F 6650

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Eighth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 802/IT 010 802—ARTIFICIAL INTELLIGENCE [CS, IT]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 marks.

1. What is a monotonic production system ?

2. When would best-first search be worse than simple breadth-first search ?

3. What is resolution ? Comment on the completeness of resolution.

4. Outline the difference between supervised and unsupervised learning.

5. Define a fuzzy number. Give example.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each full question carries 5 marks.

6. Construct a search tree for the "Water Jug Problem" presented below :

   You are given two jugs, a 4-gallon one and a 3-gallon one, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured.

   Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug ?

7. Outline with an example the difference between depth-first search and breadth-first search.

8. Explain with an example Unification.

9. What is a decision tree ? Give example.

10. Explain with an example any *two* operations that can be performed on fuzzy sets.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each question carries 12 marks.

11. For the "Tower of Hanoi" problem presented below, formally define the problem as a space of all possible configurations where each configuration is called a state (initial state, goal state, and actions) :

Somewhere near Hanoi there is a monastery where monks devote their lives to a very important task. In their courtyard are three tall posts. On these posts is a set of sixty-four disks, each with a hole in the center and each of a different radius. When the monastery was established, all of the disks were on one of the posts, each disk resting on the one just larger than it. The monk's task is to move all of the disks to one of the other pegs. Only one disk may be moved at a time, and all the other disks must be on one of the pegs. In addition, at no time during the process may a disk be placed on top of a smaller disk. The third peg can, of course, be used as a temporary resting place for the disks. What is the quickest way for the monks to accomplish their mission ?

Even the best solution to this problem will take the monks a very long time. This is fortunate, since legend has it that the world will end when they have finished.

Or

12. What is hill climbing ? Write a Python program to implement the hill climbing algorithm.

13. Illustrate the A* search algorithm with an example.

Or

14. What is alpha-beta pruning ? Explain with an example.

15. Consider the problem of answering questions based on a database of simple facts, such as the following :—

 (a) Marcus was a man.

 (b) Marcus was a Pompeian.

 (c) Marcus was born in 40 A.D.

 (d) All men are mortal.

 (e) All Pompeians died when the volcanoerupted in 79 A.D.

 (f) No mortal lives longer than 150 years.

 (g) It is now 2017 A.D.

Represent each of these facts using predicate logic and then use a formal inference method to answer the question: Is Marcus alive ?

Or

16. Explain with an example inference in rule-based systems using forward chaining and backward chaining.

17. Explain with an example the following types of learning:

 (a) Learning by parameter adjustment. (6 marks)

 (b) Learning with macro-operators (6 marks)

Or

18. Illustrate with an example the steps in the version space algorithm.

19. Explain with a diagram the following fuzzy membership functions:

 (a) Triangular membership function. (6 marks)

 (b) Trapezoidal membership function. (6 marks)

Or

20. What is an expert system? Explain with an example the process of reasoning with knowledge.

[5 × 12 = 60 marks]