

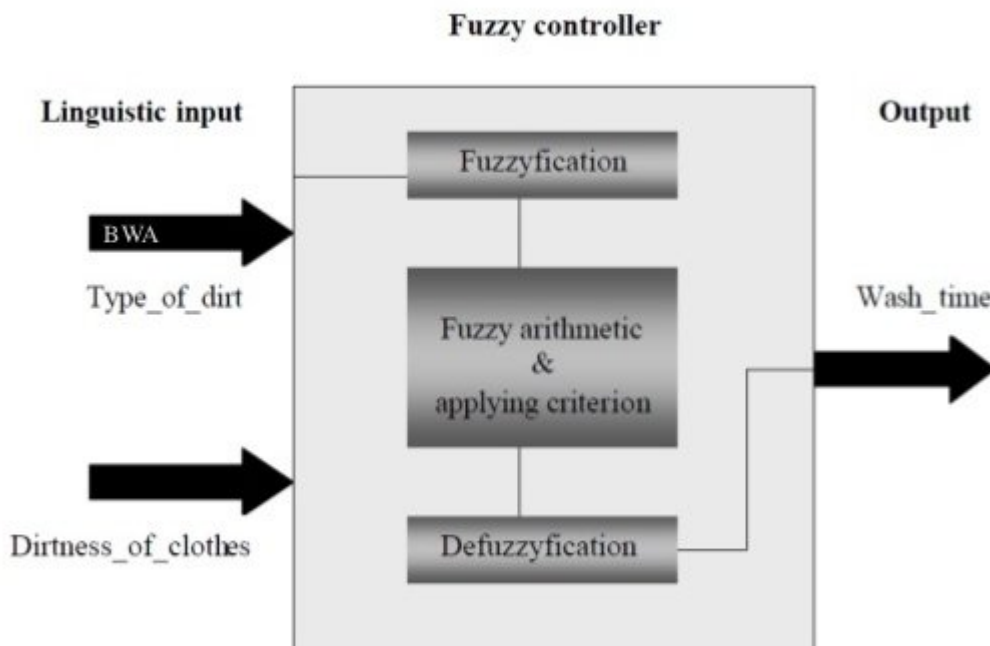
Worksheet for Unit 2 and Unit 3

1. Is it possible to relate any of the searching techniques in a case when any Bluetooth enabled device is looking for the other Bluetooth enabled devices? Justify your answer.

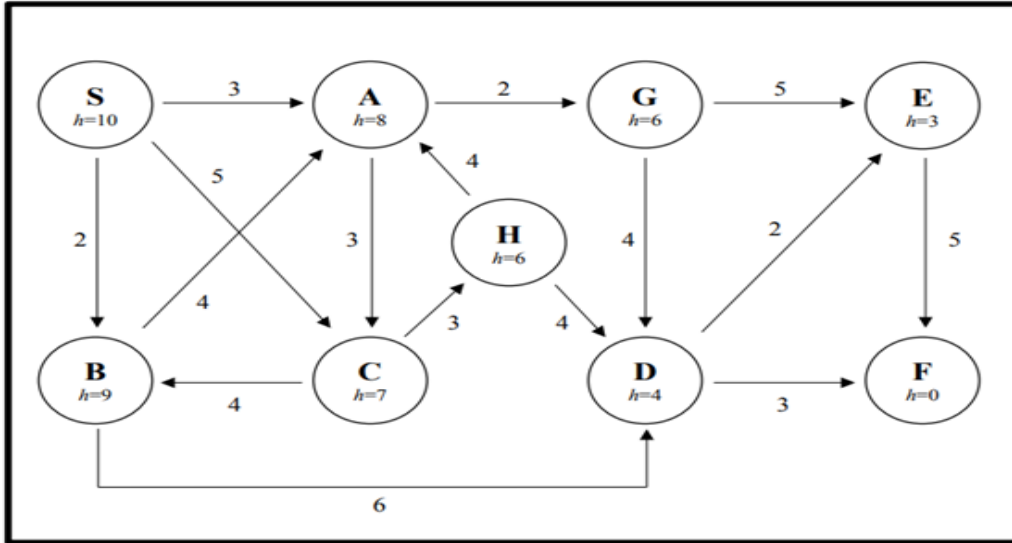
2. Derive the working principle of mini max approach with a suitable state space tree for tic tac toe problem.

