VIT
Vellore Institute of Technology
CHENNAI

Reg. Number

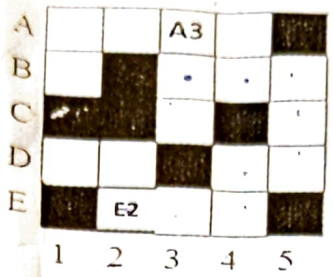
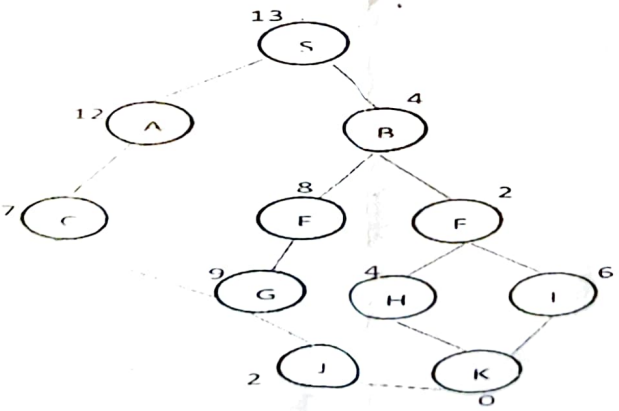
Continuous Assessment Test (CAT-I) - AUGUST 2024

Programme	:	B.Tech (CSE with Specialization)	Semester	:	FALL 2024-25
Course Code & Course Title	:	BCSE306L Artificial Intelligence	Slot	:	C2+TC2
Faculty	:	Dr. VERGIN RAJA SAROBIN M Dr. NOEL JEYGAR ROBERT V Dr. MODIGARI NARENDRA Dr. D JEYA MALA Dr. VIJAYAPRABAKARAN K Dr. KAVITHA J C Dr. POONKODI Dr. SANKAR P Dr. GAYATHRI R	Class Number	:	CH2024250102605 CH2024250101700 CH2024250102609 CH2024250101683 CH2024250101689 CH2024250101695 CH2024250101035 CH2024250100579 CH2024250101701
Duration	:	1 ½ hours	Max. Mark		50

General Instructions:
Write only your registration number on the question paper in the box provided and do not write other information.

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		Analyse and elaborate any 5 disciplines that impact the contributions on AI's growth and discuss how the integration of these diverse fields has accelerated the development of AI technologies.	10
2	i) ii)	Imagine you are designing a smart home system that utilizes various sensors to detect human presence and manage electrical and electronic devices. Explain four specific AI techniques that could be employed to achieve an effective human detection and automation within the system. (8 Marks) Discuss the advantages associated with each technique. (2 Marks)	10

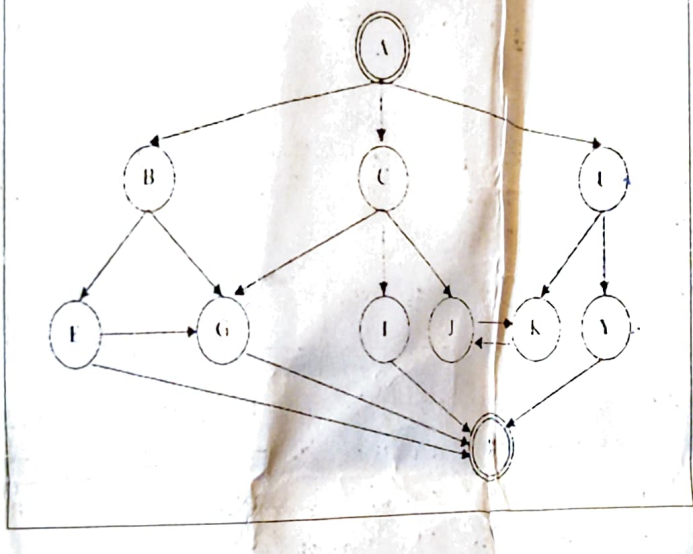
3		Consider a maze traversal problem as shown in the diagram below. A3 is the start square and E2 is the goal square. You are supposed to move one step at a time and avoid obstacles (black squares). Apply the cost as follows: move up or down with cost 1 and move left or right with cost 2.  	12
	i)	Formulate the state space graph with the problem formulation steps. (4 Marks)	
	ii)	Find the path from A3 to E2 applying two uninformed search techniques, one that will not get trapped exploring a blind alley and the other based on minimum cost. (6 Marks)	
	iii)	Compare the performance of both the search techniques. (2 Marks)	
4		Consider the below graph with the node S as the initial state and the node K as the goal state. The graph includes heuristic values given near the nodes. Identify the informed search algorithm that uses a heuristic function to evaluate and prioritize which node to explore next.  	8
	i)	Illustrate the order in which the nodes are expanded step by step and discover the path between the nodes S and K by applying the identified search algorithm. (6 Marks)	
	ii)	Comment on the optimality of the algorithm. (2 Marks)	
5		In the context of heuristic-driven search algorithms, consider a directed graph given below where each node has an associated heuristic value h(n)	10

estimating the cost to the goal node M

i) Apply hill climbing algorithm on the graph, starting from node A. (4 Marks)

ii) Discuss all the potential risks of hill climbing algorithm in this context. (4 Marks)

iii) Suggest possible modifications or enhancements to overcome these issues. (2 Marks)



h(n)

h(A) = 7
h(B) = 5
h(C) = 3
h(D) = 4
h(E) = 2
h(G) = 3
h(I) = 6
h(J) = 2
h(K) = 1
h(Y) = 2
h(M) = 0 .