Student Exam No._____

GANPAT UNIVERSITY

B.Tech. Semester - VIII Mechatronics Engineering

MC801 - Artificial Intelligence

Regular Examination: - May/June-2012

[Time: 3 Hour] [Total Marks: 70]

Instructions:

(1) All questions are compulsory.
(2) Assume suitable data if necessary and mention in answer book.
(3) Figures to the right indicate full marks.
(4) Support answers with appropriate diagram and output for the program.

SECTION – I

Que.1 **(a)** Draw and explain different architectures of Artificial Neural Network. [4]

(b) Derive and Discuss the result of additive activation model consists of passive decay term and constant external excitatory input. [4]

(c) Write a short note on basic competitive learning. [4]

OR

Que.1 **(a)** Determine the weights of network with four inputs and one output using correlational learning law for following data: [2]

On training state input: [1100] and [1001]
Off training state input: [0011] and [0110].

(b) Determine the new weights using back propagation algorithm when the network shown is presented the input pattern X = [1.0 0.0] and target output Y = 1.0. Assume learning rate = 0.3 and use binary sigmoidal activation function for all neurons. [10]

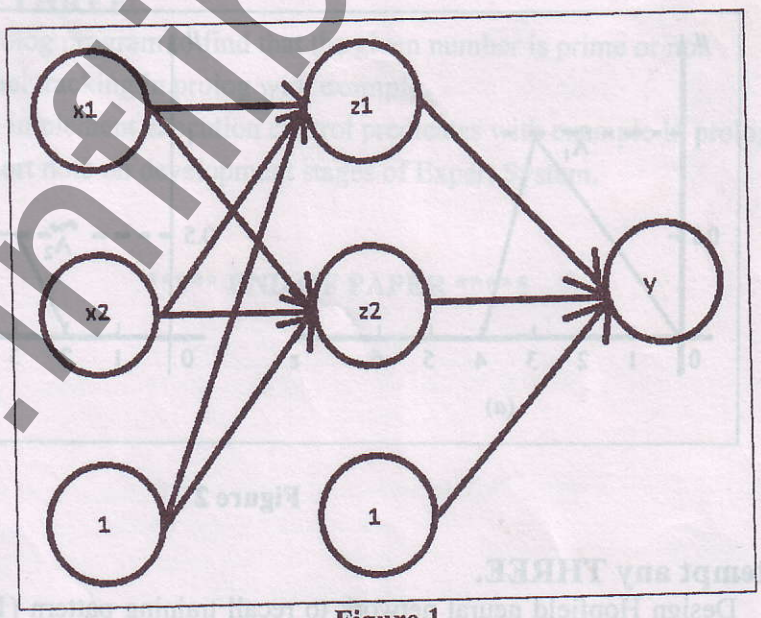

Figure 1

The initial weights and bias matrix are as below.

$$W = \begin{bmatrix} 0.4 \\ 0.3 \end{bmatrix}; \quad W_0 = [-0.2]; \quad V_0 = [0.3 \quad 0.5]; \quad V = \begin{bmatrix} 0.6 & -0.45 \\ -0.1 & 0.35 \end{bmatrix}$$

Note: - 1) Row indicates input and Column indicates output.

Que.2 **(a)** Name different feed forward tasks and explain any one with example. **[3]**

(b) For a fuzzy set $\tilde{A}$ and $\tilde{B}$, **[4]**

$$\tilde{A} = \left\{\frac{0.5}{2} + \frac{0.3}{3} + \frac{1}{4} + \frac{0.7}{5}\right\}$$

$$\tilde{B} = \left\{\frac{0.2}{2} + \frac{0.4}{3} + \frac{0.7}{4} + \frac{0.5}{5}\right\}$$

Determine

i) $\tilde{A} \cup \tilde{B}$,

ii) $\tilde{A} \cap \tilde{B}$,

iii) $\bar{\tilde{A}}$,

iv) $\bar{\tilde{B}}$,

v) $\tilde{A} \mid \tilde{B}$,

vi) $\tilde{B} \mid \tilde{A}$,

vii) $A_{0.5}$

viii) $B'_{0.5}$

(c) Let A = {2, 3, 4, 5} and B = {3, 4, 5, 6, 7}. **[4]**

Define Fuzzy relation $\tilde{R}$ = "b is much larger than a." and

$\tilde{S}$ ="a is approximately equal to b."

