



39. Course Specification of Special Machines

	I. Course Identification and General Information:							
1.	Course Title:	Speci	al Machine	es				
2.	Course Code & Number:	PME3	326					
			C.	Н		TOTAL		
3.	Credit hours:	Th.	Tu.	Pr	Tr.	IOIAL		
		2	2	2	-	4		
4.	Study level/ semester at which this course is offered:	Fourt	h Year/ Fir	st Semes	ster			
5.	Pre –requisite (if any):	Machine 1 (PME221) , Machine 2 (PME224)				achine 2		
6.	Co –requisite (if any):	NA						
7.	Program (s) in which the course is offered:	Electr Engin	rical Po eering	ower	and	Machines		
8.	Language of teaching the course:	Englis	sh					
9.	Location of teaching the course:	Class	& lab					
10.	Prepared By:	Assoc	. prof. Dr.	Radwan	AL box	ıthigy		
11.	Date of Approval	2020						

II. Course Description:

This course is designed to provide principal concepts of special machines as a major Electric system component. The course includes: The construction, classification, performance characteristics, analysis, parallel operation, testing and applications of: Single phase induction motors, DC and AC stepper motors, DC and AC servo motors, universal motor, Single-phase Synchronous Motors (Reluctance and Hysteresis) and linear motors as well as, starting and speed control of the different types of motors. Laboratory experiments and MATLAB simulation tool are carried out for different types of machines devices to verify the theoretical concepts.

presentations.

Title of the Program: Electrical Power and Machines Engineering







	III. Course Intended learning outcomes (CILOs) of the course	Referenced PILOs
a1	Recognize operation principles, speed control and application in industrial system of various type of general-purpose DC and AC special machines.	A1
a2	Acquire knowledge to professionally design and analysis the special machines using computer simulators and practical experiments.	A2,A3
b1	Differentiate between the elements of special machines by their characteristics and construction.	B1
b2	Evaluate the modeling and design principles of special machines used in the process of designing the elements of systems.	В3
c1	Test and practically investigate the performance of special machines by performing electrical, mechanical and related measurements such as: current, voltage, power speed, and torque.	C3
c2	Perform and evaluate practical design of industrial system using computer software such as Modelica, Simulink, LVSim, MATLAB.	C2,C4
d1	Develop students cooperative work though team work.	D1
d2	Encourage students self-learning of general IT skills through	D2,D5

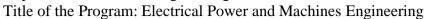
(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:				
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies		
a1- Recognize operation principles, speed control and application in industrial system of various type of general-purpose DC and AC special machines.	 Lectures, Tutorial, Interactive class discussions, Laboratory experiments, Self-study 	Assignments,Written exams,Quizzes		
a2- Acquire knowledge to professionally design and analysis the special machines using computer simulators and practical experiments.	 Lectures, Tutorial, Interactive class discussions, Laboratory experiments, 	Assignments,Written exams,Quizzes		

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■ Self-study	

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:				
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies		
b1- Differentiate between the elements of special machines by their characteristics and construction.	 Lectures, Interactive class discussions, Laboratory experiments, Self and cooperative learning. 	Assignments,Quizzes,Written examsHomework.Lab. reports.		
b2- Evaluate the modeling and design principles of special machines used in the process of designing the elements of systems.	 Lectures, Interactive class discussions, Laboratory experiments, Self and cooperative learning. 	 Assignments, Quizzes, Written exams, Homework. Lab. reports. 		

© Alignment Course Intended Learning Outcomes of Professional and Practical				
Skills to Teaching Strategies and Assessment Strategies:				
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies		
c1- Test and practically	■ Lectures,	• Quizzes ,		
investigate the performance of	Interactive class	Laboratory		
special machines by	discussion	assignments and		
performing electrical, mechanical	■ Exercises,	reports,		
and related measurements such as:	Series of laboratory	■ Homework,		
current, voltage, power speed,	experiment,	Midterm and final		
and torque.	Self-study	exam.		
	■ Lectures,	■ Quizzes ,		
c2- Perform and evaluate	Interactive class	Laboratory		
practical design of industrial	discussion	assignments and		
system using computer software	■ Exercises,	reports,		
such as Modelica, Simulink,	Series of laboratory	■ Homework,		
LVSim, MATLAB.	experiment,	Midterm and final		
	Self-study	exam.		

