Master of Computer Applications
MCAE-506: Artificial Intelligence
Unique Paper Code: 223402506
Semester V
Nov-Dec 2022
Year of admission: 2020

Time: Three Hours **Max. Marks: 70**

Note:

1. Attempt all Questions.
2. All Questions contain equal marks.
3. Parts of the same question should be answered together.

1. For each of the following assertions, state whether it is true or false. Support your answer with examples or counterexamples where appropriate.

   (a) An agent that senses only partial information about the state cannot be perfectly rational.

   (b) There exist task environments in which no pure reflex agent can behave rationally.

   (c) There exists a task environment in which every agent is rational.

   (d) The input to an agent program is the same as the input to the agent function.

   (e) Every agent is rational in an unobservable environment.

2. (a) Write a program that will take as input two Web page URLs and find a path of links from one to the other. What is an appropriate search strategy? Is bidirectional search a good idea? Could a search engine be used to implement a predecessor function?

   (b) Select the next move for MAX player using minimax (putting an X) for the following state of the Tic-Tac-Toe game. Give systematic explanation of your answer.

	O	O
	X	
X		

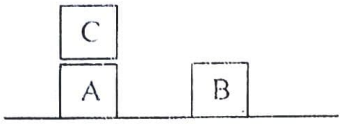
3. Consider the following sentence:
   $[(\text{Food} \Rightarrow \text{Party}) \vee (\text{Drinks} \Rightarrow \text{Party})] \Rightarrow [(\text{Food} \wedge \text{Drinks}) \Rightarrow \text{Party}]$.

   (a) Determine, using enumeration (truth table), whether this sentence is valid, satisfiable (but not valid), or unsatisfiable.

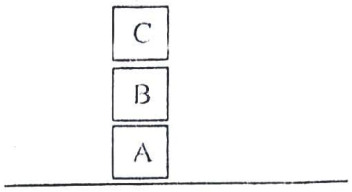
   (b) Convert the left-hand and right-hand sides of the main implication into CNF, showing each step, and prove your answer to (a) using resolution.

4. (a) What do you mean by Planning? List various components of a Planning system. Describe the differences and similarities between problem solving and planning.

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



Start: ON(C, A) ∧
ONTABLE (A) ∧
ONTABLE (B) ∧
ARMEMPTY



goal: ON (B, A) ∧
ON (C, B)

5. (a) Describe various types of knowledge representation techniques with the help of an example for each representation.

(b) What is an Expert System? Distinguish between a Knowledge based System and an Expert System? Describe the various conflict resolution strategies in Rule Based Expert Systems.

6. (a) What is the difference between Stemming and Lemmatization? Explain with the help of an example.

(b) Explain the TF-IDF algorithm and how it conquers the drawbacks of the Bag-of-Word algorithm.

(c) Build a summary consisting of three sentences for the following text using extractive text summarization by arranging its sentences in their decreasing order of importance. The importance of a sentence is calculated by adding the normalized frequency of each word (except stopwords) of the sentence.

Artificial Intelligence is human like intelligence. It is the study of intelligent artificial agents. Science and engineering to produce intelligent machines. Solve problems and have intelligence. Related to intelligent behavior. Development of reasoning machines. Learn from mistakes and successes. Artificial Intelligence is related to reasoning in everyday situations.

7. Differentiate between the following

(a) Breadth first search and Best first search

(b) Substitution and Unification

(c) Goal based agent and Utility based agent

(d) Goal-stack planning and Partial-order planning