



VIT

Vellore Institute of Technology

Reg. Number:

Continuous Assessment Test (CAT) – I - AUG 2024

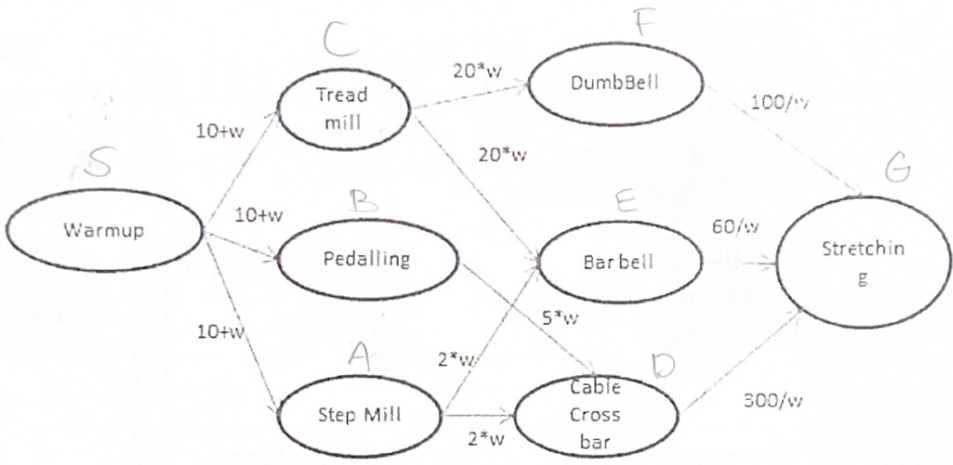
Programme	:	BTech CSE	Semester	:	Fall 24-25
Course Code & Course Title	:	BCSE306L Artificial Intelligence	Slot	:	E1+TE1
Faculty	:	Dr. B Radhika Selvamani Dr. Tahir Mujtaba Dr. Modigari Narendra Dr. Sharmila Dr. Bhavadharini Dr. Madura Meenakshi Dr. Suganya	Class Number	:	CH2024250101163 CH2024250101176 CH2024250101166 CH2024250101171 CH2024250101168 CH2024250101174 CH2024250101173
Duration	:	90 minutes	Max. Mark	:	50

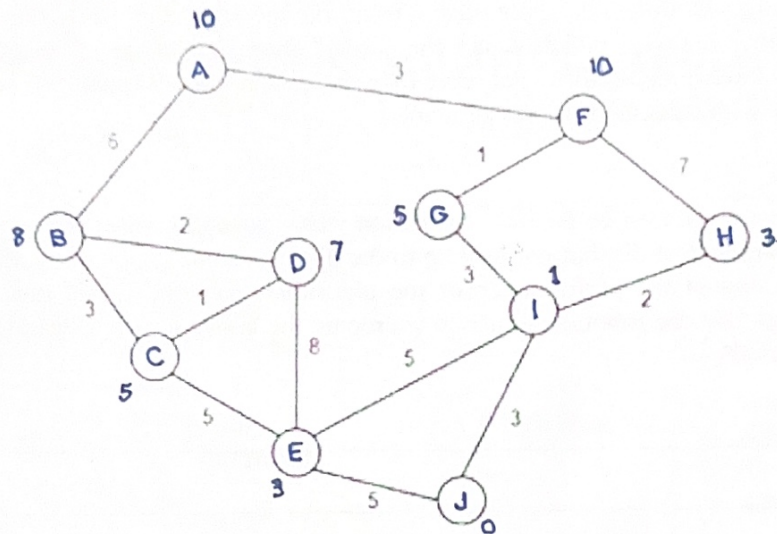
General Instructions:

