Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II – EXAMINATION – SUMMER 2017

Subject Code: 2722710 Date:30/05/2017

Subject Name: Neuro Computing and Applications

Time:02:30 PM to 05:00 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)** Explain in brief the necessary steps for Back Propagation Learning algorithm. Clearly mentions all assumptions made. **07**

(b) Enlist useful properties and capabilities offered by neural networks. Explain any two of them in brief. **07**

Q.2 **(a)** Starting with input node (forward step), derive weight updating equations for neuron j when a) neuron j is an output node for back propagation learning algorithm. Clearly mentions all assumptions made. **07**

(b) Explain **Sigmoid** as an activation function used in single and multilayer neural networks. Explain how it differs than other function giving clear comparison. **07**

OR

(b) Describe in brief following heuristics affecting the performance of artificial neural network models. **07**

i) Learning from Hints

ii) Normalization of inputs

Q.3 **(a)** Explain KOHONEN model architecture for Self Organization Map (SOFM). **07**

(b) Consider six number of points in two dimensional Euclidian space (x , y) as Shown below. Inp**ut pattern coordinates are:** **07**

Point	X	Y	**Point**	X	Y
1	3	4	**4**	4	6
2	2	3	**5**	9	8
3	8	9	**6**	6	7

Assume threshold distance a) 2 b) 5. Determine clusters using VQ in each case. Comment on the results in view of threshold distance and clusters formed.

OR

Q.3 **(a)** Explain concept of Associative Memory Explain two layer models for associate memory with necessary details. **07**

(b) A hetro associative network is given. **07**

S1 = (1 1 0 0) t 1 = (1 0)

S2 = (0 1 0 0) t 2 = (1 0)

S3 = (0 0 1 1) t 3 = (0 1)

S4 = (0 0 1 0) t 4 = (0 1)

a) Find the weight matrix b) Test the network with (1) input vector [1 1 1 1] & (2) input vector [-1 1 -1 -1]

Q.4 **(a)** What is stability plasticity dilemma? Explain basic ART network architecture. **07**

(b) Discuss in brief solution of EXOR problem in context of following: **07**

a) Macculo-pits model
b) Perceptron
c) Back propagation network
d) RBF network

OR

Q.4 **(a)** Consider the typical problem for training using BP algorithm , where training set is given as under: **07**

Sr.No	INPUT	OUTPUT
1	0.45 0.12 0.25 0.06	0.3

i) Compute the stage wise outputs using sigmoid as activation function for hidden neuron. Take linear activation function otherwise.
ii) Compute the error and hence weight updates to the concerned neurons for one complete step.

Q.4 **(b)** Explain with necessary details Radial Basis Function networks. Enlist three major differences between RBF and multi-layer Perceptron. **07**

Q.5 **(a)** Explain state space model for recurrent network architectures in brief. **07**

(b) Discuss application of neural networks in any medical diagnosis application in brief. **07**

OR

Q.5 **(a)** Explain NARX model for recurrent network architectures in brief. **07**

(b) Discuss application of neural networks in any image processing /robotics application in brief. **07**

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