3.a) What are the key differences between uninformed search and informed search? Name any two search methods in each category.

4. Explain how fuzzy logic can be applied in a washing Machine and mention its significance. Find the diagram for the input and output



5. You are given below a state-space graph that consists of nine states, the costs of the connections between them, and a heuristic, $h(n)$, for each state. Your task is to find a path from start state S to goal state F.



a. Which solution path will the Depth-First Search (DFS) algorithm find? Expand the successors of a node in alphabetical order (e.g., if a node has 3 successors, A, B, and C, then A will be expanded before B, and B will be expanded before C). Give your answer as one of (i) – (vi) and show the search tree used to find this solution.

- (i) S – A – C – B – D – E – F
- (ii) S – A – C – H – D – F
- (iii) S – A – C – B – D – F
- (iv) S – B – A – G – D – E – F
- (v) S – C – B – A – G – D – F
- (vi) DFS will not find a solution.

b. Apply the A* algorithm for the given problem. Assume that states are selected/expanded in alphabetical order when a tie occurs (e.g., if there is a tie between states A and B, then expand A first).

c. Which solution will Uniform-Cost Search (UCS) find? Give your answer as one of (i) – (vi) and show the search tree used to find this solution.

- (i) S – B – D – F
- (ii) S – C – H – A – G – D – F
- (iii) S – B – D – E – F
- (iv) S – A – C – H – D – E – F
- (v) S – B – A – G – D – E – F
- (vi) UCS will not find a solution.

6. Consider the following statements:

- If I leave and do not go on vacation then I am happy.
- If I leave then I go on vacation.
- I leave.

Can we conclude that: I go on vacation and I am happy

Use the resolution method for the above problem.

7. A total of 500 married couples are polled about their salaries with the following results

	husband makes less than \$25K	husband makes more than \$25K
wife makes less than \$25K	212	198
wife makes more than \$25K	36	54

- (a) Find the probability that a husband earns less than \$25K.
- (b) Find the probability that a wife earns more than \$25K, given that the husband earns as that much as well
- (c) Find the probability that a wife earns more than \$25K, given that the husband makes less than \$ 25K.

8. Suppose we have a scenario where 4 queens are placed such that the initial heuristics is 5. Apply both Hill climbing algorithm and A* Algorithm to identify the final states. Does it have equal final states if yes /No why?

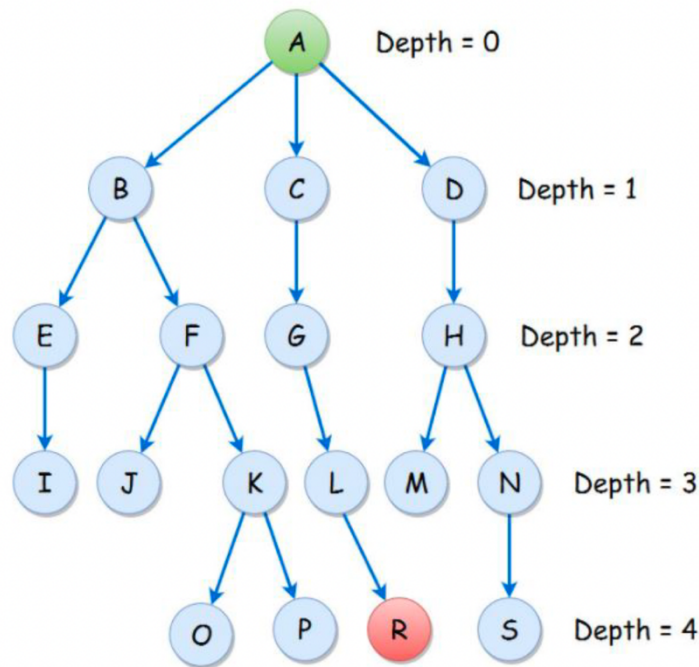
9. Solve the given equation with the help of a genetic algorithm where each value of the variable is considered as a four digit binary number. The fitness function should be +10 and -10 from the resultant value of the given equation. Some random numbers can be taken initially for the variable and the initial population set should be of 5.

