Total No. of Questions : 5] [Total No. of Printed Pages : 3

MCA–401(N)

M. C. A. (Fourth Semester) EXAMINATION, June, 2007

(New Scheme)

ARTIFICIAL INTELLIGENCE AND APPLICATIONS

[MCA – 401 (N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : (i) Attempt all questions

(ii) Attempt any *two* parts from each question.

(iii) All questions carry equal marks.

1. (a) Write a recursive function in LISP named power that takes two numeric arguments, n and m. The function computes the nth power of m (m^n). Be sure to account for the case where $n = 0$ i. e., $m^0 = 1$.

(b) Use A. I. techniques to solve the following problem : Translating an English sentence into Hindi.

(c) What do you mean by A. I. ? What are the major task domains of A. I. ?

2. (a) Write a recursive algorithm (using open and closed lists) to implement breadth-first search. Does recursion allow the omission of the open list when implementing breadth-first search ? Explain.

P. T. O.

(b) Trace the constraint satisfaction procedure solving the following cryptarithmetic problem :

$$\begin{array}{r} \text{MONITER} \\ +\ \text{NETWORK} \\ \hline \text{INTERENT} \end{array}$$

(c) Write down the A* algorithm. Prove that the set of states expanded by algorithm A* is a subset of those examined by breadth-first search.

3. (a) Given the following information :

(i) If x is on top of y, y supports x.

(ii) If x is above y and they are touching each other, x is on top of y.

(iii) A cup is above a book.

(iv) A cup is touching a book :

(1) Translate the above statements into a clausal form.

(2) Show that the predicate supports (book, cup) is true using resolution.

(b) Using the conceptual dependency's primitive set create a script of Bankgoing.

(c) (i) Express the following sentence as conceptual dependency structure : 2

"Sam gave mary a box of candy."

(ii) Compare the inference process using frames to that of inference in FOPL. Give examples of both. 3

(iii) Compare semantic nets and partitioned semantic nets ? Draw semantic nets for the following : 5

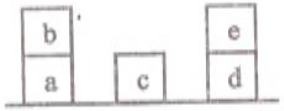
"Bob told John that his wedding ring was at the jewellers".

4. (a) Derive a parse tree for the sentence "Reasoning is an act and not a science" using natural language

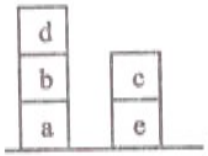
grammar. Also draw the ATN to implement the grammar.

(b) Consider the following blocks world problem. Show how STRIPS would solve the given problem.

Start :



Goal :



(c) Why do game-playing programs work from a current state to a goal, rather than the backward from a goal ? What properties of a game might suggest using a backward strategy ? Give an example.

5. (a) Why is it important that an expert system be able to explain the why and how questions related to a problem solving session ? Give an example of the use of meta knowledge in expert systems inference.

(b) What is the inductive leap used in inductive learning ? Why is it potentially dangerous, but still useful ? At what point can it be taken ?

(c) Consider the set of propositions :

patient has spots
patient has measles
patient has high fever
patient has an allergy
patient is taking rest

Make the Bayesian network by constructing the necessary conditional probability matrix.