



Model No.12

Course Specifications : Analysis and Design of Electric Machines

University : Benha university

Faculty : Shoubra Faculty of Engineering

Department : Electrical Engineering Department

1- Course Data

Course Title: Analysis and Design of Electric 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: 20/6/2010

2- Course Aim

By the end of the course the students will be able to:

- give the method of analysis and design of universal motors.
- Analyze the two-phase induction motors.
- analyze and design of single-phase induction motors.
- Analyze the small type transformers design.
- Illustrate the analysis of linear induction motors.
- Illustrate the analysis of stepper motors.

3- Intended Learning Outcomes of Course (ILOS)

a- Knowledge and Understanding

- a.1) Demonstrate design procedure related to the Analysis and Design of Electric Machines disciplines. (a.4)
- a.2) Demonstrate knowledge of Single-phase Induction Motors and universal motors. (a.8)
- a.3) Describe the Analytical and computer methods appropriate for Design of Small single-phase Transformers.. (a.13)
- a.4) List the Design methods for Stepper Motors, induction motors. (a.14)
- a.5) Give the Principles of operation and performance specifications of electrical and electromechanical engineering systems. (a.15)

b- Intellectual Skills

- b.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems. (b.1)
- b.2) Select appropriate solutions for engineering problems based on analytical thinking.(b.2)
- b.3) Think in a creative and innovative way in problem solving and design.(b.3)
- b.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.(b.4)
- b.5) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.(b.13)
- b.6) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines. (b.14)

c- Professional Skills

- c.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems.(c.1)
- c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, product and/or services.(c.2)
- c.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.(c.3)
- c.4) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.(c.13)
- c.5) Test and examine components, equipment and systems of electrical power and machines.(c.14)
- c.6) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.(c.17)

4- Course Contents

No	Topic	No. of hours	ILOs	Teaching / learning methods and strategies	Assessment method
1	Universal Motors.	6	a3, b2, c1, c3	Presentation board, computer and data show	Home Assignments, Quizzes
2	Universal Motors.	6	a3, b2, c1, c3	Presentation board, computer and data show	Home Assignments, Quizzes
3	Universal Motors.	6	a3, b2, c1, c3	Presentation board, computer and data show	Home Assignments, Quizzes
4	Two-phase Induction Motors.	6	a4, b1, b3, c2	Presentation board, computer and data show	Home Assignments, Quizzes
5	Single-phase Induction Motors.	6	a5, b5, c2, c4	Presentation board, computer and data show	Home Assignments, Quizzes
6	Single-phase Induction Motors.	6	a5, b5, c2, c4	Presentation board, computer and data show	Home Assignments, Quizzes
7	Single-phase Induction Motors.	6	a5, b5, c2, c4	Presentation board, computer and data show	Home Assignments, Quizzes
8	Mid term exam	3	a1, a2, b5, b6		
9	Single-phase Induction Motors.	6	a5, b5, c2, c4	Presentation board, computer and data show	Home Assignments, Quizzes
10	Design of Small single-phase Transformers.	6	a1, b4, b6, c4,	Presentation board, computer and data show	Home Assignments, Quizzes
11	Linear Induction Motors.	6	a1, b6, b4, c4	Presentation board, computer and data show	Home Assignments, Quizzes
12	Stepper Motors.	6	a2, b5, b4, c5, c6	Presentation board, computer and data show	Home Assignments, Quizzes
13	Stepper Motors.	6	a2, b5, b4, c5, c6	Presentation board, computer and data show	Home Assignments, Quizzes
14	Stepper Motors.	6	a2, b5, b4, c5, c6	Presentation board, computer and data show	Home Assignments, Quizzes
15	Final exam				
16					

5- Teaching and Learning Methods

Modified Lectures
Practical training / laboratory

Class activity
Case study
Assignments / homework

6- Teaching and Learning Methods of Disables

None

7- Student Assessment

a- Student Assessment Methods

Assignments to assess knowledge, intellectual skills and professional and practical skills.

Quiz to assess knowledge, intellectual skills and professional and practical skills.

Mid-term exam to assess knowledge, intellectual skills and professional and practical skills. Final exam to assess knowledge, intellectual skills and professional and practical skills.

b- 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

c- Weighting of Assessments

Mid- Term Examination	20%
Final- Term Examination	66.67%
Assignments	6.33%
<u>Quizzes</u>	<u>7%</u>
Total	100%

8- List of References

8.1 Course Notes

- Handouts prepared by the instructor.

8.2 Essential Books (Text Books)

- 1- J. F. Gieras, "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 guided to Theory and Practice", IET, 4th Edition, 2007.
- 6- T. Wildi, "Electrical Machines, Drive and Power Systems", Prentice Hall. 2008.

8.3 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.



Shoubra
Faculty of
Engineering

Model No.11A

Course Specifications : Analysis and Design of Electric Machines

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University : Benha university

Faculty : Shoubra Faculty of Engineering

Department : Electrical Engineering Department

Matrix of Knowledge and Skills of the course

No.	Topics	hours	Basic Knowledge	Intellectual Skills	Professional Skills
1	Universal Motors.	6	a3	b2	c1,c3
2	Universal Motors.	6	a3	b2	c1,c3
3	Universal Motors.	6	a3	b2	c1,c3
4	Two-phase Induction Motors.	6	a4	b1,b3	c2
5	Single-phase Induction Motors.	6	a5	b5	c2,c4
6	Single-phase Induction Motors.	6	a5	b5	c2,c4
7	Single-phase Induction Motors.	6	a5	b5	c2,c4
8	Mid-term exam	3	a1, a2	B5, b6	
9	Single-phase Induction Motors.	6	a5	b5	c2,c4
10	Design of Small single-phse Transformers.	6	a1	b4,b6	c4
11	Linear Induction Motors.	6	a1	b4,b6	c4
12	Stepper Motors.	6	a2	b4,b5	c5,c6
13	Stepper Motors.	6	a2	b4,b5	c5,c6
14	Stepper Motors.	6	a2	b4,b5	c5,c6
15	Final -term exam				
16					

Matrix of course aims and ILO's

Course Title: Analysis and Design of Electric Machines

Code: EPE 322

Lecture: 4

Tutorial: 2

Practical: -

Total: 6

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Course aims	ILO a's					ILO b's						ILO c's					
	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6
give the method of analysis and design of universal motors.			✓				✓					✓		✓			
Analyze the two-phase induction motors.				✓		✓		✓					✓				
analyze and design of single-phase induction motors.					✓					✓			✓		✓		
Analyze the small type transformers design.	✓								✓		✓				✓		
Illustrate the analysis of linear induction motors.	✓								✓		✓				✓		
Illustrate the analysis of stepper motors.		✓							✓	✓						✓	✓

Course coordinator:

Prof. Dr. Ibrahim Abdel-Moneim Abdel-Halim

Course instructor:

Dr. Mohammed Eissa Elfaraskoury

Head of department:

Prof. Dr. Sayed Abo-elsoud Ward