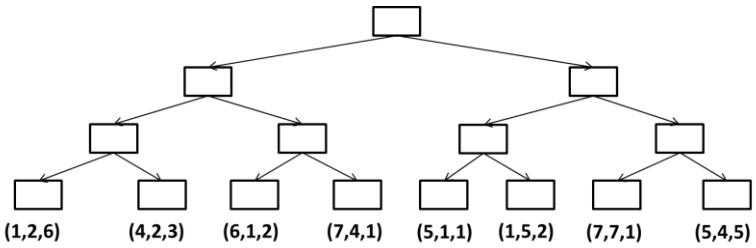
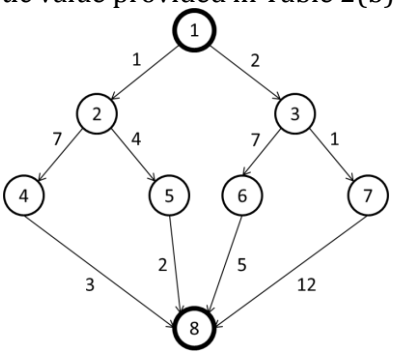
NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY
(AN AUTONOMOUS INSTITUTE AFFILIATED TO VTU, BELAGAVI)

Fifth Semester Mid-Semester Examination BE Degree (MSE-I)
Academic year 2023-2024
Department of Computer Science and Engineering
Artificial Intelligence and Machine Learning (21CSG53)

Duration: 1 Hr **Max. Marks:30**

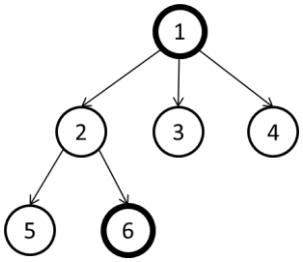
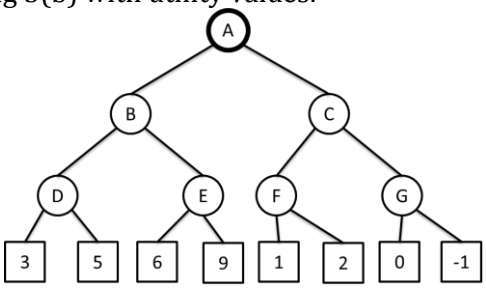
Instructions
1. ***Q1 (6 Marks) & Q4 (4 Marks) - Compulsory questions.***
2. ***Q2 and Q3 Choice-based questions for 10 marks each.***
3. ***Missing Data (if any) can be suitably assumed***

Question No		Question	Marks	CO; BL
Answer the following questions.				
1.	a.	Outline the four categories of AI and mention the significance of each category.	2	1;2
	b.	Illustrate the Simple Reflex agent with a neat diagram and write the pseudocode for the same.	2	2;2
	c.	Consider the 3-ply Game tree with the players A, B C and utility values given in Fig 1(c). Find the optimal strategy to make one of the players win the game.  Fig 1(c): Game Tree	2	3;2
		UNIT-I		
2	a.	List the properties of a Task environment. Interpret the suitable properties for the following Task environments: i. Crossword puzzle ii. Medical Diagnosis	5	2;3
	b.	Greedy Best First Search tries to expand a node that is closest to the goal, on the grounds that this is likely to lead to a solution quickly, whereas the A* search algorithm tries to minimize the total estimated solution cost. Using the tree given in Fig 2(b), which depicts the scenario of the travelling salesperson starts from city 1 and should reach city 8. The values on edges represent the cost of reaching from one city to another. Analyze the steps to reach the goal node and find the final cost using A* Search algorithms. Use heuristic value provided in Table 2(b) suitably.  Fig 2(b): Tree Table 2(b): Heuristic Values		

Node	H(n)
1	10
2	5
3	6
4	4
5	15
6	5
7	8
8	0

5 3;4

		OR		

3	a.	Describe how to formulate the 8-Queens problem with 5 components by applying the incremental formulation and complete state formulation.	5	2;3
	b.	Write the Iterative deepening depth-first search algorithm. Using the same, provide the solution for the Binary Tree depicted in Fig 2(b) where Initial state is node 1 and Goal state is node 6.  Fig 2(b): Binary Tree	5	3;4
		UNIT-II		
4	a.	The wumpus world is a cave consisting of rooms connected by passageways. Lurking somewhere in the cave is the terrible wumpus, a beast that eats anyone who enters its room. The wumpus can be shot by an agent, but the agent has only one arrow. Some rooms contain bottomless pits that will trap anyone who wanders into these rooms (except for the wumpus, which is too big to fall in). The only mitigating feature of this bleak environment is the possibility of finding a heap of gold. Provide the PEAS description for this environment.	5	2;2
	b.	Compute the optimal strategy by applying Alpha-Beta Pruning for the Game Tree depicted in Fig 3(b) with utility values.  Fig 3(b): Game Tree	5	3;3
		OR		
5	a.	Consider a 2-player game where both the players play optimally from their end to win the game. Write the Minimax algorithm to determine the optimal strategy by using the utility values at its terminal states. Also, mention the Time and Space complexity for the same.	5	2;2
	b.	Elucidate the components of a Constraint Satisfaction Problem (CSP). Solve the following Cryptarithmetic problem using CSP. C R O S S + R O A D S D A N G E R	5	3;3
6	a.	Consider a smart vacuum cleaner agent that cleans rooms size of n * n. The Agent can move Up, Down, Left and Right. Design a program to simulate the working of the Vacuum cleaner agent and calculate the overall performance.	4	3;4

Faculty Signature	***HOD Signature***