Printed Pages : 2 **Roll No.** | | | | | | | | | | | **NMCA413**

M.C.A.

THEORY EXAMINATION (SEM–IV) 2016-17

ARTIFICIAL INTELLIGENCE

Time : 3 Hours ***Max. Marks : 100***

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Explain the following: **10 x 2 = 20**

(a) Name the elements of an agent.

(b) Summarize the factors that make up rationality.

(c) What do you infer from hill-climbing search algorithm?

(d) Compare propositional logic and predicate logic

(e) Justify the usage of universal and existential quantifier with an example.

(f) Give the heuristic function for shortest path problem.

(g) Which algorithm is more similar to backward chaining algorithm? Write its algorithm.

(h) What do you mean by hybrid Bayesian network?

(i) Which value is assigned to alpha and beta in the alpha-beta pruning?

(j) List few decision tree algorithms.

SECTION – B

2. Attempt any five of the following questions: **5 x 10 = 50**

(a) Discuss the structure of an intelligent agent. Give an example.

(b) Compare the uninformed and informed search strategies with respect to all factors.

(c) Solve the 8- puzzle problem using Hill climbing. Write down the heuristic function.

Initial state

1	2	3
8	6	5
7	4	

Goal state

1	2	3
4	5	6
7	8	

(d) The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American. Prove that Col. West is criminal by forward and backward chaining.

(e) Assume two players, min and max, play nim (as described above). Min plays first. If a terminal state in the search tree developed above is a win for min, a utility function of zero is assigned to that state. A utility function of 1 is assigned to a state if max wins the game. Apply the minimax algorithm to the search tree to assign utility functions to all states in the search tree.

(f) Consider the following data set

Feature 1	Feature 2	Feature 3	Class
0	0	0	0
1	0	1	1
1	0	0	0
1	1	1	1
0	1	1	1
0	1	1	0

Assume the test pattern as feature 1 as 0 , feature 2 as 0 and feature 3 as 1 , classify the pattern using NNC and Bayes classifier.

(g) Write down the evaluation procedure of HMM.

(h) How a k-means Clustering algorithm works? Give an example.

SECTION – C

Attempt any two of the following questions: **2 x 15 = 30**

3. **(a)** Represent the following sentences in first-order logic, using a consistent vocabulary (which you must define):

(i) Not all students take both History and Biology.

(ii) Only one student failed History.

(iii) Only one student failed both History and Biology.

(iv) The best score in History was better than the best score in Biology.

(v) Every person who dislikes all vegetarians is smart.

(vi) No person likes a smart vegetarian.

(vii) There is a woman who likes all men who are not vegetarians.

(viii) There is a barber who shaves all men in town who do not shave themselves.

(ix) No person likes a professor unless the professor is smart.

(x) Politicians can fool some of the people all of the time, and they can fool all of the people some of the time, but they can't fool all of the people all of the time.

(b) (i) Give a predicate calculus sentence such that every world in which it is true contains exactly one object.

(ii) Represent the sentence "All Germans speak the same languages" in predicate calculus. Use *Speaks(x, l)*, meaning that person *x* speaks language *l*.

4. Write in detail about the decision trees and decision lists with an example.

5. How parameter estimation is done? Explain with an example.