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(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:					
Course Intended Learning Outcomes					
d1- Develop students cooperative work though team work.	Interactive classDiscussion,	 Laboratory reports, Assignments, Quizzes, Written exams, Lab. Exams, Homework. 			
d2- Encourage students self-learning of general IT skills through presentations,	Interactive classDiscussion,Self-study assignments	 Laboratory reports, Assignments, Quizzes, Written exams, Lab. Exams, Homework. 			

I	IV. Course Content:					
	A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours	
1.	Introduction	a1,a2,b1,b2	 Course description. Review of Electromagnetic circuits. Review of Energy balance. Review of Magnetic field system (Energy and Coenergy). 	1	2	
2.	Single phase induction motor	a1, a2, b1, b2, d1, d2	 Construction and Operation principles. Performance characteristics, equivalent circuits and application areas. 	3	6	

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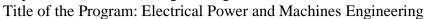


			Modeling of single-phase		
			induction motors		
3.	DC and AC stepper motor	a1, a2, b1, b2, d1,d2	 Principle of operation of single-stack, variable-reluctance stepping motor. Principle of operation of multi-stack variable-reluctance stepping motor. Principle of operation of Hybrid Stepper Motors Comparison of stepper motor types 	3	6
4.	DC and AC servo motors	a1, a2, b1, b2, d1, d2	DC Servo motorAC servo motorThree phase servo motor	2	4
5.	universal motor	a1, a2, b1, b2, d1, d2,	 Principle of operation of a universal motor Applications of Universal Motors Torque-Speed characteristics of a universal motor Speed Control of Universal Motors Reversing direction of rotation of a universal motor 	2	4
6.	Single-phase Synchronous Motors	a1, a2, b1, b2, d1, d2	 Principle of operation of a reluctance motor Torque-Speed characteristics of a reluctance motor Construction of a hysteresis motor 	2	4

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 Applications of Hysteresis Motors Mathematical analysis for the developed torque in the hysteresis motor Coperation principles Construction, modeling and application of Permanent	Numbe	r of Weeks /an	d Units Per Sem	linear synchronous motors.	14	28
Motors • Mathematical analysis for the developed torque in the	7.	Linear motor		 Construction, modeling and application of Permanent Magnet (PM) linear synchronous motors. 	1	2
 Principle of operation of a hysteresis motor Torque-Speed characteristics of a hysteresis motor 				hysteresis motor Torque-Speed characteristics of a hysteresis motor Applications of Hysteresis Motors Mathematical analysis for the developed torque in the		

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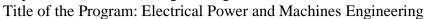
B- '	B- Tutorials Aspect:					
Order	Tutorial Skills List	Nº of Weeks	С.Н.	CILOs		
1.	 Equivalent circuit and equations of single-phase induction motor. The performance characteristics. Graphical analysis. Modelica and/or MATLAB simulation of single-phase induction motor 	2	4	a1,a2,b1,b2,c2,d1,d2		
2.	 Equivalent circuit and equations types stepper motors. The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model of stepper motors. Speed – torque control of stepper motors. 	2	4	a1,a2,b1,b2,c2,d1,d2		
3.	 Equivalent circuit and equations types servo motors. The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model of servo motors. Speed – torque control of servo motors. 	2	4	a1,a2,b1,b2,c2,d1,d2		
4.	 Equivalent circuit and equations types servo motors. The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model of DC motors. Speed – torque control of servo motors. 	2	4	a1,a2,b1,b2,c2,d1,d2		
5.	 Equivalent circuit and equations types universel motors. 	2	4	a1,a2,b1,b2,c2,d1,d2		

