Reg. No.															

B.Tech/ M.Tech (Integrated) DEGREE EXAMINATION, MAY 2024
Fourth Semester

21CSC206T – ARTIFICIAL INTELLIGENCE
(For the candidates admitted from the academic year 2022-2023 onwards)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours Max. Marks: 75

PART – A (20 × 1 = 20Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
1. Which of the following is not an application of artificial intelligence? (A) Database management system (B) Computer vision (C) Natural language processing (D) Digital assistants	1	1	1	1
2. In the context of AI problem formulation, what does the term "State Space" refer to? (A) The physical space where AI algorithms operate (B) The set of all possible states the problem can be in (C) The memory space allocated for AI programs (D) The space complexity of the AI solution	1	2	1	1
3. In a game of tic-tac-toe, the player who goes first (X) makes optimal moves, and the player who goes second (O) also makes optimal moves. Assuming both players play perfectly, what is the outcome of a standard 3×3 tic-tac-toe game? (A) X wins (B) O wins (C) It's a draw (D) Depends on the specific moves made	1	3	1	2
4. A self-driving car needs to navigate through a city while avoiding obstacles and following traffic rules. Which AI approach is most suitable for training the car to make decisions in real-time based on its environment. (A) Supervised learning (B) Unsupervised learning (C) Reinforcement learning (D) Ensemble learning	1	3	1	2
5. The post order traversal of a binary tree is 8, 9, 6, 7, 4, 5, 2, 3, 1. The inorder traversal of the same tree is 8, 6, 9, 4, 7, 2, 5, 1, 3. The height of a tree is the length of the longest path from the root to any leaf, the height of the tree is _____. (A) 2 (B) 5 (C) 3 (D) 4	1	3	2	2
6. In uniform cost search, what happens if two paths have the same cost to reach a node? (A) One of them is randomly chosen (B) Both paths are explored simultaneously (C) The first path encountered is chosen (D) The last path encountered is chosen	1	3	2	2

7. The goal of any search algorithm is to achieve the _____. 1 2 2 1

(A) Initial state (B) Intermediate state
(C) Goal state (D) State space

8. Generate and test search is a heuristic search technique based on _____. 1 1 2 1

(A) Best first search with backtracking (B) Depth first search with backtracking
(C) Iterative deepening search (D) Depth limited search

9. What is the significance of the beta value in alpha-beta pruning? 1 2 3 2

(A) The highest score found so far for the maximizing player (B) The maximum depth of the search
(C) The current node being evaluated in the game tree (D) The lowest score found so far for the minimizing player

10. Consider the problem of preparing a schedule for a class of students. What type of problem is this? 1 2 3 2

(A) Search problem (B) Constraint satisfaction problem
(C) Backtrack problem (D) Planning problem

11. In a distributed intelligent agent system, what does dynamic discovery and registration facilitate? 1 2 3 2

(A) Lack of communication between agents (B) Static interactions
(C) Dynamic interactions and collaborations (D) Independence from other agents

12. In a scenario with low observability, what technology could be particularly useful for enhancing an agent's understanding of the environment? 1 2 3 1

(A) Sensor fusion (B) Machine learning algorithms
(C) Communication networks (D) Predictive modelling

13. A knowledge representation system should have which of the following properties.

(i) Representation adequacy (ii) Inferential adequacy (iii) Inferential efficiency

(A) (i) and (ii) only (B) (ii) and (iii) only
(C) (i) and (iii) only (D) All (i), (ii) and (iii)

14. The statement "$P \wedge Q \rightarrow R$" is equivalent to: 1 2 4 2

(A) $P \wedge (Q \rightarrow R)$ (B) $(P \wedge Q) \rightarrow R$
(C) $P \rightarrow (Q \wedge R)$ (D) $(P \rightarrow Q) \wedge R$

15. In uncertain reasoning, what does the term "belief revision" refer to? 1 1 4 1

(A) Modifying existing knowledge based on new evidence (B) Completely discarding uncertain information
(C) Ignoring conflicting data (D) Using only certain information for decision making

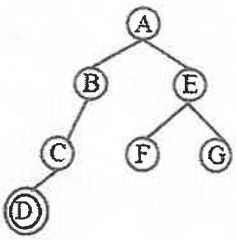
16. Which of the following is not an example of the system that uses semantic nets? 1 1 4 1

