VIT
Vellore Institute of Technology
CHENNAI

Reg. Number

Continuous Assessment Test (CAT) – I - AUGUST 2024

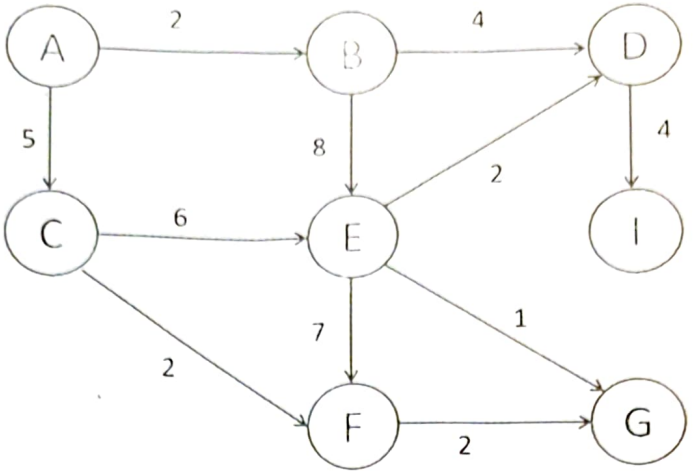
Programme	:	B.Tech	Semester	:	FALL 2024-25
Course Code & Course Title	:	BCSE306L Artificial Intelligence	Class Number	:	CH2024250102604 CH2024250101681 CH2024250101698 CH2024250102608 CH2024250101686 CH2024250101692 CH2024250101034 CH2024250100578
Faculty	:	Dr. VERGIN RAJA SAROBIN M Dr. RABINDRA KUMAR SINGH Dr. VIJAYAKUMAR K P Dr. ABIRAMI S Dr. VIJAYAPRABAKARAN K Dr. KAVITHA J C Dr. POONKODI Dr. SANKAR P	Slot	:	C1+TC1
Duration	:	1 ½ hours	Max. Mark		50

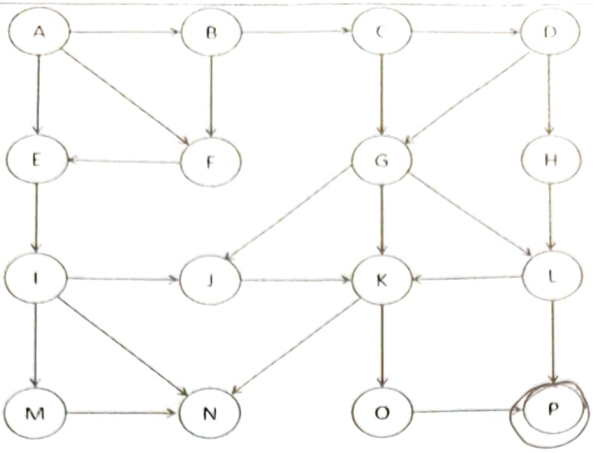
General Instructions:

- 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		You are developing an AI chatbot to assess users' risk of lung cancer by analyzing symptoms, medical history, and other relevant factors. The chatbot must accurately interpret a wide range of symptoms to distinguish lung cancer from other conditions. It should evaluate personalized risk factors like smoking history, family history, age, and environmental exposure. Addtionally, the chatbot must integrate and apply the latest medical guidelines for lung cancer diagnosis.	10
	a	Identify a suitable AI agent type for this chatbot and Explain how the chosen agent would handle dynamic symptom analysis, personalized risk assessment, and integration of medical guidelines. **(5 Marks)**	
	b	Discuss the PEAS description of the task environment for the given application. **(5 Marks)**	

2	a	 The graph provided represents a road network with nodes representing locations and edges representing roads with associated weights (travel time). An AI agent is tasked with finding optimal routes from location A to location G in this network. The agent has provided three different routes: A → B → E → G A → C → F → G A → B → D → I → B → E → G Determine the search algorithms used by the AI agent and explain how it arrived at these three different routes. Note: This agent do not have any additional knowledge about the problem domain They rely solely on the graph structure and the starting node to explore the search space. **(8 Marks)**	15
	b	Consider an AI assisted Cab Booking System. The search space of the system is represented as a graph given below and the search has to be proceeded to the next state when cab to a destination is not available by trying all possible depth limits of exploration from that node. It will stop its search if it has identified a destination within that depth limit of exploration. Identify the search technique and write the pseudo code and perform exploration of the graph given below using the selected technique. (assume that the search starts at **A** and destination is **P**) **(7 Marks)**	

			
3		A robot needs to navigate through a 7x7 grid maze to reach a goal position at (6,6) from a starting position at (0,0). The maze has walls that the robot cannot pass through, and it can move up, down, left, or right. The 7x7 grid is represented as a 2D array where 0 represents an open space, and 1 represents walls/obstacles. The initial configuration of the board = [[0, 0, 0, 0, 1, 0, 0], [1, 1, 0, 0, 1, 0, 1], [0, 0, 0, 1, 0, 0, 0], [0, 1, 1, 0, 1, 1, 0], [0, 1, 0, 0, 0, 0, 0], [0, 1, 1, 1, 1, 1, 0], [0, 0, 0, 0, 0, 0, 0]]. Trace the execution of the A* algorithm, incorporating the necessary data structures and the Manhattan distance heuristic, to find and illustrate the shortest path for the robot from the starting position (0,0) to the goal position (6,6).	15
4		You are developing a simple AI model that uses a mathematical function to predict the optimal value of a certain parameter. The function you're working with is $f(x) = -x^2+4x+6$, representing the relationship between the parameter **x** and the model's performance. Your goal is to determine the value of **x** that maximizes the performance of the model within the range $x \in [0,5]$. a) Start with an initial value of **x** within the given interval. Adjust **x** by increments of 0.2 to find the point where the function achieves its highest value. Describe your approach and the process you followed to determine this maximum point. **(3 marks)** b) After reaching a point where no further improvement seems possible, you suspect that this might not be the highest value of the function in the interval. Restart your process from a different initial value of **x** within the interval, adjusting **x** by increments of 0.2. Repeat the optimization and compare the results from different starting points and explain how you determined the best solution. **(5 marks)** a) Based on your observations, discuss the importance of trying different initial points in the search process and how this can lead to a better final result. **(2 marks)**	10