Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 710423N **Date: 21/02/2012**
Subject Name: Neuro Computing and Applications
Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Enlist useful properties and capabilities offered by neural networks. Explain any three of them in brief. **07**

(b) Explain in brief, fundamentally different classes of neural network architectures. **07**

Q.2 **(a)** Describe in brief following factors affecting the performance of artificial neural network models. **07**

i) Initialization of interconnecting weights
ii) Number of hidden nodes and layers

(b) Give classification of different learning algorithms in neural network and explain in brief. **07**

OR

(b) Discuss: "Selection activation functions and Range of normalization of training data are important factors for successful training". **07**

Q.3 **(a)** Explain with the help of necessary block diagram ADLINE and MADLINE networks. Explain MADLINE as a network to solve XOR problem. **07**

(b) Consider the typical problem for training using BP algorithm , where training pair is given as under: **07**

Training pair

Sr. No	INPUTS		OUTPUT
1	0.4	-0.7	0.1

Weights are initialized as follows:

Input to hidden layer: {0.1 0.4; -0.2 0.2 };

Hidden to output layer : (02;-0.5)

a) Compute the stage wise outputs using sigmoid as activation function.

b) Compute the error and hence weight update to the output neuron for given training pair. Assume $\eta = 0.6$

OR

Q.3 **(a)** Enlist different neural architectures of AM models. Explain "two layer models" with necessary details. **07**

(b) Consider the case of kosko's discrete Bidirectional Associative Memory (BAM) for retrieval of associated pair. Consider for N=3 training pairs are given as (P_1,Q_1), (P_2,Q_2),(P_3,Q_3) given as under: **07**

P_1 = (0 0 0 1 1 1 0 0 1) Q_1= (0 1 0 0 0 0 1 1 1)

P_2 = (1 1 1 0 0 1 1 1 0) Q_2= (1 0 0 0 0 0 0 0 1)

P_3 = (1 1 0 1 1 0 1 0 1) Q_3= (1 0 1 0 0 1 0 1 0)

Find

a) Correlation matrix

b) Try to recall of Q_2 from training pair (P_2, Q_2) using kosko's decoding procedure.

c) Comment on your results after checking with Lyapunov energy function.

Q.4 **(a)** Explain basic Adaptive Resonant Theory (ART) architecture with necessary block diagram and explanation of various blocks. **07**

(b) Discuss application of neural network in pattern recognition by considering handwritten character recognition. Draw necessary block diagram and explain importance of each block in brief. **07**

OR

Q.4 **(a)** Consider a hetro associative network using hybrid data given below. **07**

S_1 = (1 1 0 0) t_1 = (1 0)

S_2 = (0 1 0 0) t_2 = (1 0)

S_3 = (0 0 1 1) t_3 = (0 1)

S_4 = (0 0 1 0) t_4 = (0 1)

Find

a) weight matrix

b) Test the network response with following two patterns which are different than input patterns X_1 = (1 1 1 0) and X_2 = (1 1 1 0).

c) Comment on the results obtained for recognition.

(b) Discuss applications of neural networks in forecasting problem by considering basic operation, merits and demerits. **07**

Q.5 **(a)** Draw and explain in brief Kohonen Self Organization Map (SOFM) architecture. Clearly explain necessary steps for its training algorithm. **07**

(b) Enlist recurrent network architectures that highlight specific form of global feedback. Explain any one of such model in brief. **07**

OR

Q.5 **(a)** Enlist the essential processes involved in formation of self organizing maps. Explain any two of them in brief. **07**

(b) Compare Radial Basis Function networks and Multi layer Perceptron. **07**

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