BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-DS-2021/B.Tech.(CSE)-DS-2022
Course Name – Artificial Intelligence
Course Code - PEC-CSD501B
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the goal of Artificial Intelligence.
a) To solve artificial problems
b) To extract scientific causes
c) To explain various sorts of intelligence
d) To solve real-world problems

(ii) Select a characteristic of intelligent agents in AI.
a) Learning and adapting from experiences.
b) Following pre-defined rules without adaptation.
c) Processing data in a sequential manner.
d) Conducting tasks without any programming.

(iii) Select a fundamental concept in AI related to problem-solving.
a) Search algorithms and heuristics.
b) Data storage and retrieval.
c) Basic arithmetic operations.
d) Data visualization techniques.

(iv) Choose a significant application of AI in real-world scenarios.
a) Natural language processing for automated translations.
b) Spreadsheet management and data organization.
c) Basic image editing and enhancement.
d) Web browsing and information retrieval.

(v) Choose a characteristic that distinguishes strong AI from narrow AI.
a) Generalized understanding and reasoning across domains.
b) Specialized performance in a specific task or domain.
c) Reliance on human intervention for decision-making.
d) Low computational resource requirements.

(vi) Identify a characteristic of Breadth-First Search (BFS).
a) Complete
b) Optimal
c) Admissible
d) Heuristic

(vii) Predict an advantage of Depth-First Search (DFS).

a) Less memory usage b) Complete
c) Optimal d) Admissible

(viii) Predict a characteristic of Depth-First Search (DFS).

a) Non-optimal b) Complete
c) Admissible d) Heuristic

(ix) Identify a suitable problem of Uniform-Cost Search (UCS).

a) Shortest path problem b) Puzzle solving
c) Route planning d) Maze traversal

(x) Identify a characteristic of Depth-Limited Search (DLS).

a) Incomplete b) Optimal
c) Heuristic d) Memory-efficient

(xi) Choose an appropriate application of the A* algorithm.

a) GPS systems b) Sorting
c) Data Compression d) Image Processing

(xii) Choose the algorithm that does not guarantee optimality.

a) Greedy Best-First Search b) A* Algorithm
c) Dijkstra's Algorithm d) Uniform-Cost Search

(xiii) Predict a characteristic of the A* algorithm.

a) Admissible heuristic b) Completeness
c) Optimality d) Memory efficiency

(xiv) Choose the heuristic that is useful for solving the 8-puzzle problem.

a) Hamming Distance b) Manhattan Distance
c) Chebyshev Distance d) Euclidean Distance

(xv) Predict an advantage of using the Euclidean distance heuristic.

a) Optimality b) Admissibility
c) Heuristic accuracy d) Memory usage

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define State Search Space and list down its components. (3)
3. Define Turing Test (3)
4. Consider a grid-based pathfinding problem if an agent starts at the top-left corner of an N x N grid and needs to reach the bottom-right corner. The agent can move in four possible directions: up, down, left, or right. Some cells in the grid are blocked, and the agent cannot pass through these cells. The grid is represented as a 2D array where 0 indicates an open cell, and 1 indicates a blocked cell. You are tasked with implementing both Breadth-First Search (BFS) and Depth-First Search (DFS) to find the shortest path from the top-left corner to the bottom-right corner. If no such path exists, the algorithm should return "No Path". Grid = [[0, 1, 0, 0, 0], [0, 1, 0, 1, 0], [0, 0, 0, 1, 0], [1, 1, 0, 0, 0], [0, 0, 0, 1, 0]] Implement both DFS and BFS and find the path to reach the endpoint of the grid i.e., from (0,0) -> (N-1, N-1). (3)
5. List the components of a problem and define problem solving agent. (3)
6. Write about the similarities and differences between forward and backward chaining. (3)

OR

Write about the basic structure of a PROLOG program. (3)

Group-C

5 x 6=30

(Long Answer Type Questions)

7. Explain the role of problem formulation in AI and its impact on the solution process. (5)
8. Develop a structured approach to formulate real-world problems for AI. (5)
9. Explain the concept of propositional logic and its importance in artificial intelligence. (5)
10. Express the Perceptron Learning Rule and elucidate its fundamental role in training a single-layer perceptron in neural networks. (5)
11. Compare the characteristics and capabilities of single-layer neural networks with multi-layer neural networks in artificial intelligence. (5)
12. **A card is lost from a pack of 52 cards. From the remaining cards two are drawn randomly and found to be both clubs. Find the probability that the lost card is also a clubs.** (5)

OR

There are three urns, each containing both white and black balls. The first urn contains 3 white and 2 black balls, the second urn contains 2 white and 3 black balls, and the third urn contains 4 white and 1 black ball. One urn is selected at random, and then a ball is randomly drawn from the chosen urn. Given that the drawn ball is white, evaluate the probability that it came from the third urn. (5)

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