VIT

Vellore Institute of Technology

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

Continuous Assessment Test I – September 2023

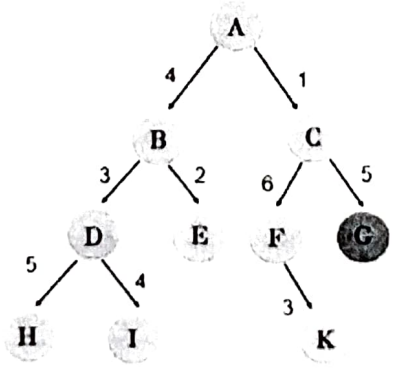
Programme	:	B.Tech Computer Science and Engineering	Semester	:	Fall Semester
Course Title	:	Artificial Intelligence	Code	:	CSE3013
			Class Nbr(s)	:	CH2023240100212
Faculty (s)	:	Dr.T.Benil	Slot	:	C2 +TC2
Time	:	2 PM to 3.30 PM	Max. Marks	:	50 marks

Answer all the Questions

1. a) Provide your view/idea on how an AI-powered agent enhances the efficiency and success of the Chandrayaan by assisting in tasks such as data analysis, navigation, and decision-making. (3 marks) 10

   b) The Chandrayaan-3 is a lunar mission aimed at landing a rover on the Moon's surface. For the rover to land, suggest an agent. Justify the agent with appropriate agent architecture and explanation (7 marks)

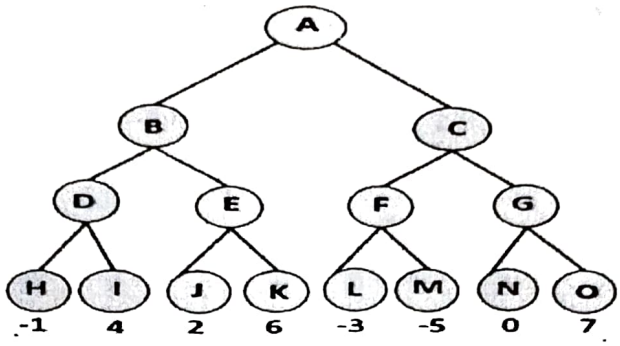
2. a) Consider the given graph with nodes labeled from 'A' to 'G' from the figure. The node 'A' represents the start state, and the node 'G' represents the goal state. Apply any five search techniques to reach the goal state with no information/metric provided on how to reach the goal state. (10 marks) 15



   b) Give the details about the efficiency considerations of different techniques considered? (5 marks)

3. i) What's the role of the Minimax algorithm in games? Why minimax does the decision after exploring all possible moves? (6 marks)

ii) Consider the graph and explain how Minimax algorithm works? (4 marks)



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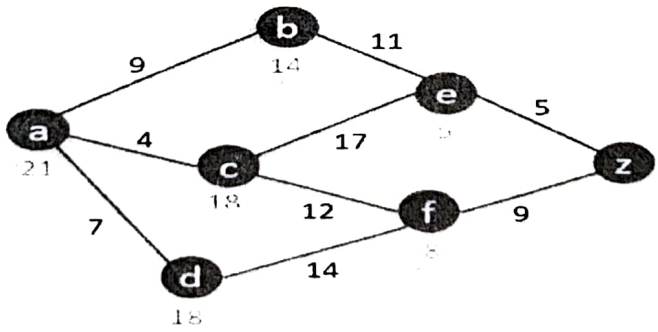
ii) Discuss the challenges that the Minimax algorithm faces in games with so many choices or unpredictable results. Justify with an use case. (3 marks)

iii) What are the main drawbacks? How can these problems be solved? Justify your answer? (2 marks)

4. A transportation network for an autonomous delivery robot is given in the figure. The nodes represent locations, and the edges represent roads with associated travel distances and traffic congestion levels. How would the robot find the optimal solution from 'a' to 'z'?