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N	Jumber of Weeks /and Units Per Semester	14	28	
7.	 Equivalent circuit and equations types linear motors motors. The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model of linear motors. Speed – torque control of linear motors. 	2	4	a1,a2,b1,b2,c2,d1,d2
6.	 Equivalent circuit and equations types single phase synchronous motors. The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model of single-phase synchronous motors. Speed – torque control of single-phase synchronous motors. 	2	4	a1,a2,b1,b2,c2,d1,d2
	 The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model universel motors. Speed – torque control of universel motors. 			

C - Practical Aspect:							
Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes			
1.	 Safety regulations and requirements in electrical laboratories. Experimental work outlines and requirements. 	1	2	a1,a2,b1,b2,c1,c2			

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	■ Introduction to main laboratory devices			
	and instrumentations.			
	 Introduction to main measurement 			
	devices.			
	 Single-phase Induction motors starting. 			
	 Single-phase Induction motors 			
2.	characteristics.	3	6	a1,a2,b1,b2,c1,c2
	Computer modeling of single-phase			
	induction motors.			
	■ Speed control Stepper motors			
3.	■ Torque-Speed characteristics	2	4	a1,a2,b1,b2,c1,c2
	■ Computer modeling stepper motor			
	■ Speed control servo motors			
4.	■ Torque-Speed characteristics	2	4	a1,a2,b1,b2,c1,c2
	■ Computer modeling servo motor			
5.	■ Torque-Speed characteristics of a	1	2	o1 o2 b1 b2 o1 o2
5.	universal motor	1	2	a1,a2,b1,b2,c1,c2
6.	■ Torque-Speed characteristics of a	1	2	a1,a2,b1,b2,c1,c2
0.	reluctance motor	1	2	a1,a2,01,02,C1,C2
7.	■ Torque-Speed characteristics of a	1	2	a1,a2,b1,b2,c1,c2
7.	hysteresis motor	1	2	a1,a2,01,02,C1,C2
	■ Familiarize with practical a single-			
	sided and double-sided linear induction			
8.	motors. Determine the performance	2	4	a1,a2,b1,b2,c1,c2
	characteristics of single-sided motor.			
	■ Computer modeling linear motor			
9.	■ Final Exam	1	2	a1,a2,b1,b2
Num	ber of Weeks /and Units Per Semester	14	28	

V. Teaching strategies of the course:

- Lectures.
- Interactive class discussion.
- Simulation Tools
- Series of laboratory experiment.

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- Title of the Program: Electrical Power and Machines Engineering
- Self-study
- Project work

7	VI. Assignments:							
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark				
1.	Comparison between types of single phase induction motors	a1,a2,b1,b2,d2	3 rd	2				
2.	Design and implementation of stepper motor circuits using MATLAB tools	a1,a2,b1,b2,c2	5 th	2				
3.	Design and implementation of servo motor circuits using MATLAB tools	a1,a2,b1,b2,c2	7 th	2				
4.	Design and implementation of single phase synchronous motor circuits using MATLAB tools	a1,a2,b1,b2,c2	8 th	2				
5.	Lab-reports	a1,a2,b1,b2	Weekly	2				
	Total							

VI	VII. Schedule of Assessment Tasks for Students During the Semester:								
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes				
1.	Quizzes	4 th ,7 th ,10 th , and 13 th	20	10%	a1,a2,b1,b2				
2.	Assignments & Homework, Tasks & Presentation	Weekly	20	10%	a1,a2,b1,b2,d2				

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3.	Mid-Term exam	8 th	20	10%	a1,a2,b1,b2
4.	Final exam practical	15 th	40	20%	a1,a2,b1,b2,c1,c2,d2
5.	Final Exam theory	16 th	100	50%	a1,a2,b1,b2
	Total		200	100%	

VIII. Learning Resources:

• Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

- 1. E.G. Janardanan, 2014, 'Special electrical machines', PHI learning Private Limited, Delhi.
- 2. Chapman s. j. (2005), Electric Machinery Fundamentals, 4th Edition, McGraw-Hill.