Find union and intersection of set $\tilde{R}$ and $\tilde{S}$.

OR

Que.2 **(a)** Explain the difference between the accretive and interpolative type of clustering problems **[3]**

(b) Find defuzzified value for union of given fuzzy sets using centroid method of defuzzification. **[8]**

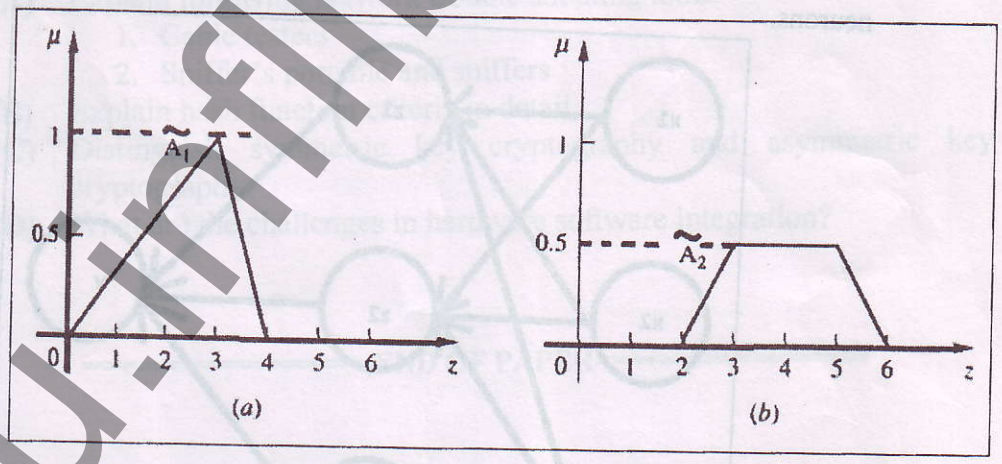

Figure 2

Que.3 **Attempt any THREE.** **[12]**

(a) Design Hopfield neural network to recall training pattern (10111) and (10010). Verify the result for (00111) and (10111).

(b) Write a short note on fuzzification by inference.

(c) Explain mamdani fuzzy controller in detail.

(d) Write a short note on crisp and fuzzy equivalence relation.

SECTION II

Que.4 (a) Write a prolog program to append two user defined lists. [4]

(b) Write a prolog program to find solution of quadratic equation. If there are two real roots, then display the result. Otherwise, display the message that "There are two imaginary roots" only. [4]

(c) Implement compound object 'part (number, description, cost)' to store information of inventory parts like drill_bit(description, cost), bolt(number, cost), nut(number, cost). Prolog program should ask for inventory object name, read details from keyboard and display the same. Assume that each time, only one inventory is read and displayed. [4]

OR

Que.4 (a) Write a prolog program to check the given data is available in list or not. [4]

(b) Write down differences between procedural programming language and prolog. [4]

(c) Write a prolog program to use dynamic database which contains book name and author name. The program should display message if the same book information is reentered instead of storing information again. [4]

Que.5 (a) Explain winding down and unwinding process with example. [3]

(b) Explain depth first search algorithm with its merits and demerits. [4]

(c) Discuss implementation of best first search algorithm with an example. [4]

OR

Que.5 (a) Write down bitwise built in predicates. Explain their syntax and operation with examples. [3]

(b) Explain breadth first search algorithm with its merits and demerits. [4]

(c) Write a short note on Simulated Annealing. [4]

Que.6 **Attempt any THREE.** [12]

(a) Write a prolog program to find that the given number is prime or not.

(b) Explain backtracking in prolog with example.

(c) Name and implement execution control predicates with example in prolog.

(d) Write a short note on development stages of Expert System.

******* END OF PAPER *******