Philadelphia University **Student Name:**

Faculty of Engineering **Student Number:**

Dept. of Computer Engineering

Final Exam, First Semester: 2012/2013

Course Title: Machine Intelligence	**Date: 15/1/2013**
Course No: (640424+630423)	**Time Allowed: 2 Hours**
Lecturer: Dr. Mohammed Mahdi	**No. of Pages: 2**

Question 1: *(10 Marks)*

Objectives: This question is about the basic concepts of Expert Systems.

Answer the following in details (sketch with example): -

1. What do we mean by expert system development team?
2. What is the main difference between forward and backward of rules chaining techniques?
3. Fuzzy Production Rules depends on the application itself.
4. One of the data mining tools is Neural Networks.

Question 2: *(10 Marks)*

Objectives: This question is about FLC design.

Design a Fuzzy Logic Controller with the following specifications: -

1. Five fuzzy set definition (NB, NS, Z, PS and PB) for input variables.
2. Three fuzzy set definitions for output variable (action) (N, Z, and P)
3. Scaled Unified UOD of 11-quantized levels between -10 and +10.
4. Center of gravity defuzzifier.

Then apply Mamdani control algorithm for input states of error = +5, and change of error = -5. What conclusion can you make?

Question 3: *(10 Marks)*

Objectives: This question is about NN.

A) Classify NN's based on the kind of input pattern. (3 Marks)

B) Discuss the limitations of FFFC NN. (3 Marks)

C) State "based on priorities" the steps of learning enhancement of EBP NN. (4 Marks)

Question 4: *(10 Marks)*

Objectives: This question is about MLP NN.

A) Suggest an MLP NN topology to train a controller of three inputs (error, change of error, and sum of error) and one output (action). Showing reasons. (5 Marks)

B) Write down the generalized delta rule for updating weights between hidden (of Tansh non-linearity) and input layers. (5 Marks)