



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech (IT-SE)/SEM-3/MSE-302B/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.*

Answer any *five* questions.

1. a) What is thinking Machine. 2  
b) What are the criterion a machine must satisfy to be thinking ? 6  
c) Write down in brief the functions used in the process of developing application TIC-TAC-TOE. 6
2. a) Explain briefly the term problems space and state space. 2  
b) Describe Production system with all its component. How should be a control strategy ? 6  
c) Two jugs of capacity 4L and 3L have no marking on them. There is a source of huge liquid that can be poured to the container, liquid can also be poured between the containers. However the container have no marking on them.  
(i) Construct a set of valid rules for state transition.  
(ii) Discuss solution strategies (preferably heuristic).  
So that 4L containers contain 2L of water. 6



3. a) Explain Best First Search algorithm illustrate it with the example of 8 puzzle problem defining appropriate heuristic. 8
- b) Analyze simple Hill Climbing also with Steepest-Ascent Hill Climbing. 6
4. a) Write down the A\* algorithm for Searching in the State space. 8
- b) What do you mean by
  - (i) Consistent heuristic
  - (ii) Admissible heuristic. 6
5. a) Explain constraint satisfaction problem. 4
- b) Identify the following crypt arithmetic problem : 8

$$\begin{array}{r}
 \text{S E N D} \\
 + \text{ M O R E} \\
 \hline
 \text{M O N E Y}
 \end{array}$$

Here each alphabets corresponds some digit. No two digits have same alphabet representation & vice versa.

- c) Explain the following terminologies associated to Hill Climbing :
  - (i) Local maximum
  - (ii) plateau. 2



6. a) What is knowledge ? Discuss the mapping between facts and representation. 6
- b) Discuss and explain various forms of knowledge. 4
- c) Explain the following terminologies as knowledge representation issues :
- (i) Representation Adequacy
  - (ii) Inferential Adequacy
  - (iii) Inferential efficiency
  - (iv) Acquisitional efficiency. 4
7. a) Give a production system for following problem :
- A farmer has a wolf, goat and cabbage, on the left side of a river. He has a boat that can carry almost one of the three with him, and he must transport the Trio with him to the right bank of the river. The problem is that he dare, not leave wolf with the goat and goat with the cabbage. How does he do the transportation ? 6
- b) Explain the operation used in predicate logic. 2



c) Consider the following :

(i) Art is the father of John

(ii) Bob is the father of Kim

(iii) Fathers are parents.

Prove that 'Art is the parent of John' by using propositional resolution. 6

8. a) Write down Minimax search algorithm. 6

b) The OAME of NIM is played as follows :

Two players alternate in removing one, two or three coins from a stack initially containing five coins. The player who picks up the last coins boxes.

(i) Draw the full game tree.

(ii) Show that the player having second move can always win.

(iii) Execute  $\alpha-\beta$  pruning procedure on the game tree.

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