



### A. Basic Information

**Course Title:** Electrical machine

**Code:** EP222

**Lecture:**4

**Tutorial:**2

**Practical:** -

**Total:** 6

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

**Major or minor element of program:**NA

**Department offering the program:**Electrical Engineering Department

**Department offering the course:**Electrical Engineering Department

**Academic year / level:**second 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:

- 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 generator
- Study performance characteristics of DC motor

#### 2. Intended Learning outcomes of Course (ILOs)

##### a. Knowledge and Understanding:

- 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**

- 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 and Practical Skills**

- 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

**d. General and Transferable Skills**

- d1) Collaborate effectively within multidisciplinary team  
 d3) Communicate effectively

**3. 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                                   | Home Assignments, Quizzes |
| 2  | construction and phasor diagram                | 6           | a1, a3, b2, b5, c1         | Lectures                                   | Home Assignments, Quizzes |
| 3  | Equivalent circuit and transformer tests       | 6           | a1, a5, b2, b7, c5, c7     | Lectures                                   | Home Assignments, Quizzes |
| 4  | Auto transformer                               | 6           | a5, a8, b3, b7 c1          | Lectures                                   | Home Assignments, Quizzes |
| 5  | Three phase transformer                        | 6           | a4, a5, b2, b4, c1         | Lectures                                   | Home Assignments, Quizzes |
| 6  | Parallel operation of transformers             | 6           | a4, a5, b2, b4, c1         | Lectures                                   | Home Assignments, Quizzes |
| 7  | solved examples                                | 6           | a8, b11,, b12<br>c7,d1, d3 | Lectures                                   | Home Assignments, Quizzes |
| 8  | Mid term exam                                  |             |                            |  |                           |
| 9  | Constution of DC machines and magnetic circuit | 6           | a1, a4, b3, b7, c5, c7     | Lectures                                   | Home Assignments, Quizzes |



|    |  |   |                               |                         |                           |
|----|--|---|-------------------------------|-------------------------|---------------------------|
| 10 | EMF, developed torque, and windings of DC machines | 6 | a5, a8, b2, b7, c5, c7        | Lectures                | Home Assignments, Quizzes |
| 11 | Armature reaction and commutation                  | 6 | a13, a18, b2, b7, c5, c7      | Lectures                | Home Assignments, Quizzes |
| 12 | DC motor   | 6 | a5, a8, b11, b7 c1            | Lectures                | Home Assignments, Quizzes |
| 13 | DC generator                                       | 6 | b13, b14, c5, c11             | Lectures                | Home Assignments, Quizzes |
| 14 | Efficiency and solved examples                     | 6 | a8, b11,, b12 c7, c11, d1, d3 | Lectures and case study | Home Assignments, Quizzes |
| 15 | Final exam   |   |                               |                         |                           |
| 16 |  |   |                               |                         |                           |

#### 4. Teaching and Learning Methods

Lectures  
Class activity  
Case study  
Assignments / homework

#### 5. Student Assessment Methods

Assignments to assess knowledge and intellectual skills.  
Quiz to assess knowledge, intellectual and professional skills.  
Mid-term exam to assess knowledge, intellectual, professional and general skills.  
Oral exam to assess knowledge and intellectual skills.  
Final exam to assess knowledge, intellectual, professional and general skills.

#### 6. 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

### 7. Weighting of Assessments

|                         |      |
|-------------------------|------|
| Mid- Term Examination   | 10%  |
| Final- Term Examination | 60%  |
| Oral Examination        | 00%  |
| Practical Examination   | 00%  |
| Semester Work           | 10%  |
| Other                   | 20%  |
| Total                   | 100% |

### 8. List of References

#### 8.1 Course Notes

Prepared by instructor

#### 8.2 Essential Books (Text Books)

Lecture material and experimental sheets

#### 8.3 Recommended Books

- ELECTRICAL MACHINES, M, Kostenko and L. Piotrovsky



- ELECTRICAL MACHINERY, A. E. Fitzgerald, JR. Stephen. Umans
- ELECTRICAL MACHINE DESIGN, SAY
- ELECTRICAL MACHINE DESIGN, A.K. SAWHNEY

8.4 Periodicals Web sites, etc

Research.com, www. Google.com

**9. Facilities Required for Teaching and learning**

Presentation board, computer and data show

Laboratory

**Course coordinator:** Prof. Dr. MOHSEN Z. EL-SHERIF  
**Course instructor:** Dr. SAMIA MANSOUR  
**Head of department:** Prof. Dr Mousa Abd-allah

7/ 12 / 2011