Sana'a University
Faculty of Engineering
Mechanical Engineering Department
Mechanical Engineering Program

35. Course Specification of Electrical Machines

I. Course Identification and General Information:						
1.	Course Title:	Electrical Machines.				
2.	Course Code & Number:	PME225				
3.	Credit Hours:	C.H				TOTAL CR. HRS
		Th.	Seminar/Tu	Pr	Tr.	
		2	2	2	-	4
4.	Study level/ semester at which this course is offered:	Third Year-First Semester.				
5.	Pre –requisite (if any):	Electrical Circuits				
6.	Co –requisite (if any):	N/A				
7.	Program (s) in which the course is offered:	Mechanical Engineering Program.				
8.	Language of teaching the course:	English Language.				
9.	Location of teaching the course:	Mechanical Engineering Department.				
10.	Prepared By:	Assoc. Prof. Dr. Radwan Al bouthigy				
11.	Date of Approval					

II- Course Description:

This course is designed to provide principal concepts of electrical machines as a major Mechanics system component. The course includes; Electromechanical energy conversion (EMEC) principles, construction, classification, performance characteristics, analysis, parallel operation, testing and applications of: Single and three-phase transformers, DC machines, Single and three-phase synchronous and asynchronous AC machines 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.

III- Alignments of the Course Intended learning outcomes (CILOs)		Reference PILOs
a1	Characterize the components and construction of DC/AC machines and transformers and classify the DC/AC machines and transformers.	A2

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Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

a2	Describe the equivalent circuit, the mathematical model, and the operation conditions, starting methods and speed control of DC/AC machines and transformers.	A3
b1	Investigate the methods of controlling the generated voltage and speed of DC/AC machines.	B1
b2	Test the operation conditions, modeling and design principles of AC synchronous and induction machines using mathematical models and computer simulation.	B2
c1	Conduct experiments on the effect of unbalanced loading on DC/AC and transformer with different connections, and the effects and limitations of each connection, and measure the efficiency and the short circuit impedance of a single/ three-phase transformers from no-load test, winding resistance, short circuit test, and load test.	C1
c2	Calculate experimentally, load characteristics of various DC motors and generators under different loading conditions.	C2
d1	Cooperate in teams to conduct experiments, analyze results, and develop technically sound reports of outcomes.	D1
d2	Evaluate transferable skills of problem solving and design.	D2

(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- Characterize the components and construction of DC/AC machines and transformers and classify the DC/AC machines and transformers.	• Lectures • Tutorials • Self-Learning • Dialogue and Discussion	• Written Exam • Oral Discussion • Reports Evaluation • Presentations and Evaluation
a2- Describe the equivalent circuit, the mathematical model, and the operation conditions, starting methods and speed control of DC/AC machines and transformers.		

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Investigate the methods of controlling the generated voltage and speed of DC/AC machines.	• Lectures • Analysis and Problem Solving • Tutorials • Project	• Written Test and Quizzes • Laboratory Reports Evaluation • Project Reports • Presentations
b2- Test the operation conditions, modeling and design principles of AC synchronous and induction machines using mathematical models and computer simulation.		

© 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- Conduct experiments on the effect of unbalanced loading on DC/AC and transformer with different connections, and the effects and limitations of each	• Lectures • Laboratory • Projects	• Written Test and Quizzes

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	connection, and measure the efficiency and the short circuit impedance of a single/ three-phase transformers from no-load test, winding resistance, short circuit test, and load test.	• Design Exercises • Simulation Tools	• Laboratory Reports Evaluation • Presentations Evaluation • Project Reports • Observation of Performance
c2-	Calculate experimentally, load characteristics of various DC motors and generators under different loading conditions.		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1-	Cooperate in teams to conduct experiments, analyze results, and develop technically sound reports of outcomes.	• Lectures • Coursework • Laboratory • Projects • Presentations • Research	• Observation and Interviews • Laboratory Reports Evaluation • Research Reports • Presentations
d2-	Evaluate transferable skills of problem solving and design.		

