

[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.*

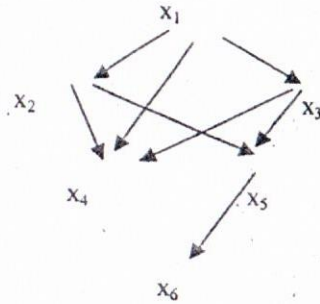
**SECTION – A**

**(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)



- (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)

- (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 → NP VP  
 NP → N | DET N  
 VP → V PP | PREP PP  
 PP → PREP NP  
 N → Jeetu | roof  
 V → walked  
 DET → a | an | the  
 PREP → 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)