

University : Benha university

Faculty : Shoubra Faculty of Engineering

Department : Electrical Engineering Department

1- Course Data

Course Code : EPE 222 Course Title : Electrical machine Study Year : Second Year

Specialization :

Teaching Hours: 6

Lecture : 4

Tutorial : 2

Practical :

Date of specifications approval: 20/6/2010

2- Course Aim

For students undertaking this course, the aims are to:

- 2.1- Supply the graduates with sufficient information about single phase and three phase transformers
- 2.2 - Understand the construction of dc machine
- 2.3- Study the different types of dc windings
- 2.4 - Study EMF of dc machine and the developed torque
- 2.5 - Study performance characteristics of DC motor
- 2.6 - Study performance characteristics of DC generator

3- Intended Learning Outcomes of Course (ILOS)

a- Knowledge and Understanding

On completing this course, students will be able to:

- a1) Concepts and theories of mathematics and sciences, appropriate to the discipline
- a3) Characteristics of engineering materials related to discipline
- a4) Principles of design including elements design, process and/or a system related to specific disciplines
- a5) Methodologies of solving engineering problems, data collection interpretation
- a8) Current engineering technologies as related to disciplines
- a13) Analytical and computer methods appropriate for electrical power and machines engineering
- a14) Design methods and tools for electrical power and machines equipment and systems
- a18) Theories and techniques for calculating short circuit, motor starting and voltage drop

b- Intellectual Skills

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

- b2) Select appropriate solutions for engineering problems based on analytical thinking
- b3) Think in a creative and innovative way in problem solving and design
- b4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources
- b5) Assess and evaluate the characteristics and performance of components, systems and processes
- b7) Solve engineering problems, often on the basis of limited and possibly contradicting information
- b11) Analyze results of numerical models and appreciate their limitations
- b12) Create systematic and methodic approaches when dealing with new and advancing technology
- b13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering
- b14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines

c- Professional Skills

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

- c1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems
- c5) Use computational facilities and techniques, measuring instruments, workshops and laboratories equipment to design experiments, collect, analyze, and interpret results
- c7) Apply numerical modeling methods to engineering problems
- c11) Exchange knowledge and skills with engineering community and industry

4- Course Contents

No	Topic	No of hours	ILOs	Teaching / learning methods and strategies	Assessment method
1	Principles of operation of transformer	6	a1, a3, b2, b5, c1	Lectures	
2	construction and phasor diagram	6	a1, a3, b2, b5, c1	Lectures	Assessment
3	Equivalent circuit and transformer tests	6	a1, a5, b2, b7, c5, c7	Lectures	
4	Auto transformer	6	a5, a8, b3, b7	Lectures	Quiz

			c1		
5	Three phase transformer	6	a4, a5, b2, b4, c1	Lectures	Assessment
6	Parallel operation of transformers	6	a4, a5, b2, b4, c1	Lectures	Quiz
7	solved examples	6	a8, b11,, b12 c7,d1, d3	Lectures	
8	Mid term exam				
9	Construction of DC machines and magnetic circuit	6	a1, a4, b3, b7, c5, c7	Lectures	Assessment
10	EMF, developed torque, and windings of DC machines	6	a5, a8, b2, b7, c5, c7	Lectures	Quiz
11	Armature reaction and commutation	6	a13, a18, b2, b7, c5, c7	Lectures	Assessment
12	DC motor	6	a5, a8, b11, b7 c1	Lectures	Quiz
13	DC generator	6	b13, b14, c5, c11	Lectures	
14	Efficiency and solved examples	6	a8, b11,, b12 c7, c11	Lectures and case study	
15	Final exam				
16					

5- Teaching and Learning Methods

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

6- Teaching and Learning Methods of Disables

None

7- Student Assessment

a- Student Assessment Methods

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

b- Assessment Schedule

No.	Assessment	Week
1	Assessment1	2, 5, 9, 11
2	Quizzes	4, 6, 10, 12
3	Mid-term	8
4	Final exam	15

c- Weighting of Assessments

Assessment	Weight
Mid- Term Examination	20%
Final- Term Examination	67%
Semester Work	0%
Other assignments/ Class work	14%
Total	100%

8- List of References**a- Books**

- 1- Course notes prepared by instructor.
- 2- Lecture material and experimental sheets
- 3- ELECTRICAL MACHINES, M, Kostenko and L. Piotrovsky
- 4- ELECTRICAL MACHINERY, A. E. Fitzgerald, J R. Stephend. Umans
- 5- ELECTRICAL MACHINE DESIGN, A.K. SAWHNEY
- 6- Research.com, www. Google.com

Matrix of course content and ILO's

Course Title: Electrical Machines

Code: EPE 222

Lecture: 4

Tutorial: 2

Practical: 0

Total: 6

Program on which the course is given: B.Sc. Electrical Engineering (Power)

Major or minor element of program: Department offering the program: Major

Department offering the course: Electrical Engineering Department

Academic year / level: second Year / second Semester.

Date of specifications approval: 20/6/2010

Course content	ILO a's								ILO b's								ILO c's				
	1	3	4	5	8	13	14	18	2	3	4	5	7	11	12	13	14	1	5	7	11
Principles of operation of transformer	✓	✓							✓			✓						✓			
construction and phasor diagram	✓	✓							✓			✓						✓			
Equivalent circuit and transformer tests	✓			✓									✓						✓	✓	
Auto transformer				✓	✓					✓			✓					✓			
Three phase transformer			✓	✓					✓		✓							✓			
Parallel operation of transformers			✓	✓					✓		✓							✓			
Construction of DC machines and magnetic circuit	✓		✓							✓			✓						✓	✓	
EMF, developed torque, and windings of DC machines				✓	✓				✓				✓						✓	✓	
Armature reaction and commutation						✓		✓	✓				✓						✓	✓	
DC motor				✓	✓								✓	✓				✓			
DC generator															✓	✓			✓		✓
Efficiency and solved examples				✓									✓	✓						✓	✓

Matrix of course aims and ILO's

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Course Aims	ILO a's								ILO b's								ILO c's				
	1	3	4	5	8	13	14	18	2	3	4	5	7	11	12	13	14	1	5	7	11
Supply the graduates with sufficient information about single phase and three phase transformers	✓	✓		✓	✓				✓		✓	✓			✓			✓	✓	✓	
Understand the construction of dc machine	✓		✓				✓			✓			✓						✓	✓	
Study the different types of dc windings	✓	✓				✓		✓		✓						✓	✓				
Study EMF of dc machine and the developed torque	✓	✓				✓				✓						✓	✓	✓		✓	
Study performance characteristics of DC motor		✓	✓					✓			✓	✓		✓		✓					✓
Study performance characteristics of DC generator								✓								✓	✓		✓		✓

- Course Coordinator :

1 - Prof. Dr. Mohsen Z. EL-Sherif

2 - Dr. Hasan Abdel-Aziz

- Head of Department :

Prof. Dr. Sayed A. Ward