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Paper Code : CS-703C

ARTIFICIAL INTELLIGENCE

Time Allotted : 3 Hours   *Full Marks : 70*

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :   10 × 1 = 10

i) Frame is a collection of

   a) Slots
   b) Filler
   c) Resolution
   d) Knowledge.

ii) A Baysian network is a

   a) tree
   b) directed graph
   c) undirected graph
   d) none of these.

iii) Horn clause is a clause with .... positive literals

   a) at most one
   b) at most two
   c) at least one
   d) at most four.

iv) An algorithm that gives optimal solution is

   a) Hill climbing
   b) BFS
   c) Blind search
   d) A*.

v) Agents are

   a) autonomous
   b) adaptive
   c) both (a) and (b)
   d) none of these.

vi) Uninformed search is also known as

   a) brute force search
   b) hill climbing search
   c) worst case search
   d) blind search.

vii) The process of eliminating existential quantifiers is known as

   a) Resolution
   b) Skolemisation
   c) Unification
   d) none of these.

viii) The rule used to change weight in Neural Network (NN) is

   a) Kirchoff's rule
   b) Hebb's rule
   c) Boehm's rule
   d) none of these.

ix) Inheritable knowledge is best represented by

a) semantic net
b) FOPL
c) database
d) none of these.

x) MYCIN is an example of

a) expert system
b) knowledge base
c) conceptual graph
d) semantic net.

xi) Minimax algorithm search process obeys

a) Breadth first search fashion
b) Depth first search fashion
c) Best first search fashion
d) Blind search fashion.

xii) Depth first search procedure uses

a) AND graph
b) OR graph
c) AND-OR graph
d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Write a program in PROLOG or LISP to find GCD of N number.

3. What is an agent in AI ? What are the types of agent ? Discuss about environment for agent. $1 + 2 + 2$

4. What is blind search technique ? Explain with examples.

5. What is tautology ? Prove that $(((P \rightarrow Q) \rightarrow P) \rightarrow P)$ is a tautology. What are Modus Ponens and Modus Tollens ? $1 + 2 + 2$

6. What do you mean by natural language processing (NLP) ? What is parsing in NLP ? What are the types of parsing ? Draw the parsed tree of the sentence "The white dog crossed the road". $1 + 1 + 1 + 2$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Is BFS identical to uniform cost search ? Justify your answer.

b) Show that if a heuristic is consistent then f(n) is monotonically non decreasing along any path.

c) Consider the following arrangement and solve the problem using A* search. Define the State space, write the operations, define the heuristic and also find whether this heuristic is admissible or not. Also show the solution.
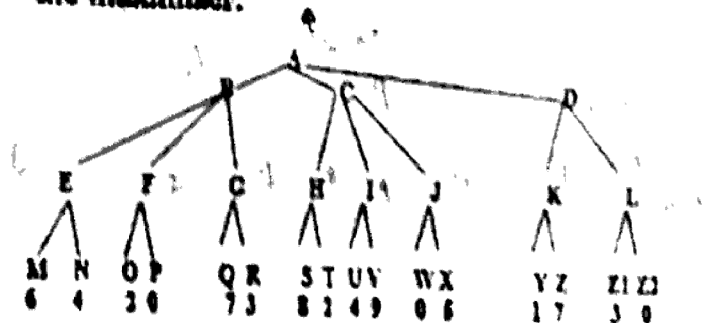
Initial State :

2	8	3
1	6	4
7		5

Final State :

1	2	3
8		4
7	6	5

2 + 3 + 10

8. a) Consider the following game tree where the evaluation function values for winning is given at leaf nodes. Assume that the game tree is opened by the maximizer.

i) Applying minimax algorithm determine which nodes the maximizer and minimizer would select in their turns.

ii) How many nodes will be pruned using alpha-beta pruning ?

b) Describe the fuzzy set operations like : union, intersection and complement.

c) What is clause ?

(5 + 6) + 3 + 1

9. a) Write the advantages of Genetic algorithm.

b) Describe goal based agent system.

c) What do you mean by a table driven agent ? What is the problem of this agent ?

d) Briefly discuss combinatorial explosion.

3 + 4 + (2 + 1) + 5

10. a) Is uniform cost search a special case of Best First Search ? Justify your answer.

b) Describe local beam search. makaut.com

c) Three missionaries and three cannibals are standing at the left bank of a river. There is a boat having a capacity of taking two people and it can be driven by a missionary or a cannibal. If the number of missionaries is less than the number of cannibals at any bank, then cannibal will eat missionary. How is it possible for all the missionaries and cannibals to cross the river so

that no missionary is getting eaten ? Describe the state space of the problem. Describe the production rules for solving the problem. Show one solution of the problem.   2 + 3 + 10

11. a) Prove that P V ~P is a Tautology.

   b) What is contradiction ?

   c) Represent the following sentences using Predicate logic or using FOPL or find the wffs of the following sentences and draw the conclusion as required :

   (i) X is an Indian, (ii) Y is an Indian, (iii) X is a leader, (iv) Every Indian is a man, (v) Every one is loyal to someone, (vi) Every man is either loyal to a leader or hate a leader, (vii) Man tries to assassinate a leader if he is not loyal to him, (viii) Y assassinated X.

   Now conclude that Y hated X.   2 + 1 + 12