

This question paper contains 4 printed pages]

Roll No.

--	--	--	--	--	--	--	--	--	--

S. No. of Question Paper : 1491

Unique Paper Code : 2341701

F-7

Name of the Paper : Artificial Intelligence

Name of the Course : B.Tech. Computer Science

Semester : VII

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* from Question Nos. 2 to 7.

Parts of a question must be answered together.

1. (a) Define an Agent, Agent Function and an Agent Program. 3
- (b) Differentiate between knowledge-based systems and expert systems. 4
- (c) Why is state space representation important ? 2
- (d) Is minimax procedure Depth-first or Breadth-first ? Justify your answer. 2
- (e) Is the following set unifiable ? If yes, obtain a most general unifier for it : 3

$$W = \{P(A, B, B), P(x, y, z)\}$$

- (f) Obtain Skolem standard form for the following : 3

$$E = \exists X \left(P(f(x)) \wedge Q(x, f(a)) \right)$$

P.T.O.

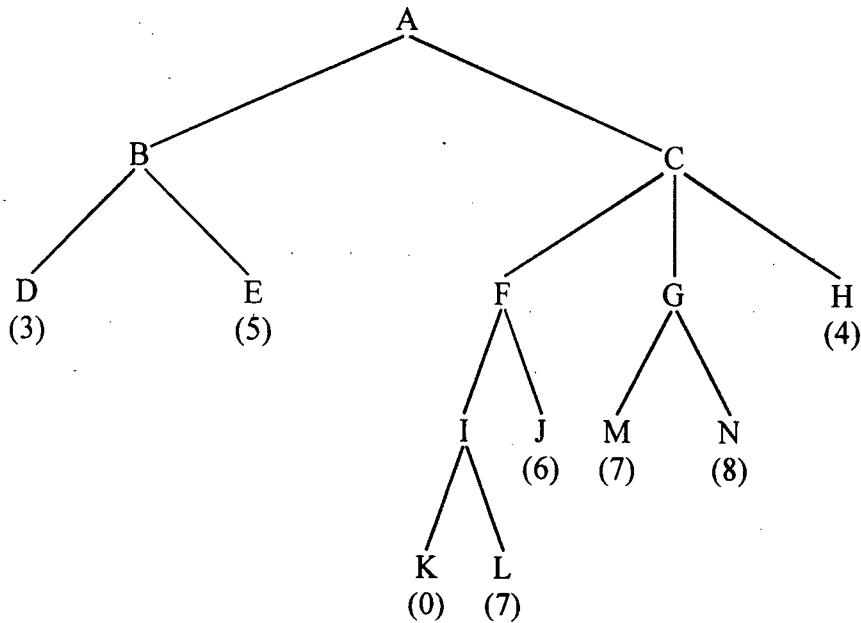
- (g) Explain utility function measure for an agent. 2
- (h) Discuss special cases of hill climbing : Local Maximum, Plateau and Ridge. 3
- (i) Express the following sentences as conceptual dependency structures : 6
- (i) Bill is a programmer
- (ii) Joe gave Sue a flower.
- (j) What are the main differences between scripts and frame structure ? 3
- (k) A 3-feet tall monkey is in a room, where some bananas are suspended from 8-feet high ceiling. The room contains two stackable, movable and climbable 3-feet high crates. Give the initial state, goal state, successor function and cost function for getting the bananas. 4
2. (a) Let h' denote the estimate of h (the actual cost of traversing from the current node to a final state node). Explain in what way the efficiency of A* algorithm and reaching of a goal state is affected if : 6
- (i) h' always underestimates h .
- (ii) h' always overestimates h .
- (b) Consider a state space where the start space is number 1, and the successor function for a state n returns two states numbered $2n$ and $2n + 1$: 4
- (i) Draw the portion of state space for states 1 to 15.
- (ii) Suppose the goal state is 11. List the order in which nodes will be visited for breadth — first search.
3. (a) Explain Cut, Fail and Cut-fail statements in PROLOG. 6
- (b) Write a PROLOG program to find GCD of two numbers. 4

4. (a) Explain Turing Test approach to AI. How is Turing Test approach different from Rational Agent approach ? 6
- (b) Develop PEAS description of the task environment for — Internet book-shopping agent. 4
5. (a) Using constraint satisfaction algorithm, solve the following crypt arithmetic problem : 6

$$\begin{array}{r}
 \text{O D D} \\
 + \text{O D D} \\
 \hline
 \text{E V E N} \\
 \hline
 \end{array}$$

- (b) A game tree is as follows :

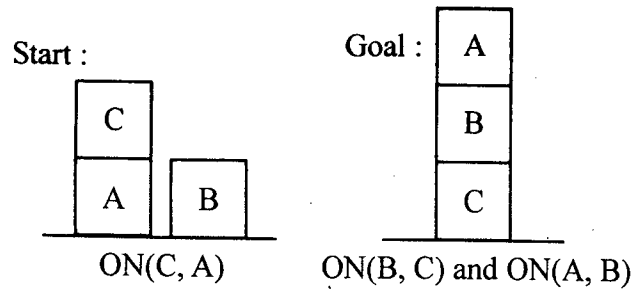
.4



Which nodes would not be examined using alpha-beta pruning procedure ? Write a stepwise explanation.

6. (a) Discuss the differences and similarities between problem solving and planning. 5

- (b) Consider the following block world problem and solve it using goal stack planning : 5



7. (a) Consider the following piece of knowledge : 6

Some patients like all doctors.

No patient like any quack.

- (i) Represent this knowledge as predicate statements.
- (ii) Prove the query “no doctor is a quack” is correct, using resolution method.
- (b) Derive a parse tree for the sentence “Mary slept on the chair” using the following rules : 4

$S \rightarrow NP VP$

$NP \rightarrow N$

$NP \rightarrow DET N$

$VP \rightarrow V PP$

$PP \rightarrow PERT NP$

$N \rightarrow \text{Mary/Chair}$

$V \rightarrow \text{Slept}$

$DET \rightarrow \text{the}$

$PERP \rightarrow \text{on}$