IV- Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
1.	Introduction to Electrical Machines.	a1,b1	- Magnetic circuits - Definition of motor and generator. - Torque development due to alignment of two fields and the concept of torque angle. - Electro-magnetically induced emf.	1	2

			- Elementary concept of an electrical machine.		
2.	DC Generators.	a1,a2, b1, b2	- Types, Construction, Operation principles and application areas. - The performance characteristics and the equivalent circuit of DC generators. - Modelica and/or MATLAB modeling of DC generator (self-study).	2	4
3.	DC Motors.	a1,a2,b1,b2,d1,d2	- Main distinction between DC generators and motors. - Types, Construction, Operation principles and application areas of DC motors. - Performance characteristics and the equivalent circuit of DC motors. - Speed control of DC motors. - The mathematical and MATLAB model of DC motor.	3	6
4.	Transformers.	a1,a2,b1,b2,d1,d2	- Single-phase transformers: Equivalent circuits, Modeling, Power and efficiency. - Three-phase transformers. Construction. Major parameters, Winding group, Parallel operations.	1	2
5.	Mid-Term Exam	a1,a2,b1,b2	The First 4 Chapters.	1	2
6.	Three-Phase Synchronous Generators.	a1,a2,b1,b2,d1,d2	- Construction, Operation principles and application areas. - Performance characteristics and equivalent circuits.	2	4

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			- Mathematical and MATLAB model. - Voltage and Power regulations. - Parallel operation of synchronous generators.		
7.	Single-Phase Induction Motors.	a1,a2,b1,b2,d1,d2	- Construction and Operation principles. - Performance characteristics, equivalent circuits and application areas. - Modeling of single-phase induction motors.	1	2
8.	Three-Phase Induction Motors.	a1,a2,b1,b2,d1,d2	- Construction, Operation principles and application areas. - Performance characteristics and equivalent circuits. - Speed control and starting methods - Mathematical and MATLAB modeling.	4	8
9.	Final Exam.	a1, a2, b1,b2	All the Chapters.	1	2
Number of Weeks /and Units Per Semester				**16**	**32**

B - Practical Aspect:

Order	Tasks/ Experiments	Week Due	Contact Hours	Learning Outcomes
1.	• Safety regulations and requirements in electrical laboratories. • Introduction to main laboratory devices and instrumentations. • Introduction to main measurement devices. • Reporting format.	1	2	a1,b1,c1,c2,d1,d2

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2.	• Open and load circuit characteristics of a separately excited D.C generator	2	2	a1,a2,b1,b2,c1,c2,d1,d2
3.	• Terminal characteristics a shunt, series and compound generators	3	2	a1,a2,b1,b2,c1,c2,d1,d2
4.	• Terminal characteristics of a separately, shunt, series and compound motors.	4	2	a1,a2,b1,b2,c1,c2,d1,d2
5.	• Starting control of D.C motors	5	2	a1,a2,b1,b2,c1,c2,d1,d2
6.	• Open-circuit, Short-circuit and load test of single/three phase transformer.	6	2	a1,a2,b1,b2,c1,c2,d1,d2
7.	• Parameters of single/three phase transformer.	7	2	a1,a2,b1,b2,c1,c2,d1,d2
8.	• Parameters of three phase synchronous generator • Voltage regulation of three phase synchronous generator	8	2	a1,a2,b1,b2,c1,c2,d1,d2
9.	• Parallel operation and synchronism. • Computer modeling of parallel operation and synchronism	9	2	a1,a2,b1,b2,c1,c2,d1,d2
10.	• Single-phase Induction motors starting and operation characteristics. • Computer modeling of single-phase induction motors.	10	2	a1,a2,b1,b2,c1,c2,d1,d2
11.	• Three-phase Induction motors performance characteristics.	11	2	a1,a2,b1,b2,c1,c2,d1,d2
12.	• Three phase induction motors parameters.	12	2	a1,a2,b1,b2,c1,c2,d1,d2
13.	• Speed – torque control of three-phase Induction motors. • Computer modeling of three-phase induction motors.	13	2	a1,a2,b1,b2,c1,c2,d1,d2