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Reg. Number:	

Continuous Assessment Test(CAT) – I - AUG 2024

Programme	:	BTech CSE	Semester	:	Fall 24-25
Course Code & Course Title	:	BCSE306L Artificial Intelligence	Slot	:	E2+TE2
Faculty	:	Dr. B Radhika Selvamani Dr. Tahir Mujtaba Dr. Modigari Narendra Dr. Sharmila Dr. Bhavadharini Dr. Madura Meenakshi Dr. Krithiga	Class Number	:	CH2024250101164 CH2024250101176 CH2024250101166 CH2024250101171 CH2024250101168 CH2024250101174 CH2024250101178
Duration	:	90 minutes	Max. Mark		50

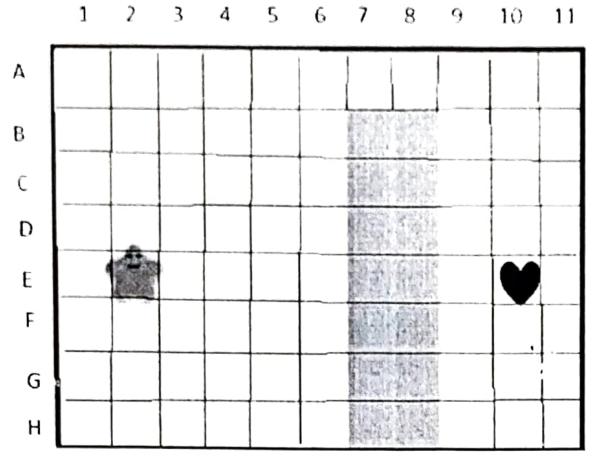
General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No.	Sub Sec.	Description	Marks
1.	a.	Explain Turing Test and how it is used to evaluate machine intelligence. [5 marks]	[10]
	b.	Identify one of the recent AI technology which you think could pass the Turing Test. Justify. [5 marks]	
2.		Let us consider that you are working as an AI Product Design Engineer for a large retail chain named BIG-BOX that wants to leverage AI to enhance its customer experience. The company has access to vast amounts of data related to customers including: • Customer name • Customer address • List of items purchased • Products browsing history • Product feedback • Customer service interactions The goal for you is to create an AI powered application for BIG-BOX to increase customer satisfaction, improve sales and streamline operations through	[10]

	a.	Personalized Recommendations. Design an appropriate AI agent to develop a personalized recommendation system that can suggest products to customers based on their previous purchase history and browsing behaviour. [6 marks]	
	b.	Analyse why other agent types are not suitable. [4 marks]	
3.	a.	"DEPAL" bank issues debit cards for their customers which are accessible through a 3 digit binary password. The company wants to test the safety of their password. They hire a professional hacker to hack the password. The hacker builds a state space search tree guessing or altering one digit at any position at a time. The state space tree is a binary tree starting from the root labelled "xxx". He verifies the generated password against the company application whenever he reaches the leaf of the tree. Draw the complete state space tree for cracking the passwords of debit cards issued by "DEPAL". (The scanning of the password is assumed to be from left to right.) [2 Marks]	[10]
	b.	Assuming that the states (intermediate and leaf) are labelled, calculate the number of states to be crossed for cracking the goal state labelled "011" using the following algorithms. [8 Marks] a. Breadth-First Search b. Iterative Deepening Search	
4.		The Star at **E2** has to reach the heart at **E10** by walking across the cells. Assume the star can even move diagonally in addition to vertical and horizontal movements. Assume the cost of traversing from one cell to another in any direction is 1. The squares marked in grey are not traversable. Assume the cost of non-traversable nodes to be infinity. a. Draw the grid below and Fill in all the cells with the manhattan heuristic value to the destination. [2 marks] b. Explore the cells using Best First Search one step at a time, listing the open and closed cells at each step.[4 marks] c. Find the path given by the Best First Search. Check if it is optimal. Justify your observation. [4 marks]	[10]



5.		Assume that a genetic algorithm uses chromosomes of the form x = abcdefgh with a fixed length of eight genes. Each gene can be any digit from 1 to 8. Let the fitness of individual x be calculated as: f(x) = (a-b)*(b-c)*(c-d)*(d-e)*(e-f)*(f-g)*(g-h) Let the initial population consist of four individuals with the chromosomes: x1 = 65413532, x2 = 87126611, x3 = 23821285, x4 = 41852184	[10]
	a.	Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last. [4 marks]	
	b.	Perform the following crossover operations: [6 marks] i) Cross the fittest two individuals using one–point crossover at the middle point. ii) Cross the second and third fittest individuals using a two–point crossover (at start position b and end position f). iii) Create a mutated individual of the fittest parent by adding 1 to all even numbers.	
		Total	50