CS/IT–702

B. E. (Seventh Semester) EXAMINATION, June, 2010

(Common for CS & IT Branch)

ARTIFICIAL INTELLIGENCE

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What are the characteristics of AI problems ? Explain the areas where AI can be applied.   6

   (b) Prove that the set of states expanded by algorithm A^+ is subset of those examined by breadth first search.   8

   (c) Solve the following cryptoarithemetic problem :   6

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2. (a) Consider the farmer, fox, goose-grain puzzle. In this puzzle a farmer wishes to cross the river taking his fox, goose and grain with him. He can use a boat which will

accommodate only the farmer and one possession ? If the fox is left alone with the goose, the goose will be eaten and if the goose is left alone with the grain, grain will be eaten. Draw a state space tree for this puzzle using left bank and right bank to denote the left and right banks respectively.   8

(b) What are the problems associated with Hill Climbing ? Differentiate between Simple Hill Climbing, Steepest Ascent Hill Climbing and Simulated Annealing algorithm.   8

(c) Design the heuristic function for the following :   4

   (i)   8 puzzle problem
   (ii) Travelling salesmen problem

3. Consider the following sentences :   20

   (i)   John likes all kinds of food.
   (ii) Apple is food.
   (iii) Chicken in food.
   (iv) Anything anyone eats and isn't killed by is food.
   (v)   Bill eats peanuts & is still alive.
   (vi) Sue eats everything Bill eats :

      (a) Translate these sentences into predicate logic.
      (b) Prove that John likes peanuts using backward chaining.
      (c) Prove that John likes peanuts using resolution.
      (d) How can knowledge be used to help resolve conflicts when there are several inconsistent non-monotonic inferences that could be drawn ? Explain with the help of example.
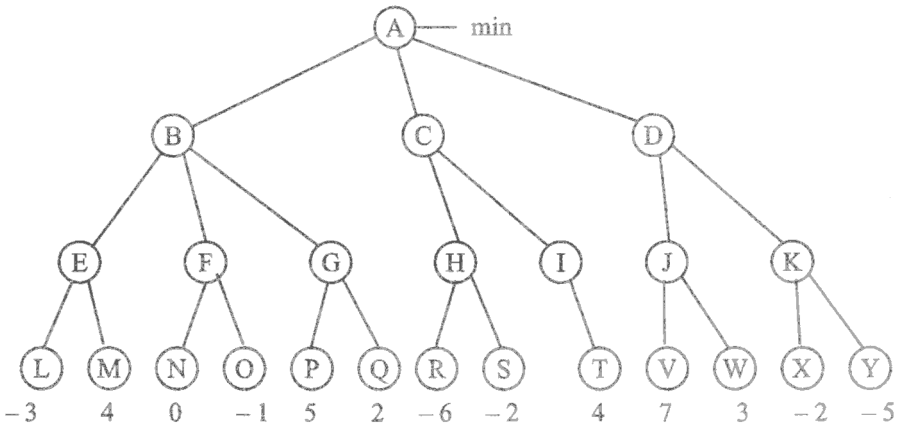
4. (a) What are the advantages and disadvantages of semantic net ? Represent the following sentences in the semantic net :   12

   (i)   Some rose are yellow.
   (ii) Football is a game, it is played by ball, it is popular in Europe.

(b) Write a script for "Going to a theater to watch a movie". 8

5. (a) Explain probablistic reasoning and Derive Bay's theorm. 8

(b) Consider the following game tree : 12

(i) Perform minimax search on the above tree.

(ii) Perform alpha-beta pruning on the above tree. How many nodes can be eliminated ?

6. (a) Consider the following block world problem : 12

Start : ON (C, D) ∧   Goal : ON (C, B) ∧
        ON (A, B) ∧   ON (A, D) ∧
        ON TABLE (B) ∧   ON TABLE (B) ∧
        ON TABLE (D) ∧   ON TABLE (D)
        ARMEMPTY

(i) Show that how STRIPS would solve this problem.

(ii) Show how TWEAK would solve this problem.

(b) Explain theorem proving with the help of examples. 8

7. (a) Derive the parse tree for the sentence "Bill loves the cat" where the following rules are used : 10

$S \to NP/VP$ $DET \to The$

$NP \to N$ $V \to loves$

$NP \to DET\ N$ $N \to Bill/CAT$

$VP \to VNP$

Modify grammar to allow NP to have zero to many adjectives.

(b) To solve the following problems determine whether the search should proceed forward or backward : 5

(i) Water jug problem

(ii) Block's world

(c) What do you understand by control strategies ? Explain different types of control strategies. 5

8. (a) Explain with suitable examples : 10

(i) Rote learning

(ii) Learning by direct instruction

(iii) Learning by analogy

(iv) Learning by deduction

(b) What is an expert system ? Explain all the components of expert system. 10

9. Write short notes on any *three* of the following : 20

(i) Production system

(ii) Frames

(iii) Common sense

(iv) Fuzzy logic

(v) Applications of Neural Network