2- Essential References.

- 1. Hughes, 2006, Electric Motors and Drives Fundamentals, Types and Applications, third edition, Elsevier Ltd, British
- 2. W. Leonhard, 1985, Control of Electrical Drives, Springer-Verlag, New York,
- 3. T. Wildi,2002, Electrical machines, drives and power systems, fifth edition, Upper Saddle River, New Jersey Columbus, Ohio
- 4. B. L. Theraja,2005, Electrical Technology, first multi-color India, S.Chand & Company Ltd.

3- Electronic Materials and Web Sites etc.

- 1. Modelica Association (2000). ModelicaTM A Unified Object-Oriented Language for Physical Systems Modeling. Tutorial Version 1.4 (ModelicaTutorial14.pdf). Available from: https://modelica.org/documents/
- 2. MapleSim Video Tutorial: Modelica Video lectures available form: http://www.youtube.com/watch?v=reehU1dzeDc.
- 3. Simulink-Matlab tutorial for beginners Video lectures available form:

IX. Course Policies:

Class Attendance:

- A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure. If the

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1.

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	student is absent due to illness, he/she should bring an approved statement from university
	Clinic. If the absent is more than 25% of a course total contact hour, student will be
	required to retake the entire course again
	Tardy:
2.	- For late in attending the class, the student will be initially notified. If he repeated lateness
	in attending class, he/she will be considered as absent.
	Exam Attendance/Punctuality:
3.	- A student should attend the exam on time. He/she is permitted to attend an exam half
3.	one hour from exam beginning, after that he/she will not be permitted to take the exam
	and he/she will be considered as absent in exam.
	Assignments & Projects:
4.	- In general, one assignment is given to the students after each chapter; the student has
4.	to submit all the assignments for checking on time, mostly one week after given the
	assignment.
	Cheating:
5.	- For cheating in exam, a student will be considered as failure. In case the cheating is
	repeated three times during his/her study the student will be disengaged from the Faculty.
	Plagiarism:
	- Plagiarism is the attending of a student the exam of a course instead of another student.
6.	If the examination committee proved a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty
	should be confirmed from the Student Council Affair of the university or according to the
	university roles.
	Other policies:
	Mobile phones are not allowed to use during a class lecture. It must be closed;
7.	otherwise the student will be asked to leave the lecture room.
	Mobile phones are not allowed in class during the examination.Lecture notes and assignments might be given directly to students using soft or
	hard copy.

Reviewed	Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek						
By	A. Barakat						
	President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi						
	Name of Reviewer from the Department: Asst. Prof. Dr. Adel Ahmed Al-Shakiri						
	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa						
	Assoc. Prof. Dr. Ahmed Mujahed						

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Title of the Program: Electrical Power and Machines Engineering

39. Template for Course Plan of Special Machines

I. Information about Faculty Member Responsible for the								
Course:								
Name of Faculty Member	Assoc. Prof. Dr. Radwan Al bouthigy Office Hours							
Location& Telephone No.	- 1 //2/84933 IISA I SUN I WUN I IUR.		WED	THU				
E-mail radwan006@yahoo.com								

	II. Course Identification and General Information:					
1.	Course Title:	Special Machines				
2.	Course Number & Code:	PME326				
			C.l	Н		Total
3.	Credit hours:	Th.	Tu.	Pr.	Tr.	Total
		2	2	2	_	4
4.	Study level/year at which this course is offered:	Fourth Year/ First Semester				
5.	Pre –requisite (if any):	Machine 1 (PME221), Machine 2 (PME224)				
6.	Co –requisite (if any):	NA				
7.	Program (s) in which the course is offered	Electrical Power and Machines				
/•	1 logiam (s) in which the course is offered	Engineering				
8.	Language of teaching the course:	English				
9.	System of Study:	Semester				
10.	Mode of delivery:	Semesters				
11.	Location of teaching the course:	Class & lab				

