Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(CSE)/SEM-7/CS-702/2011-12

2011
ARTIFICIAL INTELLIGENCE

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) The time complexity and space complexity for bidirectional breadth first search technique, respectively are (with branching factor b and depth d)

   a) $O(b^d)$, $O(b^d)$ b) ✓ $O(b^{\frac{d}{2}})$, $O(b^{\frac{d}{2}})$,

   c) $O(b^{\frac{d}{2}})$, $O(b^d)$ d) $O(b^d)$, $O(b^{\frac{d}{2}})$,

   ii) The term 'Optimality', so far one of the performance measuring indices of any search technique is concerned, refers to

   a) time complexity b) space complexity

   c) ✓ both (a) and (b) d) none of these.

iii) The main advantage of any heuristic search algorithm over blind search one is with respect to

a) time complexity b) space complexity

c) completeness d) optimality.

iv) Depth first search procedure uses

a) AND graph b) OR graph

c) AND-OR graph d) none of these.

v) If there is no heuristic, then A * algorithm boils down to

a) breadth first search b) depth first search

c) uniform cost search d) none of these.

vi) Resolution-refutation is best associated with

a) sound rule of inference

b) complete rule of inference

c) both (a) and (b)

d) none of these.

vii) In Minimax algorithm search process obeys

a) breadth first search fashion

b) depth first search fashion

c) best first search fashion

d) none of these.

viii) Iterative Deepening search procedure is

a) optimal with respect to time consumption

b) optimal with respect to space consumption

c) both (a) and (b)

d) none of these.

ix) Any decomposable problem can be represented by

a) AND graph b) OR graph

c) AND-OR graph d) none of these.

x) Which of the following is tautology ?

a) $(P \wedge Q) \wedge \sim Q$ b) $(P \wedge Q) \Rightarrow P$

c) $P \wedge \sim Q$ d) none of these.

xi) Frame is a collection of

a) Slots b) Filler

c) Resolution d) Knowledge.

xii) Planning and constraint satisfaction are alike in that they both

a) are more efficient than A* search

b) ✓ allow for the use of domain-independent heuristics that exploit structure

c) can be used for game playing as well as problem solving

d) are a good algorithmic fit for solving crossword puzzles.

GROUP – B

(Short Answer Type Questions)

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

2. What is agent ? What are the disadvantages of table driven agent ? 3 + 2

3. Compare blind search and heuristic search.

4. Discuss on the components of AI production system.

5. What is semantic net ? With the help of semantic net, represent the fact than Mr. A is 6 feet tall and he is taller than Mr. B. 2 + 3

6. Write a program in PROLOG as well as in LISP to find out the GCD of *n* numbers.

GROUP – C

(Long Answer Type Questions)

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

7. a) Discuss on 'agents as search procedure'. 5

   b) How do you evaluate any search technique ? 5

   c) Discuss on Bidirectional search technique. 5

8. a) Write down the disadvantages of hill climbing search procedure. 5

   b) When does simulated annealing algorithm behave like hill climbing ? 5

   c) In Genetic algorithm, how do you obtain the new chromosome (solution) from the old one ? 5

9. Consider the 3-puzzle problem shown in figure 1.

2	3
1	

Initial

1	2
3	

Final

Figure 1

Possible operators (in order) are : up, down, left, right; Assume that repeated states are not detected.

a) Draw the search tree using breadth first search. 7

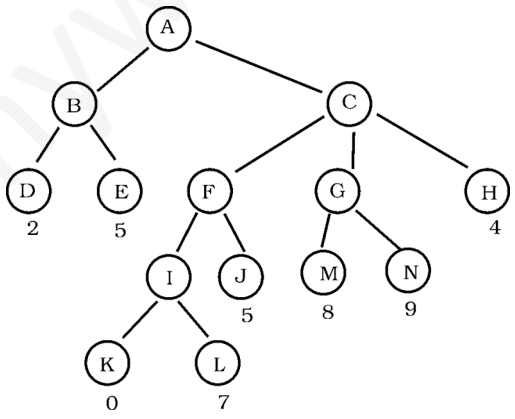
b) Would depth first search find the goal ? Explain. 4

c) How many nodes would be generated if Iterative Deepening is used starting with depth increment one ? 4

10. a) Consider the following game tree in which static scores are all from first player's point of view

i) which would be his best first move if MINIMAX algorithm is used ?

ii) Which branches will be pruned if α-β pruning algorithm is used ?



4 + 6

b) Write down the differences between conventional set and fuzzy set. 5

11. a) Consider the following sentences :

John likes all kinds of food.

Apples are food.

Anything anyone eats and is not killed by is food.

Mary eats peanuts and is still alive. Sam eats everything Mary eats.

Use resolution to answer "What food does Sam eat ?" 10

b) Write short notes on any *one* :

i) Dempster-Shafer theory

ii) Constraint satisfaction problem. 5