A. Basic Information

Course Title: Analysis and Design of Electrical Machines **Code**: EPE 322
Lecture: 4 **Tutorial**: 2 **Practical**: - **Total: 6**
Program on which the course is given: B.Sc. Electrical Engineering (Electrical Power and machines)
Major or minor element of program: N.A.
Department offering the program: Electrical Engineering Department
Department offering the course: Electrical Engineering Department
Academic year / level: Third Year / **Second** Semester
Date of specifications approval: 10/5/2006

B. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:
- Understand the method of analysis and design of universal motors.
- Analyze the two-phase induction motors.
- Understand the analysis and design of single-phase induction motors.
- Perform small type transformers design.
- Understand analysis of linear induction motors.
- Understand analysis of stepper motors.

2. Intended Learning outcomes of Course (ILOs)

a. Knowledge and Understanding:

a.4) Principles of design including elements design, process and/or a system related to electrical machines.
a.8) Current engineering technologies as related to electrical machines.
a.13) Analytical and computer methods appropriate for electrical machines.

a.14) Design methods and tools for electrical machines equipment and systems.
a.15) Principles of operation and performance specifications of electrical and electromechanical engineering systems.

b. Intellectual Skills

b.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems
b.2) Select appropriate solutions for engineering problems based on analytical thinking.
b.3) Think in a creative and innovative way in problem solving and design.
b.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
b.13) Identify and formulate engineering problems to solve problems in the field of electrical machines.
b.14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical machines.

c. Professional and Practical Skills

c.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems.
c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, product and/or services.
c.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
c.13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical machines.
c.14) Test and examine components, equipment and systems of electrical machines.
c.17) Apply modern techniques, skills and engineering tools to electrical machines.

d. General and Transferable Skills

d.6) Effectively manage tasks, time, and resources.
d.7) Search for information and engage in life-long self learning discipline.
d.8) Acquire entrepreneurial skills.
d.9) Refer to relevant literatures.

3. Contents

No	Topic	No. of hours	ILOs	Teaching / learning methods and strategies	Assessment method
1	Universal Motors	6	a13, b2, c1, c3, d8	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
2	Universal Motors	6	a13, b2, c1, c3, d8	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
3	Universal Motors	6	a13, b2, c1, c3, d8	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
4	Two-phase Induction Motors.	6	a14, b1, b3, c2, d9	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
5	Two-phase Induction Motors.	6	a14, b1, b3, c2, d9	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
6	Single-phase Induction Motors.	6	a15, b13, c2, c13,d6	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
7	Single-phase Induction Motors.	6	a15, b13, c2, c13,d6	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes

8	Mid term exam				
9	Single-phase Induction Motors.	6	a15, b13, c2, c13,d6	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
10	Single-phase Induction Motors.	6	a15, b13, c2, c13,d6	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
11	Design of Small single-phse Transformers.	6	a4, b14, b4, c13, d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
12	Linear Induction Motors.	6	a4, b14, b4, c13, d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
13	Stepper Motors.	6	a8, b13, b4, c14, c17	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
14	Stepper Motors.	6	a8, b13, b4, c14, c17	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes
15	Final exam				
16					

4. Teaching and Learning Methods

Lectures
Practical training / laboratory
Class activity
Case study
Assignments / homework

5. Student Assessment Methods

Assignments to assess knowledge, intellectual skills and proffesional and practical skills.
Quiz to assess knowledge, intellectual skills and proffesional and practical skills.
Mid-term exam to assess knowledge, intellectual skills and proffesional and practical skills.
Final exam to assess knowledge, intellectual skills and proffesional and practical skills.

Assessment schedule

Assessment 1 on weeks 2, 5, 9, 11
Assessment 2 Quizzes on weeks 4, 6, 10, 12
Assessment 3 Mid-term exam on week 8
Assessment 4 Final exam on week 15

Weighting of Assessments

Home assignments	10%
Quizzes	10%
Mid-term examination	20%
Final-term examination	60%
Total	100%

6. List of References

6.1 Course Notes

- Handouts prepared by the instructor.

6.2 Essential Books (Text Books)

1- J. F. Gieros,"Linear Induction Drives",Clarendon Press,Oxford,USA, 1994.

2- P. C. Sen,"Principles of Electric Machines and Power Electronics", John Wiley, 1997.
3- A. E. Fitzgerald et al.,"Electric Machinery", 6th Edition, McGraw Hill, 2003.
4- S. J. Chapman,"Electric Machinery Fundamentals", McGraw Hill, 2004.
5- P. Acarnely," Stepping Motors: A guied to Theory and Practice ", IET, 4th Edition, 2007.
6- T. Wildi," Electrical Machines, Drive and Power Systems", Prentice Hall. 2008.

6.3 Recommended Books

1- P. C. Krause et al.,"Analysis of Electric Machinery and Drives", IEEE Press,2nd Edition,2002.
2- A. Emadi,"Energy-efficient Electric Motors",Marcel Dekker, 3rd Edition, 2005.
3- J. F. Gieras,"Advancements in Electrical Machines", Springer, 2008.
4- I. Boldea and L. N. Tutelea"Electric Machines: Steady State, Transients, and Design with MATLAB", CRC Press,2009.

7. Facilities Required for Teaching and learning

Lecture room equipped with presentation board, computer and data show.
Laboratory.

Course coordinator: Prof. Dr. Ibrahim Abdel-Moneim Abdel-Halim
Course instructor: Dr. Mohammed Eissa Elfaraskoury

Head of department: Prof. Dr. Mousa A. Abd-Allah **Date: 8 / 12 / 2011**