MCA
(SEM III) THEORY EXAMINATION 2021-22
ARTIFICIAL INTELLIGENCE

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A 1. Attempt *all* questions in brief. 2 x 10 = 20

a. Define the terms – weak artificial intelligence and strong artificial intelligence.
b. What is natural language processing?
c. Explain AND-OR graph.
d. Differentiate between simple hill climbing and steepest ascent hill climbing algorithms.
e. Justify the usage of universal and existential quantifier with an example.
f. Compare propositional logic and predicate logic
g. Explain naïve bayes classifier.
h. What are statistical learning models.
i. Write short note on Support Vector Machine (SVM)
j. What does a Bayesian network represent?

SECTION B 2. Attempt any *three* of the following: 10 x 3 = 30

a. What is PEAS description of the task environment for "Internet shopping agent".
b. Describe alpha-beta pruning and give the other modifications to Min-Max procedure to improve its performance?
c. Write the steps for converting FOPL into CNF.
d. What is machine learning? Differentiate between supervised, unsupervised and reinforcement learning.
e. Design principles of pattern recognition system. Explain Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA).

SECTION C 3. Attempt any *one* part of the following: 10 x 1 = 10

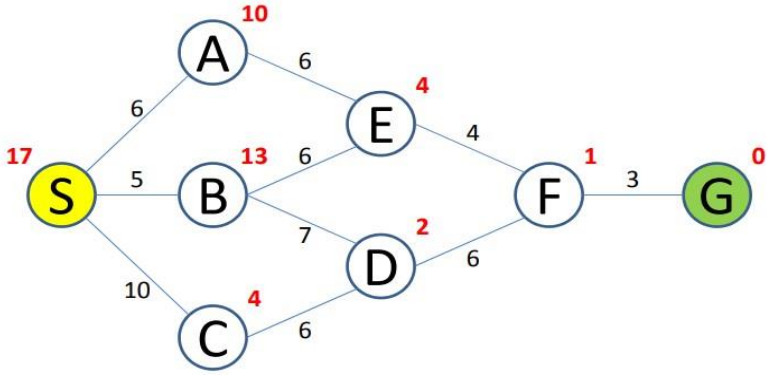
(a) Describe intelligent agents in terms of Precepts, Actions, Goals and Environment with suitable block diagram and example.

(b) Differentiate between goal-based agent and utility-based intelligent agents with the help of block diagram?

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Identify the difference between forward and backward chaining? Given the knowledge base as: P, P→Q, Q→R. Infer R by using forward and backward chaining?

(b) Explain the A* Algorithm on the following figure. Explicitly write down the queue at each step and find the path till goal state.



5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Convert the following sentence into predicate logic and then prove "Was Marcus loyal to Caesar? using resolution:

1. Marcus was a man.
2. Marcus was a Pompeian.
3. All Pompeian's were Romans.
4. Caesar was a ruler.
5. All Romans were either loyal to Caesar or hated him.
6. Everyone is loyal to someone.
7. People only try to assassinate rulers they are not loyal to.
8. Marcus tried to assassinate Caesar.

(b) Distinguish between Markov model and Hidden Markov Model (HMM) in probabilistic reasoning?

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Describe the decision tree-learning model by choosing a suitable example? Discuss the issues related to the applications of decision tree

(b) Explain the expectation and maximization (EM) algorithm for finding the maximum likelihood with hidden variables

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) To which category of clustering schemes does the k-means algorithm belong? What is its major advantage? Which are the factors that influence the computation duration of this algorithm

(b) Show, how classification is done by k-nearest neighbours. Construct KNN classification algorithms on the following dataset and predict the class for X (p1=4, p2=6). Given k=3.

P1	P2	Class
6	5	False
7	7	False
3	5	True
2	4	True