

**GANPAT UNIVERSITY**  
**M. Tech Sem. I Information Technology**  
**Regular Examination Dec-Jan 2013-14**  
**3IT102: Computational Intelligence**

Max Time: 3 Hours]

[Max Marks: 70

- Instructions:** 1. Figures to the right indicate full marks of the question.  
 2. All questions are compulsory.  
 3. Each section should be written in a separate answer book.

**SECTION: I**

Q:1 (a) Classify the following problems according to AI problem characteristics. [6]

(i) Chess (ii) Missionaries and Cannibals (iii) Water Jug

(b) Show the solution for the "Tower of Hanoi" of 4 disks. Suggest the strategy also. [6]

**OR**

Q:1 (a) Solve the following cryptarithmic problem. Clear mention your heuristics applied to solve the problem. Suggest also the strategy. [6]

$$\begin{array}{rcccccc}
 & F & O & R & T & Y \\
 + & & & T & E & N \\
 + & & & T & E & N \\
 \hline
 S & I & X & T & Y
 \end{array}$$

(b) You are given two water Jugs of 16 liters and 7 liters. Only by exchanging the water you have to obtain 8 liters of water in 16 liters of jug. Devise the operators for the problem. Also suggest the strategy for the solution of the problem. [6]

Q:2 (a) What is the horizon effect? Show its solution with an example. [5]

(b) Give an example of a problem for which Breadth first search would work better than depth first search. Also give an example for which depth first search would work better than breadth first search. Justify your answer. [3]

(c) What is role of heuristic? Attempt to describe good heuristic function. [3]

(i) Blocks world (ii) N-Queen

**OR**

Q:2 (a) What are the demerits of Hill climbing techniques? Discuss in detail. [5]

(b) Consider the following 8 puzzle problem. Solve it using A\* algorithm. Show each solution steps. [6]

1	2	3
8	5	6
4	7	

Initial

1	2	3
4	5	6
7	8	

Goal



- Q:3 (a) Elaborate the following keywords [4]  
 (i) knowledge (ii) Computationally intelligent system  
 (b) Compare Best first search with A\* algorithm. [3]  
 (c) Discuss Alpha-Beta cutoff procedure with an example. [5]

**SECTION: II**

- Q:4 (a) Given training samples from two linearly separable classes, the perceptron training algorithm terminates after a finite number of steps, and correctly classify all elements, irrespective of the initial random non-zero random weight vector  $w_0$ . [6]

- (b) Consider the OR gate truth table. Develop a perceptron model. Show the iteration up to 1 epoch. Initial weights and bias are 0.5. Learning rate: 1. [6]

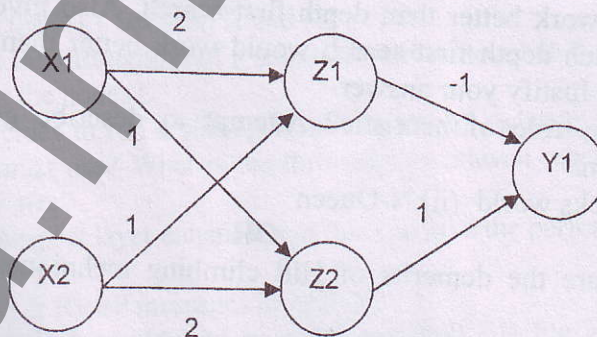
X1	X2	t
0	0	0
0	1	1
1	0	1
1	1	1

OR

- Q:4 (a) Discuss various types of activation functions. [6]

- (b) For the given following problem, apply perceptron learning and at the end of 1 epoch, find the number of misclassification. Begin with initial weights and bias are 1.  
 Class 1: (3, 1), (4, 2), (5, 3), (6, 4)  
 Class 2: (2, 2), (1, 3), (6, 4) [6]

- Q:5 (a) Consider the following problem. Solve it using Backpropagation learning. Go up to 1 epoch. Input pattern [0.6 0.8] is presented and target output is 0.9. Use learning rate: 0.3. Initial weights have been shown on the edges. [8]



- (b) Compare Biological Neural networks with Artificial Neural Networks. [3]

- Q:5 (a) Discuss the practical issues in Back propagation learning. [6]

- (b) Briefly Explain competitive learning. [5]

- Q:6 (a) Explain commonly used membership functions in Fuzzy sets and relations [6]

- (b) Briefly explain Quick propagation. [4]

- (c) Compare Supervised learning vs Unsupervised learning [2]