



VIT

Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

REG.NO.:

SLOT: C1

Programme Name & Branch : B.Tech. (CSE and Business systems]
Course Code and Course Name : CBS3004 Artificial Intelligence
Faculty Name(s) : Dr. S. Margret Anouncia (10093)
Class Number(s) : VL2024250107570
Date of Examination : 15/10/2024
Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

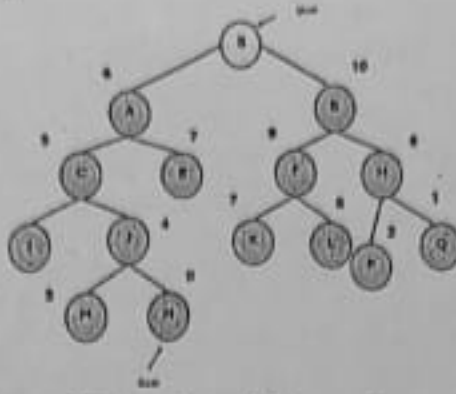
- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
 - CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.
 - CO4: Analyse and illustrate how search algorithms and planning play vital role in problem solving.

Q. No	Question	M	CO	BL
1.	a. Determine the solution path for the given AND - OR graph using AO* procedure [5 Marks] b. Out of A* and AO* procedure, which one guarantees optimal solution always? Why? [1 Mark] c. Fill up the blanks with right characteristics of the heuristic search methods [4 Marks] I. In A* The heuristic $h(n)$ must be _____ to guarantee optimality. II. A* uses a _____ data structure to keep track of the nodes that need to be evaluated. III. The cost of an AND node in AO* is defined as the _____ of the costs of its children. IV. IDA* combines the benefits of _____ and _____ search	10	4	3





2. a. Apply the concept of Local beam search with beam value = 2 for the given graph to explore multiple paths simultaneously to find a good solution more efficiently. [6 Marks]



- b. Given the characteristics of Simulated Annealing, Hill Climbing, and Local Beam Search, match each characteristic to the appropriate local search algorithm. [4 Marks]

- It can escape local optima by accepting worse solutions temporarily.
- It maintains multiple states and selects the best among them.
- It only explores neighbouring solutions without backtracking.
- It utilizes a temperature parameter that decreases over time.
- It can get stuck in local optima due to its greedy nature.
- It produces new candidates by combining multiple states.
- It can handle multiple paths simultaneously and is more robust against local optima compared to simple hill climbing.
- It can be used in very large-scale integration (VLSI) of electronics components.

3. You are planning to arrange a birthday party and assign a reasonable seating arrangements for 7 guests: Alisha, Bakht, Chetan, Dileep, Disha, Eega, and Fred. They sit on a single round table in a circle, with everybody have two neighbours.

However, there are certain constraints you need to consider:

- Alisha cannot sit next to Bakht.
- Bakht cannot sit next to Chetan.
- Chetan cannot sit next to Dileep or Disha or Eega.
- Dileep cannot sit next to Disha or Eega.
- Fred cannot sit next to Alisha or Bakht.

Assume that Alisha sits in chair 1, the other chairs are numbered 2-7.

- a. Perform a backtracking search, exploring the search space in alphabetical order of guest names, and prioritize lower-numbered seats when multiple valid options are available. [7 Marks]

- b. In the seating arrangement for the birthday party, if Chetan is assigned to chair 2, then Dileep cannot be assigned to chair _____. [1 Mark]





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(Deemed to be University under section 3 of UGC Act, 1956)

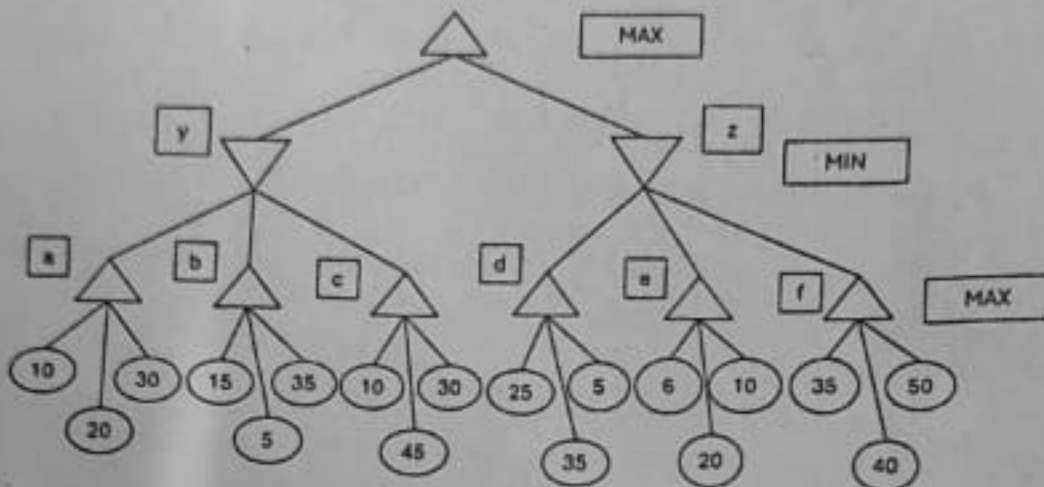
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- c. In the birthday party seating arrangement problem, consider the constraint that Chetan cannot sit next to Dileep. If the current assignments are as follows:
Chair 1: Alisha (A); Chair 2: Chetan (C); Chair 3: Dileep (D)
Based on arc consistency, can we conclude that the assignment of Chetan in chair 2 is valid? Justify your answer. [2 Marks]

4. a. Consider the given game tree, Apply the minimax algorithm to identify the optimal strategy for both players. Specify the chosen actions and their corresponding values. [6 Marks]



10 4 4

- b. Reconstruct the graph by reordering the nodes to get maximal pruning when using the alpha-beta algorithm. [4 Marks]

5. a. Consider the given paragraph and create a semantic Network representation of the content.

By 2024, the cutting-edge technology of artificial intelligence (AI) will revolutionize various fields. With advances in natural language processing computer vision and automation Natural language processing (NLP) has been improved with models that show a deeper understanding of context. Helps humans become more suitable. -Computer interaction Computer vision technology uses complex algorithms for real-time object detection and facial recognition. Transforming industries like security and healthcare automatic system Autonomous vehicles and drones It is equipped with advanced machine learning algorithms to provide more secure communications and improve decision-making in dynamic environments. F AI is increasingly integrated with edge computing, reducing latency, and increase data processing efficiency by processing closer to the data source. This integration facilitates the development of AI-based smart IoT devices for predictive maintenance and energy management. Overall, these technologies represent a major leap forward in AI's ability to improve lives. daily Automate complex tasks and provide a personalized user experience.

10 2 6

[6 Marks]

- b. Convert the following statements into predicate logic expressions





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		[4 Marks]		
i.	Quantum computers have begun to demonstrate practical applications in solving complex problems, particularly in fields like cryptography, drug discovery, and optimization.			
ii.	Artificial intelligence models outperform human performance in diagnosing certain medical conditions and it Leads to more accurate and faster diagnosis			

