

GITAM (Deemed to be University)
[CSEN2031]

GST/GSS/GSB/GSHS Degree Examination
III Semester

ARTIFICIAL INTELLIGENCE
(Effective from the admitted batch 2021–22)

Time: 2 Hours

Max.Marks: 30

Instructions: All parts of the unit must be answered in one place only.

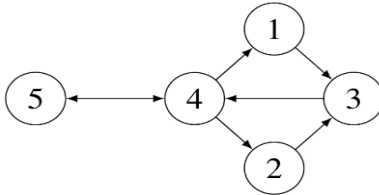
SECTION-A

1. Answer all the questions.

(5x1=5M)

- a) Imagine being a professor teaching AI students. Please give a PEAS description of the work environment and analyze its properties using the criteria in "Teaching AI Students."

b)



Visit all the nodes in the above graph using DFS algorithm and mention the order of visiting.(Choose 1 as a starting vertex)

- c) A student is Hardworking (H) and Intelligent (I), then they will Excel academically (E). Represent this assertion in a Knowledge Base using Propositional Logic
- d) Consider the following First-Order Logic statement:
 $\forall x (\text{Dog}(x) \Rightarrow \text{Animal}(x))$
What does this statement mean, and what is your interpretation for it?
- e) Suppose you are creating a spam email filter for a personal email account. How could supervised learning help you classify incoming emails as 'spam' or 'not spam'? Provide a brief explanation of the data required for training the supervised learning model and the key benefit of using this approach

SECTION-B

Answer the following:

(5x5=25M)

UNIT-I

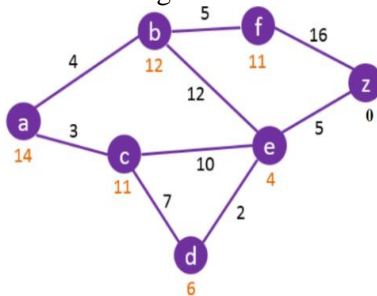
- Imagine that There are two water jugs here. One is 4 gallons (4G) and the other is 9 gallons (9G). One of these two jugs, however, does not have a measurement mark, so we do not know the exact amount that is in it. Now, let's say there is an endless supply of water. Can we use these empty jugs to measure all 1G, 3G, and 6G? If yes explain the step-by-step process for doing this, including the starting state, the steps in between, and the end result for measuring each exact amount of water.

OR

- Describe the task environment of Autonomous taxi explaining each of the property of the environment.

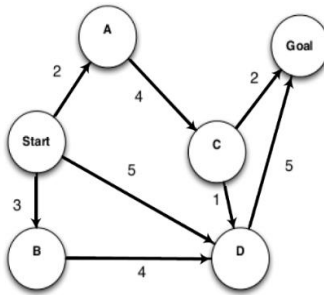
UNIT-II

- Assume You are developing a vehicle routing algorithm for commodities delivery. You wish to apply the A* algorithm to discover the shortest route from a start position to a target location, taking into account road costs and node heuristics. The following graph depicts a road network map with the real cost of traversing each road on the edge and the heuristic value of each node at the bottom. Start node "a" and target node "z".



OR

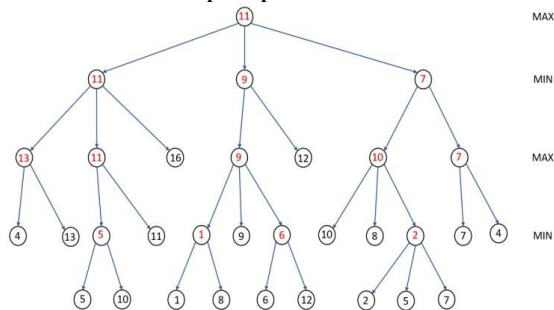
- Consider the graph, where the problem is to find a path from start to Goal.



show the sequence of frontiers and give the path found for the Breadth-first search and Uniform cost search (Lowest-cost-first search)

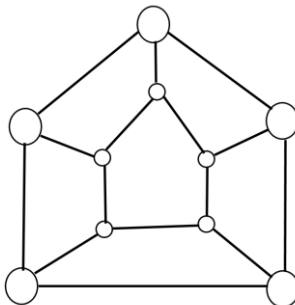
UNIT-III

6. Use the Alpha-Beta pruning algorithm to prune the game tree in the following tree. Assuming child nodes are visited from left to right. Show all final alpha and beta values computed at root, each internal node explored, and at the top of pruned branches.



OR

7. Given an undirected graph and a number **m**, the task is to color the given graph with at most **m** colors such that no two adjacent vertices of the graph are colored with the same color. Implement this with $m=2,3,4$ and justify your answer.



UNIT-IV

8. The following Knowledge base is given. Prove that West is a Criminal using forward chaining approach. Identify the facts/conclusions added in Knowledge Base for proving that West is a Criminal.
- a) $\text{American}(x) \wedge \text{Weapon}(y) \wedge \text{Sells}(x, y, z) \wedge \text{Hostile}(z) \Rightarrow \text{Criminal}(x)$
 - b) $\text{Owns}(\text{Nono}, M1)$,
 - c) $\text{Missile}(M1)$,
 - d) $\text{Missile}(x) \wedge \text{Owns}(\text{Nono}, x) \Rightarrow \text{Sells}(\text{West}, x, \text{Nono})$
 - e) $\text{Missile}(x) \Rightarrow \text{Weapon}(x)$,
 - f) $\text{Enemy}(x, \text{America}) \Rightarrow \text{Hostile}(x)$
 - g) $\text{American}(\text{West})$,
 - h) $\text{Enemy}(\text{Nono}, \text{America})$

OR

9. Represent the following sentences in first-order logic, using a consistent vocabulary:
- a) Some students took French in spring 2001.
 - b) Every student who takes French passes it.
 - c) Only one student took Greek in spring 2001.
 - d) The best score in Greek is always higher than the best score in French.
 - e) Every person who buys a policy is smart.

UNIT-V

10. As you know, Covid-19 tests are common nowadays, but some results of tests are not true. Let's assume; a diagnostic test has 99% accuracy and 60% of all people have Covid-19. If a patient tests positive, what is the probability that they actually have the disease? Apply suitable theorem for the above problem and predict the probability that they actually have the Covid-19 disease.

OR

11. Illustrate different forms of learning with suitable examples.