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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**

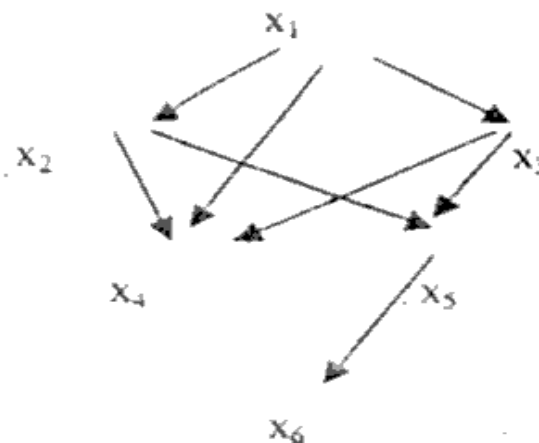
**(Compulsory)**

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)



(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 e) 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)  $P \vee (\sim P \& Q \& R)$

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

(c) Transform the following into DNF :

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

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

### SECTION – B

*(Attempt any 4 questions.)*

4. (a) Write a recursive LISP function to find the  $n$ th 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 | DET N

VP  $\rightarrow$  V PP | PREP PP

PP  $\rightarrow$  PREP NP

N  $\rightarrow$  Jeetu | roof

V  $\rightarrow$  walked

DET  $\rightarrow$  a | an | the

PREP  $\rightarrow$  on | 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)