



VIT

Vellore Institute of Technology
(Chartered as the University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT: A2+TA2

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch	: B Tech CSE with Business Systems	
Course Code and Course Name	: CBS3004 Artificial Intelligence	
Faculty Name(s)	: Prof Swetha V, Prof P Natarajan	
Class Number(s)	: VL2025260103295, VL2025260103298	
Date of Examination	: 17/08/2025	
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:
 1. Evaluate Artificial Intelligence (AI) methods and describe their foundations.
 2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning
 4. Analyze and illustrate how search algorithms and planning play vital role in problem solving.

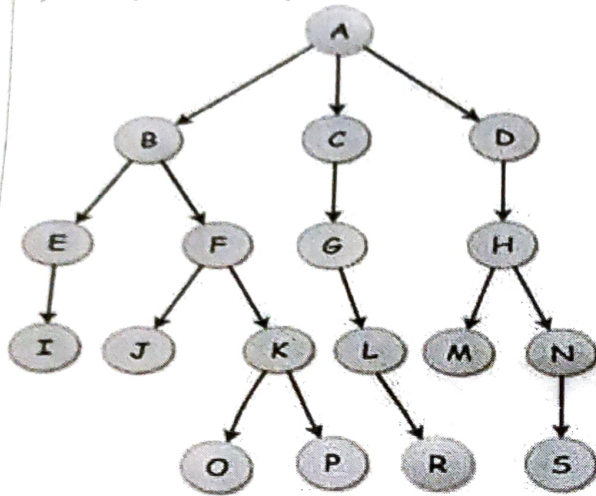
Q.No	Question	M	CO	BL																		
1.	A) A drone-based crop monitoring AI detects plant diseases and sprays pesticides where needed. Recently, it misclassifies healthy crops in low sunlight, sprays already treated areas, and uses battery power inefficiently. As the AI engineer, define and explain the PEAS (Performance measure, Environment, Actuators, Sensors) description for this system.	5	1	2																		
	B) A delivery robot operates inside a large warehouse. It receives orders from a central system, navigates to pick-up points, collects packages, and delivers them to the correct loading dock. Identify the type of agent this robot represents. With diagram, explain the working of that agent.	5																				
2.	A treasure hunter must arrange 8 ancient artifacts on a 3x3 grid to match the required unlock sequence. One cell is empty to allow sliding of artifacts., Represent the problem in the state space search form, define cost, constraints, and actions. Initial State: <table><tr><td>Map</td><td>Key</td><td>Trap</td></tr><tr><td>Boots</td><td>Empty</td><td>Water</td></tr><tr><td>Fire</td><td>Sword</td><td>Gold</td></tr></table> Goal State: <table><tr><td>Gold</td><td>Sword</td><td>Map</td></tr><tr><td>Boots</td><td>Empty</td><td>Key</td></tr><tr><td>Trap</td><td>Water</td><td>Fire</td></tr></table>	Map	Key	Trap	Boots	Empty	Water	Fire	Sword	Gold	Gold	Sword	Map	Boots	Empty	Key	Trap	Water	Fire	10	2	3
Map	Key	Trap																				
Boots	Empty	Water																				
Fire	Sword	Gold																				
Gold	Sword	Map																				
Boots	Empty	Key																				
Trap	Water	Fire																				
3.	You are a logistics officer in a high-security research facility tasked with distributing rare minerals using only two secure containers, one holding 3 units and the other 5 units. With unlimited mineral supply but no measuring tools, your goal is to end up with exactly 4 units in the 5-unit container by only filling, emptying, or pouring between the two containers. Formulate the problem as a	10	2	4																		



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state space search problem. Show the sequence of actions from initial state to reach the goal state using Breadth First Search (BFS) or Depth First Search (DFS).

4. Using the given graph, a) Apply Breadth First Search (BFS) starting from the initial node A. Show the order of node expansions until the goal node R is found. b) Apply Depth-Limited Search (DLS) starting from the initial node A with a depth limit of 3. Show the order of node expansions and state whether the goal node R is reached within the limit. c) Compare the performance of BFS and DLS for this problem.

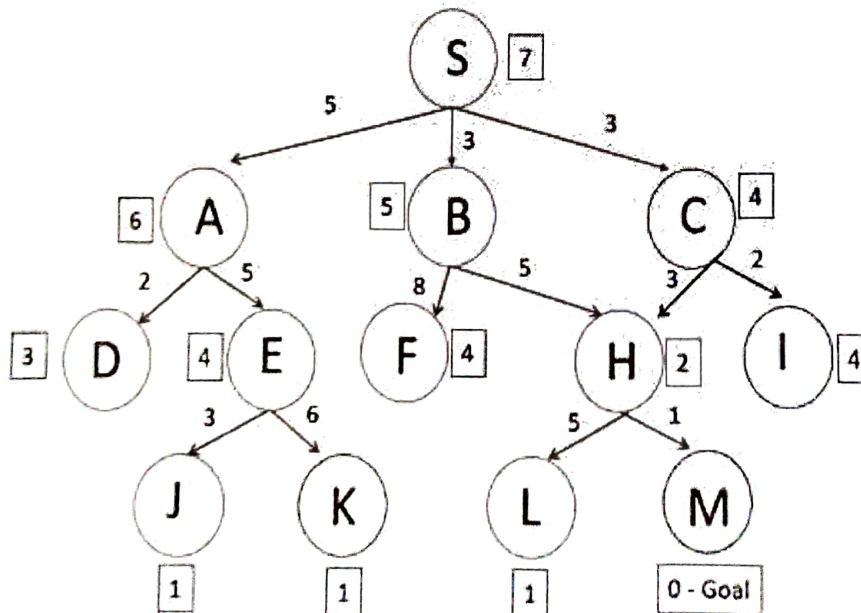


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5. Using the given graph with specified edge costs and heuristic values for each node, apply the A* search algorithm to find the optimal path from the start node to the goal node. Show all steps, including calculation of $f(n)$ for each node expanded, and indicate the final solution path and its total cost.



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