 2014
3. M. E. El-Hawary, Principles of Electric Machines with Power Electronic Applications, McGraw-Hill, most recent edition.
4. T. Wildi, Electric Machines, Drives and Power Systems, Prentice Hall, most recent edition.