(A) Wordnet (B) Concept net
(C) Control net (D) Gellish model

17.	In machine learning, what does unsupervised learning focus on? (A) Predicting an output variable from input variables (B) Learning patterns without label training data (C) Mimicking human decision making (D) Training models with explicit instructions	1	1	5	1
18.	What is the architecture of an expert system primarily concerned with? (A) Identifying planning problems (B) Designing machine learning models (C) Replicating human expertise in a specific domain (D) Create virtual words for problem solving	1	1	5	1
19.	What characterizes a simple planning agent in artificial intelligence? (A) Complex decision making algorithms (B) The ability to predict future events (C) Advanced natural language processing capabilities (D) Basic reactive responses to the environment	1	1	5	1
20.	How does a planning agent exhibit goal-directed behavior? (A) Randomly selecting actions (B) Adapting to changes in the environment (C) Achieving specific objectives over time (D) Reacting impulsively to stimuli	1	2	5	1

PART – B (5 × 8 = 40 Marks)
Answer **ALL** Questions

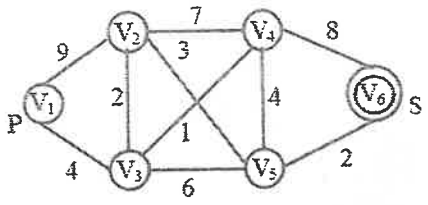
		Marks	BL	CO	PO
21. a.	Imagine you are tasked with designing an AI system for an autonomous delivery robot in a busy urban environment. The goal is to optimize the robot's route for efficient package delivery while considering factors like traffic, pedestrian safety and delivery time windows. Formulate the problem by identifying key components and considerations for the successful implementation of this AI solution.	8	4	1	2
	(OR)				
b.	Apply the problem characteristics and identify the problem type for the given scenario along with appropriate explanation. (i) Solving the equation $\int X^2+3x+\sin 2x \cos 2x \, dx$ (ii) Backtracking (iii) Tracking the mobility of an animal in the forest (iv) Ambiguity in a sentence EG: Chicken is ready to eat	8	4	1	2
22. a.	Consider the given graph and find the route to traverse from node A to destination D using breadth first search technique. Elucidate each step in detail with necessary sketch.	8	3	2	2



(OR)

b.	You are developing a warehouse management system that uses robots to move items around the warehouse. The warehouse is represented as a grid, where each cell represents a location that the robot can occupy. Some cells are obstacles that the robot cannot pass through. How would you implement path finding for the robots using the A^* algorithm?	8	3	2	3
23. a.	Imagine you are playing a two-player game with a relatively large game tree. Explain how alpha-beta pruning helps in reducing the number of nodes explored during the minimax search and why it is more efficient than the basic minimax algorithm.	8	3	3	2
	(OR)				
b.	Explain how the adaptive behavior and robustness influence the flexibility of the intelligent agent in a diversified environment.	8	3	3	2
24. a.	The agent enters a 5×5 grid Wumpus world. It senses a stench in squares (2,1) and (4,3), and a breeze in squares (1,3) and (3,4). Additionally, it observes glitter in square (5,4). What are the possible locations of the Wumpus and pits, and how should the agent proceed to safely reach the gold?	8	4	4	3
	(OR)				
b.	Discuss the challenges associated with applying uncertain knowledge and reasoning methods to simple decision-making in AI. How can these challenges be mitigated?	8	4	4	3
25. a.	Describe how mean ends analysis can be applied to solve complex scenarios in the blocks world.	8	4	5	3
	(OR)				
b.	Elaborate the types of learning models used in machine learning and their relevance in AI applications.	8	4	5	3

		Marks	BL	CO	PO
	PART – C (1 × 15 = 15 Marks) Answer **ANY ONE** Question				
26.	There are three missionaries (M) and three cannibals (C) on one side of a river. They need to cross to the other side using a boat that can carry at most two people. If the number of missionaries ever becomes less than the number of cannibals on either side of the river, the cannibals will eat the missionaries. Determine the sequence of trips to safely transport everyone to the other side.	15	4	1	3
27.	Given a weighted graph, a source node and a destination node. The task is to find the shortest path from the source node (P) to the destination node (S) using uniform cost search.	15	3	2	2



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