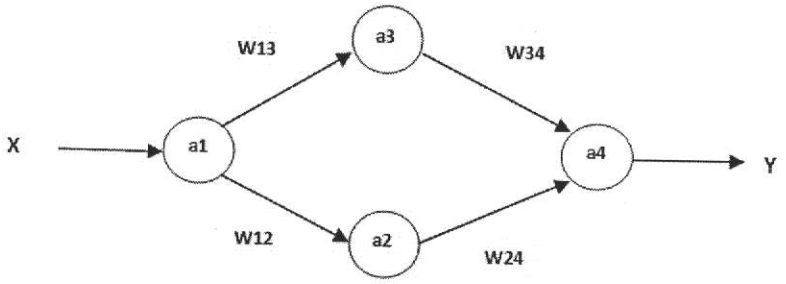
University of Technology
Computer Science Department
Class: Third
Time: 3 hours

Subject: Artificial Neural Networks
Examiner: *Dr. Ayad R. Abbas*

Final Exam / First Trail /16 -6 - 2011

ملاحظة:
1. الاسئلة متكونة من صفحتين.
2. بإمكانك الاجابة على اي خمسة أسئلة
3. يسمح باستخدام الحاسبة

Q1: A Back-Propagation Neural Network is specified below, where the current weights of the neural network are: w13=w34=1, w12=w24=0.5 and the learning rate is 0.2. **How would the neural network algorithm update the weights w24 and w34 for the training example** (input X=1, output Y=0.5) **(Use one iteration only).**



Hint: $e^{-0.5}$=0.606 and e^{-1}=0.367

(10 Marks)

Q2: Choose one branch only to solve:

(A) Write C++ program to perform the **Perceptron Neural Network.**

(B) Calculate the thresholds and weights for a **Hopfield Network** that is to learn the following three input vectors:

X1=[1 1 1] X2=[-1 -1 -1] X3= [-1 1 1].

(10 Marks)

Q3: What is the main goal of use the following parameters? **(Choose only five)**

1- Euclidean Distance 2- Vigilance Parameter 3-Liner Function 4-Sigmoid Function 5-Learning Rate 6-Fitness Function.

(10 Marks)

Q4: Write a complete algorithm for Adaptive Resonance Theory (ART).

(10 Marks)

Q5: A kohonen self-organizing map (SOM) to be cluster two vectors **Vector1=(1 1 0) and Vector2 =(0 0 0).** The maximum number of clusters to be formed is m=2 with learning rate $\propto = 0.5$ and the Initial weight matrix are:

$$\begin{bmatrix} 0.2 & 0.8 \\ 0.6 & 0.4 \\ 0.5 & 0.7 \end{bmatrix}$$

Update its weights at each step (<u>using one iteration only</u>).

(10 Marks)

Q6: Find the 5 bit number with the maximum number of 1s in its binary representation using **Roulette-wheel selection in Genetic algorithm.** Where crossover point is 2 and the initial population is: **<u>(Use one iteration only).</u>**

0 0 1 1 1

0 0 0 1 1

0 0 0 0 1

1 1 1 1 1

(10 Marks)

BEST WISHES