This question paper contains 7 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **798**

Unique Paper Code : **234607** **G**

Name of the Paper : **Artificial Intelligence (CSHT-616) (ii)**

Name of the Course : **B.Sc. (H) Computer Science**

Semester : **VI**

Duration : **3 Hours** Maximum Marks : **75**

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

Question No. **1** is compulsory.

Attempt any *four* of Question Nos. **2** to **7**.

Parts of a question must be answered together.

Marks are indicated against each question.

1. (*a*) Write a short note on heuristic search. 2

(*b*) Explain significance of cut and fail predicates in PROLOG. Give *one* example each to illustrate their effect in a knowledge base. 4

(*c*) List out various steps for solving a problem using search state space strategy. 2

P.T.O.

(*d*) Define the term Artificial Intelligence. 2

(*e*) Compute the truth table of $(F \vee G) \& \neg (F \& G)$. 3

(*f*) Consider the following propositions, where :

- p means "Paola is happy",
- q means "Paola paints a picture",
- r means "Renzo is happy".

Formalize the following sentences using propositional logic :

(*i*) "if Paola is happy and paints a picture then Renzo isn't happy".

(*ii*) "if Paola is happy, then she paints a picture".

(*iii*) "Paola is happy only if she paints a picture". 3

(*g*) Define the following terms :

(*i*) State Space Search

(*ii*) Production Rules. 2×2=4

(h) Derive a parse tree for the sentence "Abhinav likes the cake", using the following rules : 4

S → NP VP

NP → N

NP → DET N

VP → V NP

DET → the

V → likes

N → Abhinav | cake

(i) Find the probability of the event A when it is known that some event B occurred. From experiments, it has been determined that P(B/A) = 0.84, P(A) = 0.2 and P(B) = 0.34. 3

(j) What should be the features related to good performance of a rational agent ? 4

(k) Write the conceptual graph and FOPL representation for the following sentences : 4

"Every aeroplane has wings."

P.T.O.

2. (*a*) Compare and contrast "Fully observable environment" and "Partially observable environment". 6

(*b*) Evaluate the statement $(\neg P \vee Q) \& R \rightarrow S \vee (\neg R \& Q)$ for the interpretation given below :

I_1 : P is true, Q is true, R is false, S is true. 4

3. (*a*) Explain the concept of backtracking in PROLOG with an example. 4

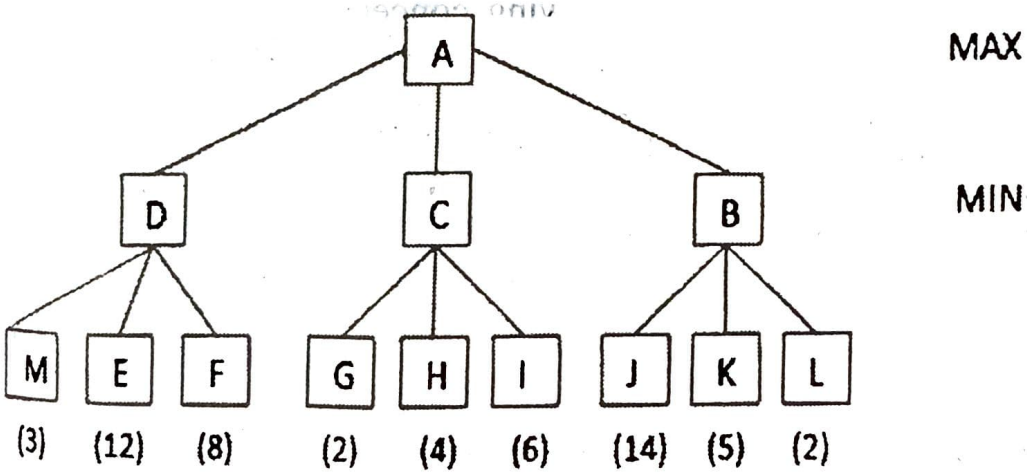
(*b*) Express the following concepts as an associative network structure with interconnected nodes and labeled arcs.

Company ABC is a software development company. Three departments within the company are Sales, Administration and Programming. Joe is the manager of Programming. Bill and Sue are programmers. Sue is married to Sam. Sam is editor for Prentice Hall. They have three children, and they live on Elm street. Sue wears glasses and is five feet four inches tall. 6

4. (*a*) What are the limitations of Hill Climbing search technique ? Explain. 4

(*b*) Explain the utility of alpha and beta cuts in Minimax problem. 4

(*c*) In the following two-ply game tree, the terminal nodes show the utility values computed by the utility function. Use the Minimax algorithm to compute the utility values for other nodes in the given game tree : 2



5. (*a*) Following is a knowledge base :

likes(George, food)

likes(George, wine)

likes(Browny, wine)

likes(Browny, George).

How do you add the following rules in the knowledge base ?

(*i*) Browny likes anything that George likes.

(*ii*) Browny likes anyone who likes wine. 6

(*b*) List out various problem characteristics that are generally helpful in the selection of an appropriate method. Analyze Simple Blocks problem in terms of these problem characteristics. 4

6. (*a*) Given the following :

(1) If x is on top of y, y supports x

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

(3) A cup is above a book

(4) A cup is touching a book.

(*i*) Write the above statements in FOPL. 2

(*ii*) Translate the above statements into clausal form. 2

(*iii*) Show that the predicate supports (book, cup) is true using resolution. 4

(b) Give an example of each of the types 1 and 2 Chomsky's hierarchy of grammars. 2

7. (a) What do you understand by non-monotonic reasoning ? Describe how truth maintenance system works for non-monotonic inference. 5

(b) Differentiate between deterministic and non-deterministic parsers. Illustrate the same by drawing their network. 5