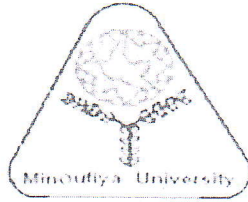


Menofiya University
Faculty of Engineering
Dept. of Electrical Engineering.
Date: 8 /6/2015
Total Marks: 100



Final Term Exam
Academic Year: 2014-2015
Post graduate Students (Ph.D)
Allowed Time: 3 Hours

التحكم الرقمي في الآلات الكهربائية

Subject/Code: **Digital Control of Electrical Machines / ELE 717**

This exam measures ILO's no. (A1, A3, A5, B1, B2, B3, C3, C4)

Remarks: No. of pages: 2 No. of questions: 6

Allowed Tables and Charts: (None)

Answer All The Following Questions:

Question 1

[20 Mark]

- Explain the IGBT characteristics. What are the modes of operation when implemented in highly inductive H-bridge inverter?
- Show with drawing how to use the IGBT for the following power electronics application (Three Phase Inverter, Three level Active Rectifier, Active Filter).

Question 2

[20 Mark]

- Describe the sinusoidal PWM for single phase H-Bridge.
- What is Over modulation? is it preferable in high power application?
- Why we should introduce dead switching time? Roughly give a value.

Question 3

[15 Mark]

- Give a brief description about hysteresis band (HB) modulation.
- How can you use fixed switching pattern to mitigate lower order harmonics. What is the name of this modulation technique?
- How do you determine or select the switching frequency for a PWM converter in a drive system?

Question 4

[15 Mark]

- a. Explain the principle of V/F control of induction motor. Can this method be used to drive parallel connected motors?
- b. Explain the closed loop slip control V/F method.

Question 5

[15 Mark]

- a. Direct Torque Control is one of the control methods of induction motor. Is the DTC control self-starting without any speed encoder? Draw block diagram of DTC; state some of its benefits.
- b. Why DTC control generates more harmonics?

Question 6

[15 Mark]

- a. After simulating a power electronic system with Simulink, can you use the controller part of the simulation program for real-time control with DSP?
- b. Can you implement fuzzy control with a look-up table in DSP?