Note: Initial condition should not have final states

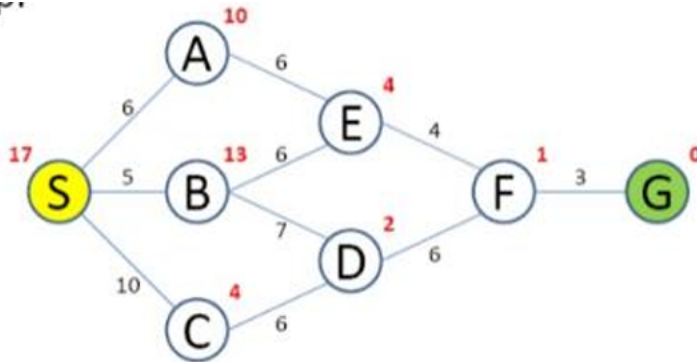
Equation is $X + Y = 26$

10. (i) Which are the two categories of search algorithms? Explain the major search strategies coming under each category. (5 marks)
- (ii) Show the working of Depth First Search for the above graph. (5 marks)
- (iii) What is the difference between Iterative Deepening Depth First Search (IDDFS) and Depth Limited Search? Also mention Parameters for Search Evaluation for both DLS and IDDFS? (5 marks)

- (iv) For the following tree, describe the traversal analysis (root node=A; goal node=R) (5 marks)

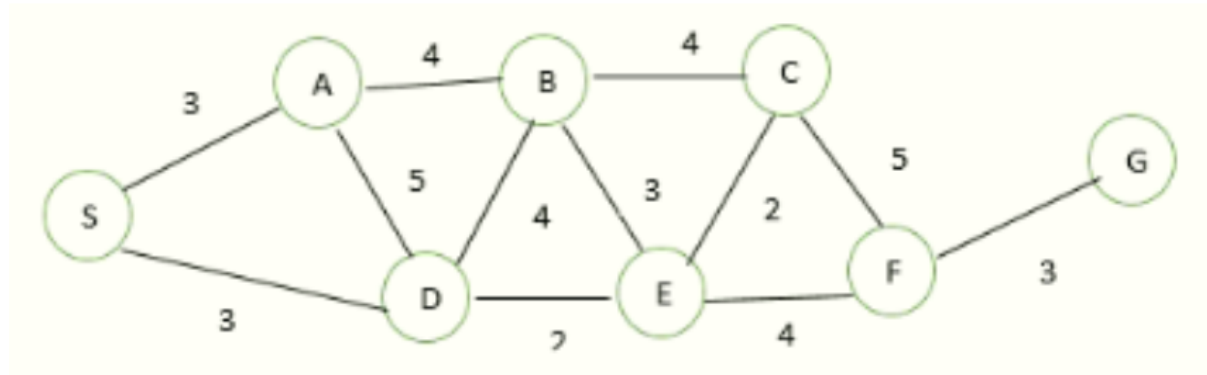


1. Perform A* algorithm on the following graph. Write down the queue at each step.

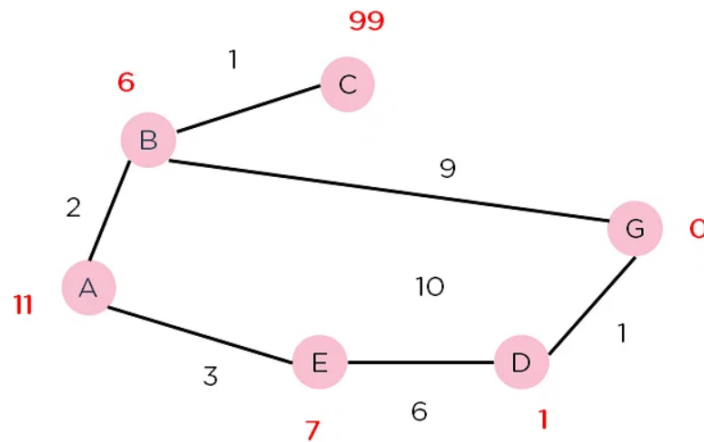


2. Consider the graph given in figure below. Assume that the initial state is S and the goal state is 7 Find path from the initial state to the goal state using BEST First search. Also report the solution cost. The Straight-line distance heuristics estimates for the nodes are as follows:

