



Model No.12

Course Specifications : Electrical Machines (2)

University : Benha university

Faculty : Shoubra Faculty of Engineering

Department : Electrical Engineering Department

1- Course Data

Course Title: Electrical machines (2)

Code: EPE312

Lecture: 4 **Tutorial:**2

Practical: 0

Total: 6

Program on which the course is given: BSc Electrical Engineering (Electrical Power and machines)

Major or minor element of program: Major

Department offering the program: Electrical Engineering Department

Department offering the course: Electrical Engineering Department

Academic year / level: Third Year / First Semester

Date of specifications approval: 20 / 6 / 2010

2- Course Aim

For students undertaking this course, the aims are to:

- 2.1- demonstrate the construction of ac machine.
- 2.2- analyze the different types of ac windings.
- 2.3- illustrate EMF, MMF of ac machine and its harmonics.
- 2.4- give the graduates with sufficient information about three phase synchronous and induction machines.

3- Intended Learning Outcomes of Course (ILOS)

a- Knowledge and Understanding

On completing this course, students will be able to:

- a- 1 –Give the concepts and theories of mathematics and sciences, appropriate to the AC Machines. (a.1)
- a- 2 – Describe the characteristics of engineering materials related to AC Machines. (a.3)
- a- 3 – Demonstrate the principles of design including elements design, process and/or a system related to the synchronous and induction machines. (a.4)
- a- 4 –Give the methodologies of solving the induced EMF, MMF, voltage regulation, motor torque and power flow diagram. (a.5)
- a- 5- List the current engineering technologies for the induction motor starting and speed control methods. (a.8)
- a- 6 – Demonstrate the analytical and computer methods appropriate for electrical machines engineering such as drawing the different characteristics of the synchronous and induction machines. (a.13)
- a- 7 – List the design methods and tools for the different types of AC machines. (a.14)

b- Intellectual Skills

At the end of this course, the students will be able to:

- b- 1 - Select appropriate solutions for engineering problems related the the synchronous and induction machines based on analytical thinking. (b2)
- b- 2 - conclude a creative and innovative way in problem solving and design. (b3)
- b- 3 - Combine, exchange, and assess different ideas, views, and knowledge from a range of sources. (b4)

b- 4 - Assess and evaluate the characteristics and performance of synchronous and induction machines. (b5)

b- 5 - Solve engineering problems, often on the basis of limited and possibly contradicting information. (b7)

b- 6 - Analyze results of numerical models and appreciate their limitations. (b11)

c- Professional Skills

On completing this course, the students are expected to be able to:

c- 1 - Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems. (c1)

c- 2 - Use computational facilities and techniques, measuring instruments, workshops and laboratories equipment to design experiments, collect, analyze, and interpret results. (c5)

c- 3 - Apply numerical modeling methods to AC machines problems. (c7)

c- 4 - Exchange knowledge and skills with engineering community and industry. (c11)

4- Course Contents

Week No.	Topic	No. of hours	ILOs	Teaching/ learning methods and strategies	Assessment method
1	Construction of three-phase machines	6	a1, a2 , b1, b2 , c1, c2	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
2	Winding of alternating current machines	6	a4, a5, b3, b4, c2, c3	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
3	Double-layer winding	6	a7, b4, b5, c1, c3	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
4	Double-layer winding	6	a7, b4, b5, c1, c3	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
5	EMF of ac machines and its harmonics	6	a7, b4, b5, c1, c3,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
6	MMF of ac machines	6	b6,c4	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
7	Synchronous machines	6	a1, a2, b1, b2, c1, c2,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
8	Mid-term exam	3	a2, a3, a6, b2, b3		
9	Synchronous Generator	6	a5, a6, b4, b6, c1, c3	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
10	Synchronous motor	6	a4,a5,a7, b3,b4, b6, c1, c2,c4,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
11	Induction machines	6	a3, a4, b4, b5, c1, c2,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
12	Induction motor	6	a4,a5,a7, b4, b5, c1, c2,c4, d1,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
13	Induction generator	6	a2,a3, a6, b4, b5, c1, c2,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
14	Building up of the voltage and voltage regulation	6	a4,a5,a7, b4, b5, c1, c2,c4,	Classroom board, computer and data show	Home Assignments, Quizzes, Oral Exam
Final -term exam					

5- Teaching and Learning Methods

- 5.1- Modified Lectures.
- 5.2- Class activity.
- 5.3- Case study.
- 5.4- Assignments / homework.

