



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 × 1 = 10

- i) Find out the most appropriate predicate representation for “every child likes to play game”
- a) $\exists x : [\text{CHILD}(x) \rightarrow [\forall y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$
 - b) $\forall x : [\text{CHILD}(x) \rightarrow [\exists y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$
 - c) $\forall x : [\text{CHILD}(x) \rightarrow [\forall y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$
 - d) $\exists x : [\text{CHILD}(x) \rightarrow [\exists y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$.
- 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 Rosenblatt.

xii) Single layer perceptron is used for

- a) Linear separability
- b) Non-linear 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.

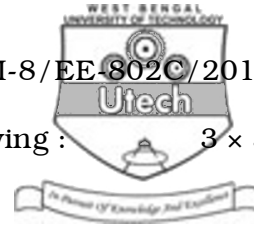
- b) What do you mean by self-organized map ? Discuss Kohonen's self-organized learning method.

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.
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