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Total No. of Questions : 09

B.Tech. (ECE) (Sem.-7)

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Subject Code : BTEC-909D-18

M.Code : 90686

Date of Examination : 30-11-2023

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) What is the foundational goal of Artificial Intelligence (AI)?
- b) Define the term "intelligent agent" in the context of AI.
- c) Define the concept of "good behavior" in intelligent agents.
- d) How does boolean algebra contribute to AI problem-solving?
- e) What are expert systems and how do they mimic human expertise?
- f) Describe briefly the process of color selection in AI applications.
- g) What is problem-solving in AI, and how do algorithms contribute to it?
- h) Discuss briefly the importance of searching in AI algorithms.
- i) What is knowledge representation and why are they essential in AI?
- j) Write the application of AI in the context of an "internet shopping world."

SECTION-B

2. You are building a search algorithm to find the shortest path between two points on a grid. The grid is represented as a 2D array, where each cell can be either empty (0) or blocked (1). Implement a Breadth-First Search (BFS) algorithm to find the shortest path from the top-left corner to the bottom-right corner, considering that you can only move horizontally or vertically.
3. Explain the bias-variance tradeoff in machine learning. How does increasing model complexity affect bias and variance? How does this tradeoff impact a model's generalization performance?
4. Define Explainable AI (XAI) and its significance. Why is it important for AI models to provide explanations for their decisions, especially in critical applications like healthcare and finance?
5. Differentiate between supervised and unsupervised learning. Provide examples of tasks that fall under each category. Explain the challenges associated with unsupervised learning.
6. Describe the concept of semantic networks in knowledge representation. How do nodes and arcs represent entities and relationships? Provide an example of a semantic network for representing relationships in a family tree.

SECTION-C

7. You are using k-means clustering to group data points into two clusters. Given the following data points in a 1D space: [2, 3, 7, 9, 12, 15], initialize the centroids at 4 and 10 and perform two iterations of the k-means algorithm. Show the updated centroids and cluster assignments after each iteration.
8. Define ontologies in the context of knowledge representation. How do ontologies help capture domain-specific knowledge and relationships? Provide an example of an ontology used in a specific field, such as medicine or geography.
9. Explain the concept of a pattern database heuristic in solving combinatorial problems. How are pattern databases precomputed and how do they help accelerate the search process? Provide an example scenario where a pattern database heuristic is applied.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.