6- Teaching and Learning Methods of Disables

None

7- Student Assessment

a- Student Assessment Methods

1	Assignments to assess knowledge, intellectual, professional and general skills
2	Quiz to assess knowledge, intellectual, professional and general skills
3	Mid-term exam to assess knowledge, intellectual, professional and general skills
4	Oral exam to assess knowledge, intellectual, professional and general skills
5	Final exam to assess knowledge, intellectual, professional and general skills

b- Assessment Schedule

No.	Assessment	Week
1	Assignments	2, 5, 9, 11
2	Quizzes	4, 6, 10, 12
3	Mid-term exam	8
4	Final exam	15

c- Weighting of Assessments

Assessment	Percentage of total
Written examination	66.67%
Oral examination	0%
Practical/ Laboratory work	0%
Other assignments/ Class work	33.33%
Total	100%

8- List of References

a- Course Notes

- 1- Course notes Prepared by instructor.

b- Books

- 1- Lecture material and experimental sheets.

c- Recommended Books

- 1- MG Say, "Alternating current machines".
- 2- Hindmarch, "Electrical machines and their applications".
- 3- AEFitzgeraled, "Electrical machinery".
- 4- Alexander S Langsdrof, " Theory of alternating current machinery".
- 5- M, Kostenko andLPiotrovsky, " ELECTRICAL MACHINES".

d- Web Sites

- 1- Research.com, www.Google.com



Shoubra
Faculty of
Engineering

Model No.11A

Course Specifications : Electrical Machines (2)

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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	General Skills
1	Construction of three-phase machines	6	a1, a2	b1, b2	c1, c2	
2	Winding of alternating current machines	6	a4, a5	b3, b4	c2, c3	
3	Double-layer winding	6	a7	b4, b5	c1, c3	
4	Double-layer winding	6	a7	b4, b5	c1, c3	
5	EMF of ac machines and its harmonics	6	a7	b4, b5	c1, c3	
6	MMF of ac machines	6		b6	c4	
7	Synchronous machines	6	a1, a2	b1, b2	c1, c2	
8	Mid-term exam	3	a2, a3, a6	b2, b3		
9	Synchronous Generator	6	a5, a6	b4, b6	c1, c3	
10	Synchronous motor	6	a4,a5,a7	b3,b4, b6	c1, c2,c4	
11	Induction machines	6	a3, a4	b4, b5	c1, c2	
12	Induction motor	6	a4,a5,a7	b4, b5	c1, c2,c4	
13	Induction generator	6	a2,a3, a6	b4, b5	c1, c2	
14	Building up of the voltage and voltage regulation	6	a4,a5,a7	b4, b5	c1, c2,c4	
	Final -term exam					

Matrix of course content and ILO's

Course Title: Electrical machines (2)

Code: EP312

Lecture: 4

Tutorial: 2

Practical: - **Total:** 6

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Course content	ILO a's							ILO b's						ILO c's			
	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4
Construction of three-phase machines	✓	✓						✓	✓					✓	✓		
Winding of alternating current machines				✓	✓					✓	✓				✓	✓	
double-layer winding							✓				✓	✓		✓		✓	
EMF of ac machines and its harmonics							✓				✓	✓		✓		✓	
MMF of ac machines													✓				✓
Synchronous machines	✓	✓						✓	✓					✓	✓		
Synchronous Generator					✓	✓					✓		✓	✓		✓	
Synchronous motor				✓	✓		✓			✓	✓		✓	✓	✓		✓
Induction machines		✓	✓								✓	✓		✓	✓		
Induction motor				✓	✓		✓				✓	✓		✓	✓		✓
Induction generator		✓	✓			✓					✓	✓		✓	✓		
Building up of the voltage and voltage regulation				✓	✓		✓				✓	✓		✓	✓		✓

Matrix of course aims and ILO's

Course Title: Electrical machines (2) **Code:** EPE312
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Course Aims	ILO a's							ILO b's						ILO c's			
	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4
Demonstrate the construction of ac machine.	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	
Analyze the different types of ac windings.							✓				✓	✓	✓	✓		✓	✓
Illustrate EMF, MMF of ac machine and its harmonics.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course coordinator: Prof Dr. MOHSEN Z EL-SHERIF, A. Prof Dr. MAHMOUD ALAHMAR, Dr. OMAR ELSAYED & Dr. MOHAMED M. FATHY

Course instructor: Prof Dr. MOHSEN Z EL-SHERIF
Head of department: Prof. Dr. Sayed A. Ward