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14.	• Submission of the Lab. Report.	14	2	a1,a2,b1,b2,c1,c2,d1,d2
Number of Weeks /and Units Per Semester		**14**	**28**	

C – Case Studies and Tutorial Aspect:

Order	Tasks/ Tutorials	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1.	• Calculation of magnetic circuits, magnetic flux, flux density, magnetic field intensity, and permeability. • Force and torque calculations.	1	2	a1,b1,c1,c2,d1,d2
2.	• Equivalent circuit of types DC generator. • The performance characteristics. • Modelica and/or MATLAB simulation of DC generator.	2	4	a1,a2,b1,b2,c1,d1,d2
3.	• Equivalent circuit of types DC motor. • The performance characteristics. • The mathematical and Modelica and/or MATLAB model of DC motors. • Speed – torque control of DC motors.	2	4	a1,a2,b1,b2,c1,d1,d2
4.	• Calculation of single and three phase Transformers' Parameters. • Performance characteristics. • Modelica and/or MATLB Transformer modeling.	2	4	a1,a2,b1,b2,c1,d1,d2

5.	• Performance characteristics of synchronous generators. • Equivalent circuits. • Mathematical and MATLAB model. • Voltage and Power regulations. • Parallel operation of synchronous generators.	2	4	a1,a2,b1,b2,c1,d1,d2
6.	• Performance characteristics of single-phase induction motor • Equivalent circuits. • Starting and speed control.	2	4	a1,a2,b1,b2,c1,d1,d2
7.	• Performance characteristics of single-phase induction motor • Equivalent circuits. • Power and torque calculation. • Parameters of three pase induction motor • Starting and speed control.	3	6	a1,a2,b1,b2,c1,d1,d2
Number of Weeks /and Units Per Semester		**14**	**28**	

V- Teaching Strategies of the Course:

- Lectures.
- Tutorials.
- Self-learning.
- Dialogue and Discussion.
- Analysis and Problem Solving.
- Project.
- Laboratory.
- Simulation Tools.
- Design Exercises.
- Coursework.
- Presentations.

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- Research.

VI- Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Comparison between types DC of DC generator	a1,a2,b1,b2,d2	3rd	4
2.	Design and implementation of generator circuits using MATLAB tools	a1,a2,b1,b2,c1	4th	3
3.	Design and implementation of DC motor circuits using MATLAB tools	a1,a2,b1,b2,c1	6th	3
4.	Design and implementation of transformer circuits using MATLAB tools	a1,a2,b1,b2,c1	8th	3
5.	Design and implementation of three induction motor circuits using MATLAB tools	a1,a2,b1,b2,c1	10th	3
6.	Lab-reports.	a1,a2,b1,b2	Weekly	4
Total				**20**

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	5th, 10th	20	10%	a1,a2,b1,b2
2.	Assignments	Weekly	20	10%	a1,a2,b1,b2,d2
3.	Mid-Term Exam.	8th	20	10%	a1,a2,b1,b2
4.	Final Exam Practical.	15th	40	20%	a1,a2,b1,b2,c1,c2,d2
5.	Final Exam Theory	16th	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).*

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1- Required Textbook(s) (maximum two).	
	1- Chapman S.J. (2005), Electric Machinery Fundamentals,4 th Edition, McGraw-Hill. 2- Fitzgerald A. E. (2003), Electric Machinery, 6 th Edition, McGraw-Hill.
2- Essential References.	
	1. D.F. Warne (2000), Newnes Electrical Engineer's Handbook, 1 st Edition, Biddles Ltd- wwv. biddlesxo. Uk. 2. Nasar S. A. (1998), Electric Machines and Electro mechanics, 2 nd Edition, Schaum's Outlines Series- McGraw-Hill. 3. Bandyopadhyay M.N, (2009), Electrical Machines: Theory and Practice, 1st Edition, Prentice-Hall of India Pvt Ltd. 4. Bimbhra P.S., (1995), Electric Machinery, 7 th Edition Khanna Publishers.
3- Electronic Materials and Web Sites *etc*.	
	1. Modelica Association (2000). ModelicaTM - A Unified Object-Oriented Lang for Physical Systems Modeling. Tutorial Version 1.4 (ModelicaTutorial14 Available from: https://modelica.org/documents/ 2. MapleSim Video Tutorial: Modelica Video lectures available http://www.youtube.com/watch?v=reehU1dzeDc. 3. Simulink-Matlab tutorial for beginners Video lectures available form:

