A- Basic Information

Course Title: Power Electronics (2) **Code**: EP411
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: **Fourth** Year / **First** Semester
Date of specifications approval: 10/5/2006

A. Professional Information

1. **Overall aims of course**
   By the end of the course the students will be able to:
   - Understanding the broad classifications of power electronics converters.
   - Analyze the AC voltage controller circuits and its applications.
   - Understand the cycloconverter circuits and its applications.
   - Understand and analyze the DC/DC converter circuits and its applications.

2. Intended Learning outcomes of Course (ILOs)

a. Knowledge and Understanding:
a.1) Concepts and theories of mathematics and sciences, appropriate to the discipline.
a.3) Characteristics of engineering materials related to discipline.
a.4) Principles of design including elements design, process and/or a system related to specific disciplines.
a.5) Methodologies of solving engineering problems, data collection interpretation.

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.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
b.5) Assess and evaluate the characteristics and performance of components, systems and processes.

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.7) Apply numerical modeling methods to engineering problems.

d. General and Transferable Skills

d.1) Collaborate effectively within multidisciplinary team.
d.3) Communicate effectively.
d.7) Search for information and engage in life-long self learning disciplin

3. Contents

No	Topic	No. of hours	ILOs	Teaching / learning methods and strategies	Assessment method
1	Analysis of single-phase AC voltage controllers	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
2	Analysis of single-phase AC voltage controllers	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
3	Analysis of three-phase AC voltage controllers	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case	Home Assignments, Quizzes, Oral Exam

				study, Assignments / homework	
4	Analysis of three-phase AC voltage controllers	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
5	Analysis of three-phase AC voltage controllers	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
6	Analysis of Cycloconverters	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
7	Analysis of Cycloconverters	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
8	Mid term exam				
9	DC choppers, step-down choppes	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
10	Step-up DC choppers	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
11	Buck DC regulators	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
12	Boost DC regulators	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
13	Buck-Boost DC regulators and non-ideal effects	6	a3,a4,a5,b1,b2, c1,c7,d1,d3,d7	Lectures, Practical training / laboratory, Class activity, Case	Home Assignments, Quizzes, Oral Exam

				study, Assignments / homework	
14	DC chopper circuits: design and applications	6	a4,d1,d3	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home Assignments, Quizzes, Oral Exam
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 and intellectual skills and proffesional and practical skills.
Quiz to assess knowledge, intellectual and professional skills 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.

6. Assessment schedule

Assessment 1 on weeks 2, 5, 9, 11, 13
Assessment 2 Quizzes on weeks 4, 6, 10, 12
Assessment 3 Mid-term exam on week 8
Assessment 4 Oral Exam on week 14
Assessment 5 Final exam on week 15

7. Weighting of Assessments

Home assignments 10%

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

8. List of References

8.1 Course Notes

- Handouts prepared by the instructors.

8.2 Essential Books (Text Books)

- D. W. Hart, Introduction to power electronics, John Wiley sons, 1997.
- M. H. Rashid, Power Electronics: Circuits, Devices, and Applications, 3rd Ed., Prentice Hall, 2004

8.3 Recommended Books

- P.C Sen, Principles of Electric Machines & Power Electronics, John Wiley sons, 1997.

8.4 Web sites

- Interactive Power Electronics Seminar by Swiss Federal Institute of Technology Zurich: http://www.ipes.ethz.ch/ipes/e_index.html
- Interactive Power Electronics online text by University of Technology Sydney, Australia
- http://services.eng.uts.edu.au/~venkat/pe_html/contents.htm
- Interactive Power Electronics Online Course by Power Designers, USA http://www.powerdesigners.com/InfoWeb/resources/pe_html/contents.htm

9. Facilities Required for Teaching and learning

Presentation board
Computer and data show

Laboratory setups

Course coordinator: Prof. Dr. Hamed Galal Hamed
Course instructors: (1) Prof. Dr. Hamed Galal Hamed
(2) Assoc. Prof. Hassan Abd El-aziz Mansour

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