Faculty of Engineering & Technology

Power Electronics 2

Information :

Course Code :	EPR 452	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electrical Power Engineering

Instructor Information :

Title	Name	Office hours
Professor	Naser Mohammed Bayoumy AbdelRahim	4
Lecturer	Ahmed Mohy Eldeen Ibrahim Mohamed	1
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen	2
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen	2

Area Of Study :

The Main Goals of this course are:
ÅDevelop studentôs knowledge about the operation of AC-AC, DC-DC and DC-AC power electronics converters and their applications.
ÅProvide the student with the analytical tools necessary to analyse and design of AC-AC, DC-DC and DC-AC power converters.
ÅTrain the student to perform basic experiments on single-phase AC-AC converters and DC choppers.

Description :

Ac voltage controllers: The single phase AC voltage controller, Three phase controller, Integral cycle control, Thyristor commutation techniques, Main principles, Circuits, DC choppers: The single thyristor chopper, Two thyristor choppers, Inverters: Single phase circuits, Bridge inverter circuits.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Describe the operation of single-phase integral cycle and phase control AC voltage controller.
2 -	Explain the operation and characteristics of three-phase AC voltage controllers with resistive loads.
3 -	Explain the principle operation of step-down choppers with resistive and inductive loads.
4 -	Explain the construction, equivalent circuit, and operation of switching-mode regulators.
5 -	Describe the operation of PWM single-phase and six-step three-phase inverters and the methods of voltage and frequency control.
b.Intellectual Skills: :	
1 -	Analyze the operation of single-phase AC voltage controllers with resistive and inductive loads and three-phase ac voltage controllers with resistive loads.
2 -	Evaluate the performance of DC choppers and switch-mode regulators.
3 -	Analyze operation of PWM single- phase inverters,
4 -	Analyze operation three-phase six-step inverters.

c.Professional and Practical Skills: :	
1 -	Perform basic experiments on single-phase AC voltage controller.
2 -	Perform basic experiments on DC choppers.
d.General and Transferable Skills: :	
1 -	Work coherently and successfully in a team work.
2 -	Work in stressful environment and within constraints.
3 -	Effectively manage tasks, time, and resources.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Phase control of single-phase ac voltage controllers with resistive and inductive loads.	14	6	8
Three-phase ac voltage controller with resistive load.	8	6	2
Single-phase AC voltage controllers: Principle of integral cycle control and phase control.	8	6	2
Single-phase transformer tap changer and single-phase cycloconverters.	8	6	2
DC Choppers	11	6	5
Switched-mode regulators: Buck; Boost; Buck-Boost; and Ĺuk regulators.	8	6	2
Single-phase PWM inverter: Half-bridge and full-bridge inverters.	8	6	2
Three-phase six-step inverter with resistive load.	5	3	2
Voltage and frequency control of single-phase inverter.	5	3	2

Teaching And Learning Methodologies :

Interactive lectures
Experiential learning
Self reading
Report writing
Problem Solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
ÅFinal exam	40.00		
Lab Exper.	10.00		
Mid- Exam I	15.00		
Mid- Exam II	15.00		
o Participations	10.00		
o Quizzes	10.00		

Recommended books :

1. M. H. Rashid. Power Electronics: Circuits, Devices, and Applications, 2nd edition Prentice Hall, 1993 and 4th ed. Pearson Education Inc., 2014.
2. N. Mohan, T. M. Undeland, and W.P. Robbins, Power Electronics: Converters, Applications and Design, John Wiley, 2nd edition, 2003.
3. Dewan S.B. and Straughen, Power semiconductor circuits, John Wiley& Sones, 1984.