I. Course Policies:

1	**Class Attendance:** - The student should be attending not less than 75% of total contact hours of the subject, otherwise he will not able to take exam and be considerd as an exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic.
2	**Tardy:** - For lateness in attending the class, the student will be initially notified. If he repeates late in attending class he will be considered absent.
3	**Exam Attendance/Punctuality:** - The student should attend the exam on time. He is permitted to attend the exam half one hour from exam beginning, after that he/she will not be permitted to take exam and he/she is considered absent in the exam.
4	**Assignments & Projects:** - In general one assignment is given after each chapter of a course. The student should submit the assignment on time, mostly one week after giving the assignment
5	**Cheating**:

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	- For cheating in exam, the student is considered as failure. In case the cheating is repeated three times during study the student will be disengaged from the Faculty
6	**Plagiarism**: Plagiarism is the attending of the student the exam of a course instead of other student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Affair Council of the university.
7	**Other policies:** - The mobile phone is not allowable to be used during class lecture. It must be switched off, otherwise the student will be ordered to leave the lecture room. - The mobile phone is not allowed to be taken during the examination time. - Lecture notes and assignments may be given directly to students using soft or hard copy.

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

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35. Template for Course Plan of Electrical 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.	775284933	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail	radwan006@yahoo.com						

II. Course Identification and General Information:

1.	Course Title:	Electrical Machines.				
2.	Course Number & Code:	PME225				
3.	Credit Hours:	Th.	Seminar/Tu.	Pr.	Tr.	Total Cr. Hrs.
		2	2	2	-	4
4.	Study level/year at which this course is offered:	Third Year-First Semester.				
5.	Pre –requisite (if any):	Electrical Circuits				
6.	Co –requisite (if any):	N/A				
7.	Program (s) in which the course is offered	Mechanical Engineering Program				
8.	Language of teaching the course:	English Language.				
9.	System of Study:	Semesters.				
10.	Mode of delivery:	Lectures, Tutorials and Lab.				
11.	Location of teaching the course:	Mechanical Engineering Department.				

III. Course Description:

This course is designed to provide principal concepts of electrical machines as a major Mechanics system component. The course includes Electromechanical energy conversion (EMEC) principles, construction, classification, performance characteristics, analysis, parallel operation, testing and applications of: Single and three-phase transformers, DC machines, Single and three-phase synchronous and asynchronous AC machines 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. Provide students deep understanding of EMEC principles and fundamental theories of the general-purpose DC and AC machines.
2. Illustrate the operation principles, construction, performance characteristic and application areas of numerous general-purpose electrical machines and transformers.
3. Provide students modeling principles and ability to drive the performance equations of various types of electrical machines and transformers.
4. Reinforce students' ability to self-learning and applying advanced computer software such as Modelica, LVSim-EMS and Simulink-MATLAB, etc.
5. Enable students to model and analyze the performance characteristics of various types of general-purpose electrical machines and transformer, analytically and/or using computer simulation software such as Modelica, Simulink, LVSim-EMS, MATLAB, etc.
6. Qualify students to make use of industrial data sheets and related codes and standard related to the various types of electrical machines.
7. Build students ability to identify the applications areas, working condition, merits and demerits of numerous types of electrical machines and transformers applying knowledge gained during present course, information obtained from industrial data sheets and related codes and standard.
8. Build up theoretical background and practical skills necessary to achieve an economical and technical adequate selection of a desired type of electrical machine in practice.

