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RM-7813

B. E. IV (Sem. VIII) (I.T.) Examination

May / June – 2010

Artificial Intelligence

Time : Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 4 (Sem. 8) (I.T.)**

Name of the Subject :

☛ **Artificial Intelligence**

☛ Subject Code No. : **7 8 1 3** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Answer briefly and to the point.
(3) Draw diagrams wherever required.
(4) Make suitable assumptions wherever necessary.

SECTION-I

1 (a) Define the following terms : **10**

(i) A.I.
(ii) Chronological Backtracking
(iii) Control Knowledge
(iv) Ply
(v) Heuristic.

(b) Convert the following statements into first order predicate logic : **10**

(i) Caesar was a ruler.
(ii) All Romans were either loyal to Caesar or hated him.
(iii) Everyone is loyal to someone.
(iv) Marcus was not loyal to Caesar.
(v) Marcus tried to assasinate Caesar.

2 (a) Consider the following Cryptorithmetic Problem : **10**

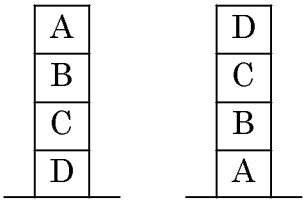
```
    S   E   N   D
+   M   O   R   E
-   -   -   -   -
M   O   N   E   Y
```

Assign a decimal digit to each of the letters in such a way that the answer to the problem is correct. If the same letter occurs more than once, it must be assinged the same digit each time. No two different letters may be assigned the same digit.

Use the constraint satisfaction procedure to solve the problem, and clearly justify your choice of constraints at every step.

OR

2 (a) Consider the situation of 'Fig. A' as the initial state in a typical blocks-world problem. The goal state is shown in 'Fig.B'. Devise an appropriate heuristic based on the hill-climbing strategy for the blocks-world problem and change the state of blocks from initial to goal state. (The available operators are : (i) pick up a block and put it on the table, (ii) pick up a block and put it on another block). Show the evaluation of your heuristic function at each step. **10**



Initial state Fig.A Goal state Fig.B

(b) Explain the requirements of good control strategies. **5**

3 (a) Explain the basic concept behind hill climbing. **7**
Explain the situations under which hill-climbing fails to find a solution. How can one deal with these situations ?

OR

3 (a) Explain problem reduction using AND-OR graphs. 7

(b) In order to decide a heuristic strategy for solving a problem, which are the seven important problem characteristics that should be analyzed ? Analyze the game of 'Chess' based on these characteristics. 8

SECTION-II

4 (a) State with reason whether the following pairs of expressions are unifiable or not : 10

(i) P(a,b) and R(a,c)

(ii) P(a,X) and P(a,b)

(iii) P(a,X) and P (Y,b)

(iv) P(a,X) and P(a,g(Y))

(v) P(a,c,) and P(a,b).

(b) Do as directed : 10

(i) Write algorithm for depth first search. Also state advantages and limitations of depth first search. 6

(ii) Explain with example the difference between simple hill climbing and steepest ascent hill climbing. 4

5 (a) What is an expert system ? Explain the following terms with respect to expert systems : 8

(i) Brittleness

(ii) Meta-Knowledge

(iii) Expert System Shell

(iv) Validation.

OR

5 (a) State the Baye's theorem. With the help of a suitable example, explain how a rule-based expert system can be built by application of a Bayesian Network. 8

(b) With the help of a suitable example explain Fuzzy Logic. 7

6 Write short notes on : (any **three**) 15

(i) Natural Language Processing

(ii) AO* Algorithm

(iii) A.I. in everyday life

(iv) Minimax Search with alpha-beta cut-offs.

(v) D-Separation.