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III. Course Description:

This course is designed to provide principal concepts of special machines as a major Electric system component. The course includes: The construction, classification, performance characteristics, analysis, parallel operation, testing and applications of: Single phase induction motors, DC and AC stepper motors, DC and AC servo motors, universal motor, Single-phase Synchronous Motors (Reluctance and Hysteresis) and linear motors as well as, starting and speed control of the different types of motors. Laboratory experiments and MATLAB simulation tool are carried out for different types of machines devices to verify the theoretical concepts.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:
 - 1. Recognize operation principles, speed control and application in industrial system of various type of general-purpose DC and AC special machines.
 - **2.** Acquire knowledge to professionally design and analysis the special machines using computer simulators and practical experiments.
 - **3.** Differentiate between the elements of special machines by their characteristics and construction.
 - **4.** Evaluate the modeling and design principles of special machines used in the process of designing the elements of systems.
 - **5.** Test and practically investigate the performance of special machines by performing electrical, mechanical and related measurements such as: current, voltage, power speed, and torque.
 - **6.** Perform and evaluate practical design of industrial system using computer software such as Modelica, Simulink, LVSim, MATLAB.
 - 7. Develop students cooperative work though team work.
 - **8.** Encourage students self-learning of general IT skills through presentations.

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V Course Content:

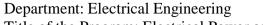
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V. Course Content:					
	A – Theoretical Aspect:				
Order Units/Topics List Sub Topics List		Number of Weeks	Contact hours		
1.	Introduction	 Course description. Review of Electromagnetic circuits. .Review of Energy balance. Review of Magnetic field system (Energy and Co-energy). 	1 st	2	
2.	Single phase Construction and Operation principles. Performance characteristics, equivalent		2 nd ,3 ^{rd,} 4 th	6	
3.	DC and AC stepper motor	 Principle of operation of single-stack, variable-reluctance stepping motor. Principle of operation of multi-stack variable-reluctance stepping motor. Principle of operation of Hybrid Stepper Motors Comparison of stepper motor types 	5 th ,6 th ,7 th	6	
4.	Midterm Exam		8 th	2	
5.	DC and AC servo motors	DC Servo motorAC servo motorThree phase servo motor	9 th ,10 th	4	
6.	universal motor	 Principle of operation of a universal motor Applications of Universal Motors Torque-Speed characteristics of a universal motor Speed Control of Universal Motors Reversing direction of rotation of a universal motor 	11 th ,12 th	4	

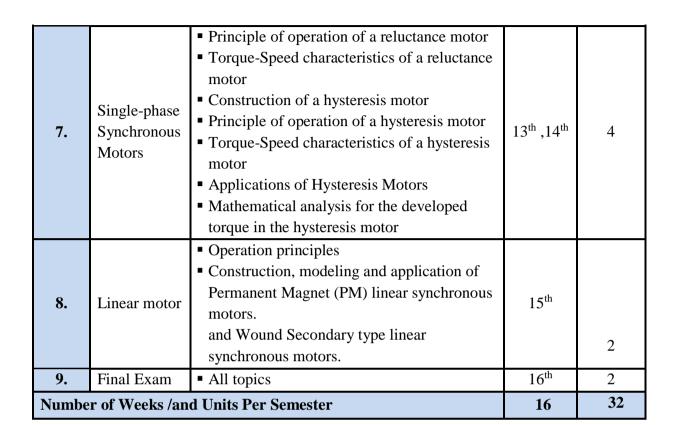
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B- Tutorials Aspect:			
Order Tutorial Skills List		Nº of Weeks	С.Н.
1.	 Equivalent circuit and equations of single-phase induction motor. The performance characteristics. Graphical analysis. Modelica and/or MATLAB simulation of single-phase induction motor 	1 st ,2 nd	4
2.	 Equivalent circuit and equations types stepper motors. The performance characteristics. Graphical analysis Speed regulation The mathematical and Modelica and/or MATLAB model of stepper motors. 	3 rd ,4 th	4

