Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (EE-N)/SEM-8/EE-802C/2010

2010
AI & 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 any *ten* of the following : $10 \times 1 = 10$

   i) Find out the most appropriate predicate representation for "every child likes to play game"

      a) $\exists x : [CHILD (x) \rightarrow [\forall y : [GAME (y) \wedge LIKES (x, y)]]]$

      b) $\forall x : [CHILD (x) \rightarrow [\exists y : [GAME (y) \wedge LIKES (x, y)]]]$

      c) $\forall x : [CHILD (x) \rightarrow [\forall y : [GAME (y) \wedge LIKES (x, y)]]]$

      d) $\exists x : [CHILD (x) \rightarrow [\exists y : [GAME (y) \wedge LIKES (x, y)]]]$.

   ii) AI does not overlap with

      a) Linguistics

      b) Psychology & philosophy

      c) Both (a) and (b)

      d) None of these.

iii) Hill climbing has potential problems like

a) Lake b) Foothill trap

c) Garden d) All of these.

iv) The form of heuristic function of A^* search is

a) $f*(n) = g*(n)* h*(n)$ b) $f*(n) = g*(n) + h*(n)$

c) $f*(n) = g(n) + h(n)$ d) None of these.

v) Searching techniques are used for

a) Goal node searching

b) Optimization of search space

c) Finding goal distance of the goal node from start node

d) All of these.

vi) Computers are better than human beings in the matter of non-numeric symbolic processing

a) always b) sometimes

c) never d) most of the times.

vii) Knowledge consists of

a) Concepts and procedures

b) Facts and rules

c) All of these

d) None of these.

viii) The major components of neuron are

a) Dendrites, Cell Body and Axon

b) Cell Body and Axon

c) Dendrites and Axon

d) Frontal & temporal lobe.

ix) The graph of sigmoidal function is

a) V-shaped b) S-shaped

c) Step Shaped d) None of these.

x) Which characteristic is not present in ANN ?

a) Speed b) Storage

c) Fault tolerance d) Software dependency.

xi) Perceptron was developed by

a) Kohonen b) Clark

c) Widrow and Roff d) Frank Rosenblelt.

xii) Single layer perceptron is used for

a) Linear separability b) Non-liner separability

c) Error minimization d) Annealing.

GROUP – B

(Short Answer Type Questions)

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

2. a) What is Artificial Intelligence ?

   b) What are the different branches of AI ? Explain any three of them in detail. 1 + 1 + 3

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. 5

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.

   b) Using resolution principle, prove that Marcus hate Caesar.

   c) Discuss the algorithm of Depth First Search and Breadth First Search. 4 + 5 + 3 + 3

9. Point out any four characteristics of an AI system. Explain the characteristics. Explain the equivalence relationship in predicate logic. Give an example of equivalence relationship. Can a system engaged in purely numeric computation be called a non-intelligent system ? Explain with suitable arguments. 4 + 4 + 3 + 1 + 3

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

    b) What do you mean by self-organized map ? Discuss Kohonen's self-organized learning method. 8 + 7

11. a) What is adaptive resonance theory ?

    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.

    4 + 11

12. Write short notes on any *three* of the following : 3 × 5

a) Activation Function

b) Classification Problem

c) Knowledge Acquisition

d) Hill Climbing Search

e) Unsupervised Training

f) Plasticity and Noise Saturation Dilemma.