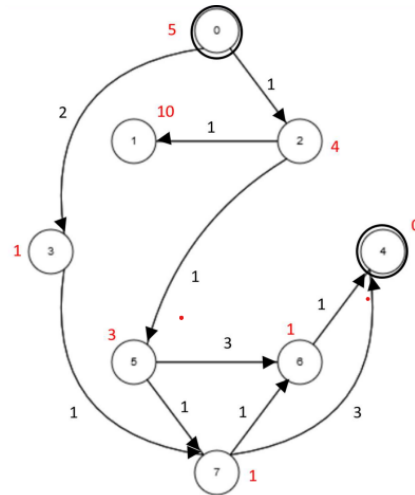
$H(A)=12$, $h(B)=9$, $h(C)=7$, $h(D)=11$, $h(E)=9$, $h(F)=9$, $h(S)=14$



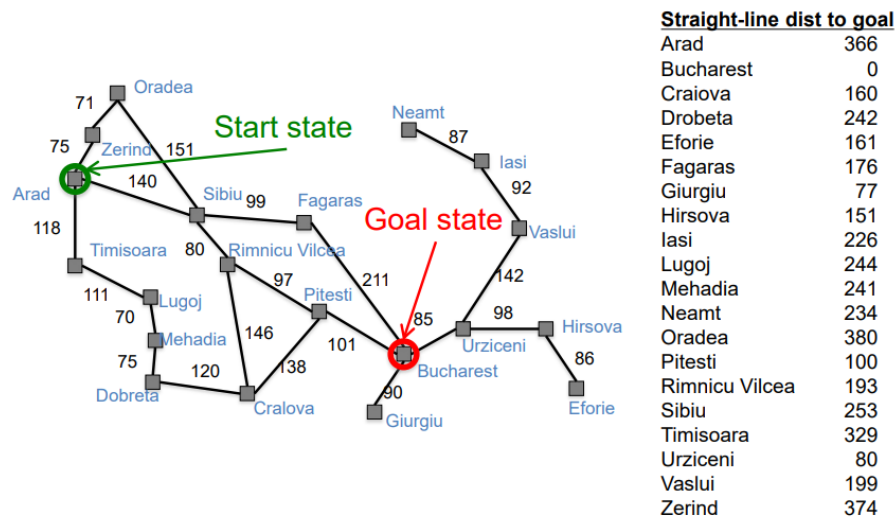
3. Implement A* algorithm for the graph shown below. The nodes are represented in pink circles, and the weights of the paths along the nodes are given. The numbers above the nodes represent the heuristic value of the nodes.



4. In the directed graph given below, with edge weights as cost of those edges, and heuristic values of node written in red, A* search is performed on the graph with the starting node "0" and one goal node "4" (node numbers are written inside the nodes). Consider the two sub cases: a) ties in selecting node for expansion from the fringe are resolved by choosing the node with the LARGER index b) ties in selecting node for expansion from the fringe are resolved by choosing the node with the SMALLER index. Find the optimal path and list of nodes explored for both cases.



5. Find the shortest path from Arad to Bucharest using Best First Search and A* search. Which algorithm gives optimal solution? Justify.



UNIT-3

1. Explain Monty Hall problem in detail by consider number of inputs = 3. Find the probabilities for getting gift and not getting gift.
2. Resolution problem: Did Curiosity kill the cat?

Jack owns a dog. Every dog owner is an animal lover. No animal lover kills an animal. Either Jack or Curiosity killed the cat, who is named Tuna. Did Curiosity kill the cat?

Problem statement and how to solve-methodology (5 marks)

Remaining stepwise analysis (20 marks)

Representation (5 marks)

Convert to clause form (5 marks)

The resolution refutation proof (5 marks)

The proof tree (5 marks)

3. Consider the following two-person game: Assume that both players know the value of x .

		Player 2	
		L	R
Player1	U	1,2	0,1
	D	3,0	X,1

- A. For what values of x (if any) is there a Nash equilibrium in which player 2 chooses R with the probability one? Explain and describe the equilibrium or equilibria in different cases.
- B. For what values of x (if any) does decision R for player 2 survive iterated deletion of strictly dominated strategies. Explain.