



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)

التحكم الرقمي في الآلات الكهربائية

Answer All The Following Questions:

Question 1

[25 Mark]

- Give short notes about voltage fed-inverters and their applications.
- Sketch the power circuit and explain the principal of operation for
-Half-bridge and Centre-tapped single phase inverters
- full- bridge inverter indicating that how this circuit can operate in four quadrant operation of DC motor.
- There are many possible PWM techniques have been presented. List the main classification of PWM techniques.

Question 2

[25 Mark]

- Describe the sinusoidal PWM for single phase H-Bridge.
- Draw the general block diagram of variable frequency speed control of induction motor. Describe briefly the main parts of the system.
- Discuss the main difference between the scalar and vector control methods. Explain with the help of block diagrams how the scalar control can be employed to control the induction motor.

Question 3

[25 Mark]

- Give a brief description about hysteresis band (HB) modulation.
- Describe with drawing the block diagram the open loop volt/Hz speed control of multiple PM synchronous motor.
- Explain the vector control principal of a sinusoidal SPM machine. Also draw the block diagram of sinusoidal SPM machine vector control for constant torque region.

Question 4

[25 Mark]

- Explain the principle of V/F control of induction motor. Can this method used to drive parallel connected motors?
- The fuzzy system basically consists of formulation of the mapping from a given input set to an output set. Explain the steps of fuzzy inference process.
- At the end of fuzzy inference process defuzzification must be done. List the most important methods used for defuzzification step.
- Can you implement fuzzy control with a look-up table in DSP?

With best wishes

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