V. Course Content:

- Distribution of Semester Weekly Plan Of course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Topics List	Sub Topics List	Week Due	Contact Hours
1.	Introduction to Electrical Machines.	- Magnetic circuits - Definition of motor and generator. - Torque development due to alignment of two fields and the concept of torque angle. - Electro-magnetically induced emf. - Elementary concept of an electrical machine.	1st	2
2.	DC Generators.	- Types, Construction, Operation principles and application areas. - The performance characteristics and the equivalent circuit of DC generators. - Modelica and/or MATLAB modeling of DC generator (self-study).	2nd , 3rd	4
3.	DC Motors.	- Main distinction between DC generators and motors. - Types, Construction, Operation principles and application areas of DC motors. - Performance characteristics and the equivalent circuit of DC motors. - Speed control of DC motors. - The mathematical and MATLAB model of DC motor.	4th, 5th ,6th	6
4.	Transformers.	- Single-phase transformers: Equivalent circuits, Modeling, Power and efficiency. - Three-phase transformers. Construction. Major parameters, Winding group, Parallel operations.	7th	2
5.	Mid-Term Exam.	- The First 4 Chapters.	8th	2

6.	Three-Phase Synchronous Generators.	- Construction, Operation principles and application areas. - Performance characteristics and equivalent circuits. - Mathematical and MATLAB model. - Voltage and Power regulations. - Parallel operation of synchronous generators.	9th, 10th	4
7.	Single-Phase Induction Motors.	- Construction and Operation principles. - Performance characteristics, equivalent circuits and application areas. - Modeling of single-phase induction motors.	11th	2
8.	Three-Phase Induction Motors.	- Construction, Operation principles and application areas. - Performance characteristics and equivalent circuits. - Speed control and starting methods - Mathematical and MATLAB modeling.	12th, 13th, 14th, 15th	8
9.	Final Exam.	All the Chapters.	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Practical Aspect:

Order	Tasks/ Experiments	Week Due	Contact Hours
1.	• Safety regulations and requirements in electrical laboratories. • Introduction to main laboratory devices and instrumentations. • Introduction to main measurement devices. • Reporting format.	1st	2
2.	• Open and load circuit characteristics of a separately excited D.C generator	2nd	2

3.	• Terminal characteristics a shunt, series and compound generators	3rd	2
4.	• Terminal characteristics of a separately, shunt, series and compound motors.	4th	2
5.	• Starting control of D.C motors	5 th	2
6.	• Open-circuit, Short-circuit and load test of single/three phase transformer.	6 th	2
7.	• Parameters of single/three phase transformer.	7 th	2
8.	• Parameters of three phase synchronous generator • Voltage regulation of three phase synchronous generator	8 th	2
9.	• Parallel operation and synchronism. • Computer modeling of parallel operation and synchronism	9 th	2
10.	• Single-phase Induction motors starting and operation characteristics. • Computer modeling of single-phase induction motors.	10 th	2
11.	• Three-phase Induction motors performance characteristics.	11 th	2
12.	Three phase induction motors parameters.	12 th	2
13.	Speed – torque control of three-phase Induction motors. Computer modeling of three-phase induction motors.	13 th	2
14.	Submission of the Lab. Report.	14 th	2
Number of Weeks /and Units Per Semester		**14**	**28**

C- Tutorial Aspect:

Order	Topics List	Number of Weeks	Contact Hours
1.	• Calculation of magnetic circuits, magnetic flux, flux density, magnetic field intensity, and permeability. • Force and torque calculations.	1st	2

