

[This question paper contains 5 printed pages.]

6632

Your Roll No.....

B.Sc. (H) Computer Science / VI Sem. B

## Paper - 605 (i) : ARTIFICIAL INTELLIGENCE

**(Admissions of 2001 to 2010)**

*Time : 3 Hours*

*Maximum Marks : 75*

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*All questions in Section-A are compulsory.  
Attempt any Four questions in Section-B.*

**SECTION - A**  
*(Compulsory)*

1. (a) When do you call a machine intelligent ? Name the criteria used for determining whether a machine is intelligent or not ? (1+2)

(b) Compare and contrast Depth first search and Breadth first search ? (5)

(c) What are the main advantages in keeping the knowledge base separate from the control module in Knowledge-based systems ? (3)

P.T.O.

- (d) Describe the various problems associated with Hill climbing methods and explain them. (4)
2. (a) Write the joint distribution of  $x_1, x_2, x_3, x_4, x_5$  and  $x_6$  as a product of chain conditional probabilities for the following network : (3)
- 
- ```

graph TD
    x1[x1] --> x2[x2]
    x1[x1] --> x3[x3]
    x2[x2] --> x4[x4]
    x2[x2] --> x3[x3]
    x3[x3] --> x5[x5]
    x3[x3] --> x6[x6]
    x5[x5] --> x6[x6]
  
```
- (b) Express the sentences given below into conceptual dependency structure : (4)
- (i) Ram drove the car fast.
  - (ii) Rita gave Sita a bunch of flowers.
- (c) Draw a pictorial definition for the linguistic variable TALL giving your own subjective values for TALL variables and their values. (3)
3. (a) Write the output of the following LISP statements :
- (i) `cadadr '(a (b c) d)`
  - (ii) `reverse '(a (b c (d)) e f)`

(iii) member `c `(a (b (c )) d e)

(iv) (lessp 22 44 17 9 20) (4)

(b) Transform the following into CNF :

(i) P  $\vee$  ( $\neg$ P & Q & R)

(ii) ( $\neg$ P & Q)  $\vee$  (P &  $\neg$ Q) & S (3)

(c) Transform the following into DNF :

(i)  $\neg$ (P & Q) & (P  $\vee$  Q)

(ii) P  $\rightarrow$  ((Q & R)  $\leftrightarrow$  S) (3)

## SECTION - B

*(Attempt any 4 questions.)*

4. (a) Write a recursive LISP function to find the nth term of a Fibonacci series, where the number n is to be passed as an argument to a function. (4)

(b) Give the cons-cell representation of the following list :

(a ( b (c) (d (e) f ) g h) i ( j )) (6)

5. (a) Describe and give the state space representation for the water-jug problem. (2+3)

P.T.O.

(b) Transform the following into clausal form : (5)

$$\exists x \forall y (\forall z P(f(x), y, z) \rightarrow (\exists u Q(x, u) \& \exists v R(y, v)))$$

6. (a) How many types of non- deductive inference are there ? Explain. (4)

(b) Give an example of non-monotonic reasoning and describe it also. (3)

(c) Develop a parse tree for the sentence "Raja slept on the sofa". (3)

7. (a) How a problem is solved using Mean-Ends Analysis. Explain in your own words. (2)

(b) Draw a RTN (Recursive Transition Network) to implement the context Free Grammar of : "Jeetu walked on the roof" using the rules :

$$S \rightarrow NP VP$$

$$NP \rightarrow N \mid DET N$$

$$VP \rightarrow V PP \mid PREP PP$$

$$PP \rightarrow PREP NP$$

$$N \rightarrow Jeetu \mid roof$$

$$V \rightarrow walked$$

$$DET \rightarrow a \mid an \mid the$$

$$PREP \rightarrow on \mid at$$

(4)

- (c) Define the sentences  $S_1$ ,  $S_2$  and  $S_3$ .  $S_1 = P$ ,  $S_2 = Q$  and  $S_3 = P \rightarrow Q$ . Determine the probabilistic truth values of  $S_1$ ,  $S_2$  and  $S_3$  when it is known that probabilities of the possible worlds are given by  $P(W_1) = 1/4$ ,  $P(W_2) = 1/8$ ,  $P(W_3) = 1/8$  and  $P(W_4) = 1/2$ . (4)
8. (a) What do you understand by unification? Find the m.g.u. for the following set : (4)

$$S = \{P(f(x), g(y), a), P(f(x), Z, a), P(f(x), b, h(u))\}.$$

(b) Solve the given crypt arithmetic problem :

$$\begin{array}{r}
 \text{TWO} \\
 + \text{TWO} \\
 \hline
 \text{FOUR}
 \end{array} \quad (6)$$

9. Write short note on the following :

- (i) Uninformed Search
- (ii) Heuristic search
- (iii) Neural Network Architecture
- (iv) Resolution Principle (10)

(600)\*\*\*\*