Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(EE)/SEM-8/EE-802C/2012

2012

AI AND SOFT COMPUTING

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) Which of the following algorithms can be used to train a single layer feed forward network ?

a) Hard competitive learning

b) Soft competitive learning

c) Genetic algorithm

d) All of these.

e) None of these.

ii) The competitive learning rule is suited for

a) unsupervised network training

b) supervised network training

c) reinforced network training

d) all of these.

iii) Which of the following techniques cannot be used for preprocessing the inputs to a ANN ?

a) Normalization

b) Winner-takes-all

c) Fast Fourier Transform

d) Principal component analysis

e) Deleting outlets from the training set.

iv) The madaline network is

a) the combination of two single layered feed forward neural networks

b) a type of multilayered feed forward neural network with multiple neurons in output layer

c) the combination of adaline networks and multilayered feed forward network with one neuron in output layer.

d) a type of feedback network.

v) BPN is the

a) Multilayer feed forward neural network

b) Multilayer feedback neural network

c) Recurrent network

d) Competitive network.

vi) Discrete Hopfield net is a

a) feed forward network

b) feedback network

c) recurrent network

d) none of these.

vii) The neighbourhood scheme for SOM is used

a) to find out the neurons of which weight vector to be updated along with winner neuron

b) to find out the neurons of which weight vector to be updated excluding winner neuron

c) to converge the net faster

d) to find out the winner neuron in the net.

viii) Which of the following neural network uses supervised learning ?

a) Self-Organizing feature map

b) The Hopfield network

c) Simple recurrent network

d) All of these

e) None of these.

ix) Acquired knowledge in ANN is stored with the help of

a) activation function

b) local induced field

c) synaptic weight

d) input signal.

x) Knowledge consists of

a) concepts and procedures

b) facts and rules

c) both (a) and (b)

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Justify or falsify — "A* algorithm admissible".

3. Write down the most appropriate predicate logic representation of the following facts : 1 + 1 + 1 + 1 + 1

   i) all men are mortal

   ii) x is greater than y

   iii) a is friend of b

   iv) computer is not a mechanical device

   v) adult citizens have voting right.

4. What is artificial neuron ? Describe mathematical model of neuron. 1 + 4

5. Implement a back propagation algorithm to solve XOR problem. Is it a linearly separable problem ? 4 + 1

6. Explain the role of activation function in ANN with suitable examples.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. List two distinguishing features of procedural knowledge and declarative knowledge. What is heuristic search ? Discuss *A** algorithm. Write short notes of Fuzzy Sets and Fuzzy Logic. Write down the differences between forward and backward reasoning. 2 + 1 + 5 + 2 + 2 + 3

8. Consider the following sentences :
   i) Marcus was a man.
   ii) Marcus was a Pompeian.
   iii) All Pompeian were Roman.
   iv) Caesar was a ruler.
   v) All Romans were either loyal to Caesar or hated him.
   vi) Everyone is loyal to someone.
   vii) People only try to assassinate rulers who are not loyal to.
   viii) Marcus tried to assassinate Caesar.
   a) Convert the above statements in Predicate logic. 4
   b) Using resolution principle, prove that Marcus hate Caesar. 5
   c) Discuss the algorithm of Depth First Search and Breadth First Search. 3 + 3

9. a) Discuss the operation of the Hopfield neural network with reference to its state updating procedure. 5
   b) State and prove the perceptron convergence theorem. 5
   c) A collection of 20 'birds' is to be classified into five different classes. The feature space comprises the 'claw size', 'body odour', 'size', 'tail orientation' and 'food habits', design an MLP architecture to classify the birds. What would be the size of training and testing sets ? 5

10. a) Discuss the MLP (Multi Layer Perceptron) Model for ANN. 8

b) What do you mean by self-organized map ? Discuss Kohonen's self-organized learning method. 7

11. a) What is adaptive resonance theory ? 4

b) There is an ART-1 network with four input unit at three cluster units. Discuss the procedure in update the weights when the samples V (1). V (2), V (3) and V (4) are (1, 1, 0, 0), (0, 0, 1, 1), (1, 0, 1, 1) and (0, 0, 0, 1). Assume the vigilance parameter as 0·2. 11