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2.	• Equivalent circuit of types DC generator. • The performance characteristics. • Modelica and/or MATLAB simulation of DC generator.	2^{nd} , 3^{rd}	4
3.	• Equivalent circuit of types DC motor. • The performance characteristics. • The mathematical and Modelica and/or MATLAB model of DC motors. • Speed – torque control of DC motors.	4^{th} , 5^{th}	4
4.	• Calculation of single and three phase Transformers' Parameters. • Performance characteristics. • Modelica and/or MATLB Transformer modeling	6^{th} ,7^{th}	4
5.	• Performance characteristics of synchronous generators. • Equivalent circuits. • Mathematical and MATLAB model. • Voltage and Power regulations. • Parallel operation of synchronous generators.	8^{th} ,9^{th}	4
6.	• Performance characteristics of single-phase induction motor • Equivalent circuits. • Starting and speed control.	10^{th} ,11^{th}	4
7.	• Performance characteristics of single-phase induction motor • Equivalent circuits. • Power and torque calculation. • Parameters of three phase induction motor • Starting and speed control.	12^{th} ,13^{th} ,14^{th}	6
Number of Weeks /and Units Per Semester		**14**	**28**

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VI. Teaching strategies of the course:

- Lectures.
- Tutorials.
- Self-Learning.
- Dialogue and Discussion.
- Analysis and Problem Solving.
- Project.
- Laboratory.
- Simulation Tools.
- Design Exercises.
- Coursework.
- Presentations.
- Research.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Comparison between types of DC generator	a1,a2,b1,b2,d2	3rd	4
2.	Design and implementation of DC generator circuits using MATLAB tools	a1,a2,b1,b2,c1	4th	3
3.	Design and implementation of DC motor circuits using MATLAB tools	a1,a2,b1,b2,c1	6th	3
4.	Design and implementation of transformer circuits using MATLAB tools	a1,a2,b1,b2,c1	8th	3
5.	Design and implementation of three induction motor circuits using MATLAB tools	a1,a2,b1,b2,c1	10th	3
6.	Lab-reports.	a1,a2,b1,b2	Weekly	4
Total				**20**

VIII. Schedule of Assessment Tasks for Students During the Semester:

Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

1.	Quizzes.	5 th,10 th,	20	10 %
2.	Assignments & Homework, Tasks & Presentation.	Weekly	20	10 %
3.	Mid-Term Exam.	8th	20	10 %
4.	Final Exam Practical.	15th	40	20 %
5.	Final Exam Theory	16th	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. Chapman S. J. (2005), Electric Machinery Fundamentals,4 th Edition, McGraw-Hill.
2. Fitzgerald A. E. (2003), Electric Machinery, 6 th Edition, McGraw-Hill.

2- Essential References.

1. D.F. Warne (2000), Newnes Electrical Engineer's Handbook, 1 st Edition, Biddles Ltd- wwv. biddlesxo. Uk.
2. Nasar S. A. (1998), Electric Machines and Electromechanics, 2 nd Edition, Schaum's Outlines Series- McGraw-Hill.
3. Bandyopadhyay M.N, (2009), Electrical Machines: Theory and Practice, 1st Edition, Prentice-Hall of India Pvt Ltd.
4. Bimbhra P.S., (1995), Electric Machinery, 7 th Edition Khanna Publishers.

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:

II. Course Policies:

1	**Class Attendance:** - The student should be attending not less than 75% of total contact hours of the subject, otherwise he will not able to take exam and be considerd as an exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic.
2	**Tardy:** - For lateness in attending the class, the student will be initially notified. If he repeates late in attending class he will be considered absent.
3	**Exam Attendance/Punctuality:** - The student should attend the exam on time. He is permitted to attend the exam half one hour from exam beginning, after that he/she will not be permitted to take exam and he/she is considered absent in the exam.
4	**Assignments & Projects:** - In general one assignment is given after each chapter of a course. The student should submit the assignment on time, mostly one week after giving the assignment
5	**Cheating**: - For cheating in exam, the student is considered as failure. In case the cheating is repeated three times during study the student will be disengaged from the Faculty
6	**Plagiarism**: Plagiarism is the attending of the student the exam of a course instead of other student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Affair Council of the university.
7	**Other policies:** - The mobile phone is not allowable to be used during class lecture. It must be switched off, otherwise the student will be ordered to leave the lecture room. - The mobile phone is not allowed to be taken during the examination time. - Lecture notes and assignments may be given directly to students using soft or hard copy.

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