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	■ Speed – torque control of stepper motors.		
	■ Equivalent circuit and equations types servo motors.		
	The performance characteristics.		
	• Graphical analysis	eth eth	,
3.	• Speed regulation	5 th ,6 th	4
	■ The mathematical and Modelica and/or MATLAB model of		
	servo motors.		
	■ Speed – torque control of servo motors.		
	 Equivalent circuit and equations types servo motors. 		
	 The performance characteristics. 		
	■ Graphical analysis	7th 0th	,
4.	■ Speed regulation The mathematical and Madelian and/on MATLAR model of	7 th ,8 th	4
	The mathematical and Modelica and/or MATLAB model of DC motors.		
	■ Speed – torque control of servo motors.		
	Equivalent circuit and equations types universel motors.The performance characteristics.		
	 The performance characteristics. Graphical analysis		
5.	Speed regulation	9 th ,10 th	4
5.	■ The mathematical and Modelica and/or MATLAB model	9,10	4
	universel motors.		
	■ Speed – torque control of universel motors.		
	 Equivalent circuit and equations types single phase 		
	synchronous motors.		
	■ The performance characteristics.		
	■ Graphical analysis		
6.	■ Speed regulation	11^{th} , 12^{th}	4
	■ The mathematical and Modelica and/or MATLAB model of		
	single-phase synchronous motors.		
	■ Speed – torque control of single-phase synchronous motors.		
_	■ Equivalent circuit and equations types linear motors motors.	10th 14th	
7.	■ The performance characteristics.	13 th ,14 th	4

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Graphical analysisSpeed regulation		
■ The mathematical and Modelica and/or MATLAB model of		
linear motors.		
■ Speed – torque control of linear motors.		
Number of Weeks /and Units Per Semester		28

C - Pı	C - Practical Aspect:				
Order	order Tasks/ Experiments		Contact hours		
1.	 Introduction to main laboratory devices and instrumentations. Introduction to main measurement devices. 		2		
2.	 Single-phase Induction motors starting. Single-phase Induction motors characteristics. Computer modeling of single-phase induction motors. 	2 nd ,3 rd ,4 th	6		
3.	 Speed control Stepper motors Torque-Speed characteristics Computer modeling stepper motor 		4		
4.	■ Speed control servo motors		4		
5.	■ Torque-Speed characteristics of a universal motor	10 th	2		
6.	■ Torque-Speed characteristics of a reluctance motor	11 th	2		
7.	■ Torque-Speed characteristics of a hysteresis motor	12 th	2		
 Familiarize with practical a single-sided and double-sided linear induction motors. Determine the performance characteristics of single-sided motor. Computer modeling linear motor 		13 th ,14 th	4		
9.	■ Final Exam	15 th	2		
	Number of Weeks /and Units Per Semester	15	28		

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Shakiri		

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Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad







VI. Teaching strategies of the course:

Title of the Program: Electrical Power and Machines Engineering

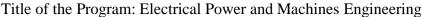
- Lectures.
- Interactive class discussion.
- Simulation Tools
- Series of laboratory experiment.
- Self-study
- Project work

7	VII.Assignments:				
No	Assignments	Aligned CILOs(symbols) Week Due		Mark	
1.	Comparison between types of single-phase induction motors	a1,a2,b1,b2,d2	3 rd	2	
2.	Design and implementation of stepper motor circuits using MATLAB tools	a1,a2,b1,b2,c2	5 th	2	
3.	Design and implementation of servo motor circuits using MATLAB tools	a1,a2,b1,b2,c2	7 th	2	
4.	Design and implementation of single-phase synchronous motor circuits using MATLAB tools	a1,a2,b1,b2,c2	8 th	2	
5.	Lab-reports	a1,a2,b1,b2	Weekly	2	
	Total				