- 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

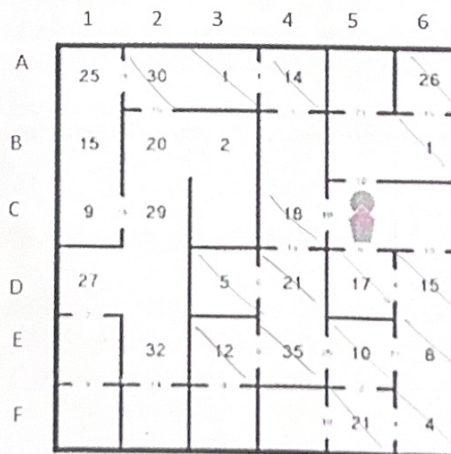
Q. No	Sub Sec.	Description	Marks
1.		You are designing an intelligent home heating system for a smart house. The system must decide how to adjust the thermostat settings throughout the day based on various factors to maintain comfort while minimizing energy costs. Give PEAS function for the agent.	[5]
2.		A people access management company has two different solutions for people access in organizations. Solution 1: A turnstile that allows people on showing the ID card. Solution 2: An automatic door which opens doors for people by sensing their mobile details, their role and responsibility in the organization, their current assigned task in addition to the occupancy detail about the room they try to access using the door. Based on these details some doors may open and others may not. There is an indicator on the door which displays the details of their access status for a door.	[15]
	a.	Choose suitable agent based architectures for the above solutions and explain in detail. [12 marks]	
	b.	Identify which among the given solutions requires intensive domain knowledge. Justify. [3 marks]	

3.	<p>A Gym Company has a set of equipments and the plan for suggesting customized exercise routine for people. The person has to start with the warmup and end with the stretching. The equipments may only be used as in the order given below in the chart below. The recovery time (minutes) for each equipment to avoid fatigue has been recommended based on the weight w of the person. Ram weighs 10 kg and Shreya weighs 100 kg.</p>  <p>a. Analyse if uniform cost approach be used to suggest the optimal sequence of exercises which takes least time to complete for Ram and Shreya. [2 marks]</p>	[10]
	<p>b. Justify with suitable illustrations, the different solutions obtained for both Ram and Shreya. [8 marks]</p>	
4.	<p>A software company has installed intelligent routers inside the premises. The information over the network is sent through various routers inside the premises. While crossing each router, the time taken by the packet to reach that router from its immediate predecessor is also stored in the packet's header. When the packet reaches the destination, the router that receives the packet at the destination sends the actual time taken by all the routers in the path using the header information. A sample path simulated in the premises is given.</p> <p>The nodes represent the routers with the cost on the edges representing the time taken between two neighbouring nodes. The time that will be taken from each router to reach the destination (H) is given near the router (node). Suggest an appropriate search algorithm that could be beneficial in identifying a path from 'A' to reach the destination at the least cost.</p>	[10]



5

You are part of a team developing a navigation system for a robotic vacuum cleaner that needs to clean an entire floor of a building efficiently. The floor has several rooms connected by doors. Each room will be periodically assigned a "dirt level" score representing how dirty it is by the sensors fixed in the room. The robot should move from room to room, always choosing the connected room with the highest available dirt level if they are directly connected. After cleaning, it sets the dirt score to zero. All the rooms with no score in the figure given below are clean and assume their score is zero.



[10]

The goal is for the robot to clean all dirty rooms in the floor. The robot keeps moving as long as it can find a room which is dirtier than the room it has currently cleaned. If no dirty rooms are found it will stop cleaning and charge itself in the current room. The robot charges till the dirt level of one of its neighbours increases higher than its current room and it starts working again.

	<p>a. Suggest an appropriate algorithm that finds the optimal path for cleaning to ensure that the overall floor level dirt score is minimized before the robot stops for charging. Assume the robot starts from the position C5. Will the robot ever encounter a room, which is not the dirtiest room and none of its neighbouring rooms have a higher dirt level score than the current room? Name this scenario and justify with suitable diagrams.[5 marks]</p>	
	<p>b. Will the robot ever encounters a situation where several connected rooms have the same amount of dirt but not leading to the dirtiest room. Explain how this scenario could impact the performance of the algorithm. Explain atleast one alternative strategy that the robot could use to overcome the above issues. Illustrate the same. [5 marks]</p>	
	<p>Total</p>	<p>50</p>