



Arab Academy for Science, Technology & Maritime Transport
College of Engineering & Technology
Electrical & Control Engineering Department

University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Mechanical Engineering

Form no. (12)
Course Specification

1- Course Data

Course Code: EE 329	Course Title: Electrical Machines		Academic Year/Level: 3 rd year / 5 th semester	
Specialization: Mechatronics Engineering	No. of Instructional Units 3 Credits	Lecture 2 Hrs.	Practical 2 Hrs.	Lab 2 Hrs.

2- Course Aim

- To inform the students with basic elements of magnetic circuits.
- To apply the different rules of magnetic circuits analysis.
- To introduce the different types of rotating and stationary machines.
- To inform the students with the different concepts, characteristics and properties of electrical machines.
- To practice different testing, and parameters determination methods to the machines.
- To apply different analysis to the machines electrical and magnetic circuits.

3- Intended Learning Outcome

a- Knowledge and Understanding	<p>(K1,18EE) Review on electric and magnetic circuits.</p> <p>(K1,18EE) Explain basic theory of motor and generator action.</p> <p>(K1,3,4,5,15EE,16EE,20EE) Explain theory, construction, operation, equivalent circuit and characteristics of DC machine, transformer, synchronous machine and induction motor.</p> <p>(K5,6,19EE,20EE) Show how to calculate power and efficiency of DC machine, transformer, induction motor and synchronous machine.</p> <p>(K6,10,19EE) Show how to find parameters of transformer, induction motor.</p>
b- Intellectual Skills	<p>(I2,4,11,13EE) Analyze operational characteristics of various types of transformers.</p> <p>(I2,4,11,14EE) Analyze and interpret DC machine theory and operational characteristics.</p> <p>(I5,14EE) Evaluate performance of DC machines.</p> <p>(I2,4,14EE) Analyze and interpret AC machine theory and operational characteristics.</p> <p>(I5,13EE) Evaluate performance of principle AC machines: (synchronous generator, synchronous motor and induction motor).</p>

<p>c- Professional Skills</p>	<p>(P1,4,8,12,13EE,14EE) Perform open-circuit and short-circuit tests on real transformers to obtain equivalent circuit parameters.</p> <p>(P1,4,7,8,12,13EE,14EE) Perform laboratory experimental tests on DC machines: no-load test, load test, and speed-torque characteristic tests of DC motors.</p> <p>(P1,4,7,8,13EE,14EE) Perform laboratory experimental tests on three-phase AC synchronous machine to obtain operational characteristics in addition to performing synchronization procedure.</p> <p>(P1,4,7,8,13EE,14EE) Perform laboratory experimental tests to determine IM motor equivalent circuit parameters, and speed-torque characteristics.</p>
<p>d- General Skills</p>	<p>(G1,3) Communicate effectively with colleagues and others to interchange knowledge and information in transformers, DC machines and AC machines.</p> <p>(G1,2,6) Communicate to work individually in small group to perform laboratory experiments and tutorial exercises in transformers, DC machines and AC machines.</p> <p>(G2,6) Estimate DC, AC machines, transformers parameters.</p> <p>(G6) Sketch the construction of DC,AC machines, transformer.</p>

4- Course Content

<p><i>Week Number 1:</i> Electrical circuits revision.</p> <p><i>Week Number 2:</i> Magnetic circuit elements, rules and analysis.</p> <p><i>Week Number 3:</i> Magnetic circuit Analysis.</p> <p><i>Week Number 4:</i> The law of motor and generator action. The construction of dc machines.</p> <p><i>Week Number 5:</i> DC motors characteristics and applications.</p> <p><i>Week Number 6:</i> DC generators characteristics and applications.</p> <p><i>Week Number 7:</i> DC machine efficiency & voltage regulation calculations.</p> <p><i>Week Number 8:</i> Transformer basics & Core loss.</p> <p><i>Week Number 9:</i> Transformer model and voltage regulation.</p> <p><i>Week Number 10:</i> Transformer rating and testing.</p> <p><i>Week Number 11:</i> AC rotating fields and theory of 3-phase induction machines.</p> <p><i>Week Number 12:</i> Induction motor equivalent circuit modeling, analysis and testing.</p> <p><i>Week Number 13:</i> Induction machines characteristics, efficiency & voltage regulation calculations.</p>

Week Number 14: Induction machines characteristics, efficiency & voltage regulation calculations.

Week Number 15: Synchronous machine modeling, characteristics and analysis.

Week Number 16: Synchronous machine operation. Revision.

Week Number 17: Final exam.

5-Teaching and Learning Methods

- Lectures
- Tutorials
- Reports & sheets
- Laboratories

6-Teaching and Learning Methods for Students with Special Needs

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

Academic Support:

- The general academic advisor appoints an academic supervisor for handicapped students.

Continuous follow ups are made for handicapped students after each assessment to evaluate their academic level of achievement

7- Student Assessment:

Quiz (to assess part of the 7th and 12th week evaluation). Report (to assess part of practical evaluation).																	
a- Procedures used:	Written Examinations to assess: The Intended Learning Outcomes. Class Activities (Reports, Discussions, -----) to assess: The Intellectual Skills.																
b- Schedule:	<table style="width: 100%; border: none;"> <tr><td>Assessment 1</td><td style="text-align: right;">4rd Week</td></tr> <tr><td>Assessment 2</td><td style="text-align: right;">5th Week</td></tr> <tr><td>Assessment 3</td><td style="text-align: right;">6th Week</td></tr> <tr><td>Assessment 4</td><td style="text-align: right;">7th Week</td></tr> <tr><td>Assessment 5</td><td style="text-align: right;">10th Week</td></tr> <tr><td>Assessment 6</td><td style="text-align: right;">11th Week</td></tr> <tr><td>Assessment 7</td><td style="text-align: right;">12th Week</td></tr> <tr><td>Assessment 8</td><td style="text-align: right;">15th Week (Lab)</td></tr> </table>	Assessment 1	4 rd Week	Assessment 2	5 th Week	Assessment 3	6 th Week	Assessment 4	7 th Week	Assessment 5	10 th Week	Assessment 6	11 th Week	Assessment 7	12 th Week	Assessment 8	15 th Week (Lab)
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c- Weighing of Assessment:	<table style="width: 100%; border: none;"> <tr><td>7th Week Examination</td><td style="text-align: right;">30%</td></tr> <tr><td>12th Week Examination</td><td style="text-align: right;">20%</td></tr> <tr><td>Final-term Examination</td><td style="text-align: right;">40%</td></tr> <tr><td>Practical Examination</td><td style="text-align: right;">10%</td></tr> <tr><td>Total</td><td style="text-align: right;">100%</td></tr> </table>	7th Week Examination	30%	12th Week Examination	20%	Final-term Examination	40%	Practical Examination	10%	Total	100%						
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8- List of References:

a- Course Notes	Subjected in documentation
b- Required Books (Textbooks)	C. Hubert "Electrical Machines:Theory,Operation Application & Control ",Pearson ,2ED.2001
c- Recommended Books	<input type="checkbox"/> C. Hubert, 'Electric Machines" Maxewell Macmillan, 1991. <input type="checkbox"/> B. S. Guru, "Electric Machinery and Transformers", Oxford Uni. Press, latest edition.
d- Periodicals, Web Sites, ..., etc.	www.ieee.org

Course coordinator:**Program Manager:**