VI	VIII.Schedule of Assessment Tasks for Students During the Semester:				
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	
1.	Quizzes	4 th ,7 th ,10 th , and 13 th	20	10%	

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Assoc. Prof. Dr.
Huda Al-Emad











2.	Assignments & Homework, Tasks & Presentation	Weekly	20	10%
3.	Mid-Term exam	8 th	20	10%
4.	Final exam practical	15 th	40	20%
5.	Final Exam theory	16 th	100	50%
	Total		200	100%

IX. Learning Resources:

• Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

- 1. E.G. Janardanan, 2014, 'Special electrical machines', PHI learning Private Limited, Delhi.
- 2. Chapman s. j. (2005), Electric Machinery Fundamentals, 4th Edition, McGraw-Hill.

2- Essential References.

- 1. Hughes, 2006, Electric Motors and Drives Fundamentals, Types and Applications, third edition, Elsevier Ltd, British
- 2. W. Leonhard, 1985, Control of Electrical Drives, Springer-Verlag, New York,
- 3. T. Wildi,2002, Electrical machines, drives and power systems, fifth edition, Upper Saddle River, New Jersey Columbus, Ohio
- 4. B. L. Theraja, 2005, Electrical Technology, first multi-color India, S.Chand & Company Ltd.

3- Electronic Materials and Web Sites etc.

- 1. Modelica Association (2000). ModelicaTM A Unified Object-Oriented Language for Physical Systems Modeling. Tutorial Version 1.4 (ModelicaTutorial14.pdf). Available from: https://modelica.org/documents/
- 2. MapleSim Video Tutorial: Modelica Video lectures available form: http://www.youtube.com/watch?v=reehU1dzeDc.
- 3. Simulink-Matlab tutorial for beginners Video lectures available form:

X. Course Policies:

1. Class Attendance:

Head of Department Asst. Prof. Dr. Adel Ahmed Al-Shakiri Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad

Sana'a University
Faculty of Engineering
Department: Electrical Engineering







Title of the Program: Electrical Power and Machines Engineering

	A student should attend not less than 75 % of total hours of the subjects otherwise					
	- A student should attend not less than 75 % of total hours of the subject; otherwise					
	he/she will not be able to take the exam and will be considered as exam failure. If the					
	student is absent due to illness, he/she should bring an approved statement from university					
	Clinic. If the absent is more than 25% of a course total contact hour, student will be					
	required to retake the entire course again					
	Tardy:					
2.	- For late in attending the class, the student will be initially notified. If he repeated lateness					
	in attending class, he/she will be considered as absent.					
	Exam Attendance/Punctuality:					
3.	- A student should attend the exam on time. He/she is permitted to attend an exam half					
٥.	one hour from exam beginning, after that he/she will not be permitted to take the exam					
	and he/she will be considered as absent in exam.					
	Assignments & Projects:					
,	- In general, one assignment is given to the students after each chapter; the student has					
4.	to submit all the assignments for checking on time, mostly one week after given the					
	assignment.					
	Cheating:					
5.	- For cheating in exam, a student will be considered as failure. In case the cheating is					
	repeated three times during his/her study the student will be disengaged from the Faculty.					
	Plagiarism:					
	- Plagiarism is the attending of a student the exam of a course instead of another student.					
_	If the examination committee proved a plagiarism of a student, he/she will be					
6.	disengaged from the Faculty. The final disengagement of the student from the Faculty					
	should be confirmed from the Student Council Affair of the university or according to the					
	university roles.					
	Other policies:					
	Mobile phones are not allowed to use during a class lecture. It must be closed;					
	otherwise the student will be asked to leave the lecture room.					
7.	- Mobile phones are not allowed in class during the examination.					
	- Lecture notes and assignments might be given directly to students using soft or					
	hard copy.					
	mus copy.					

Sana'a University
Faculty of Engineering
Department: Electrical Engineering

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Head of

Department

Asst. Prof. Dr.

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