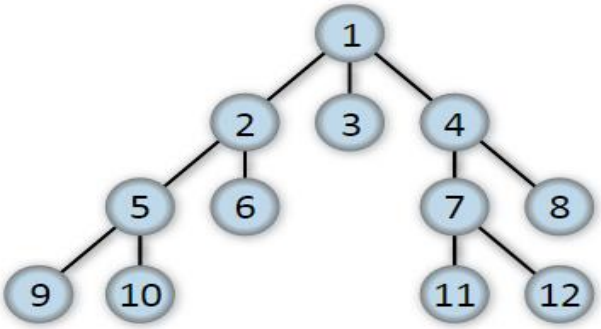
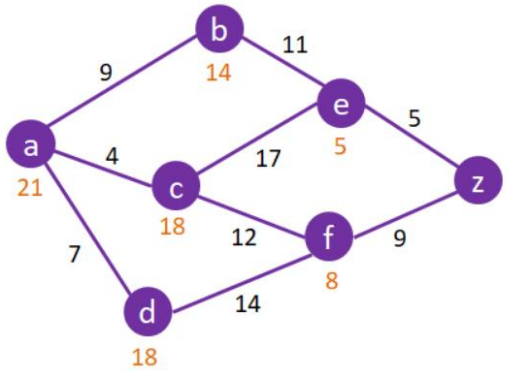
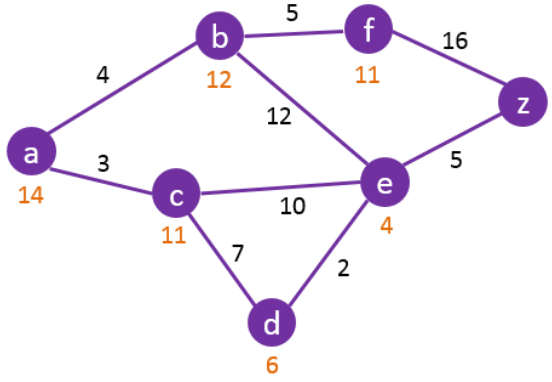
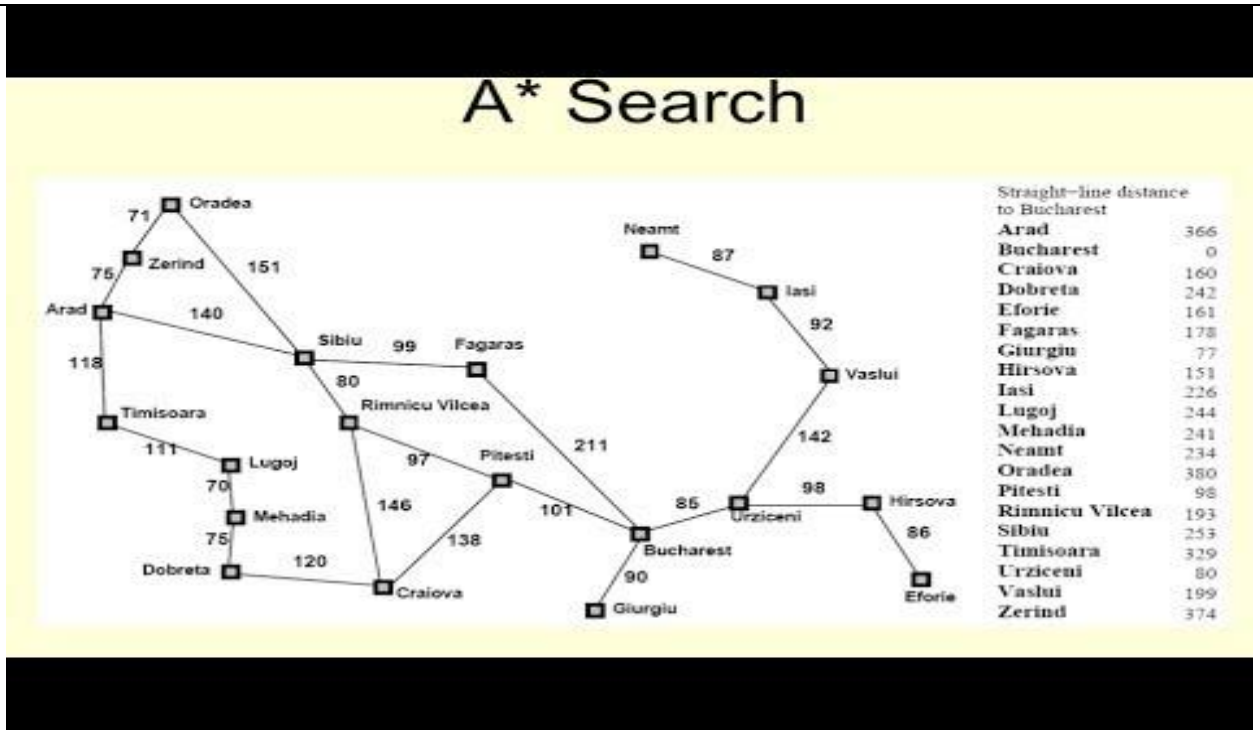
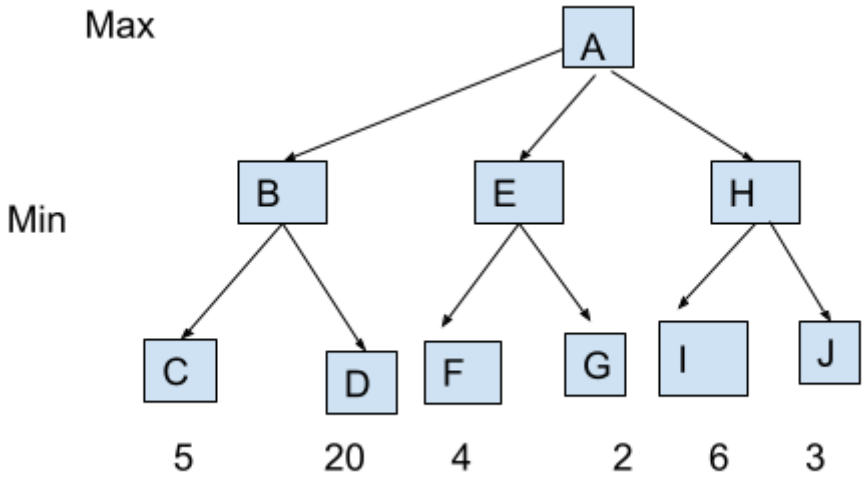
Question Bank
Introduction to Artificial Intelligence

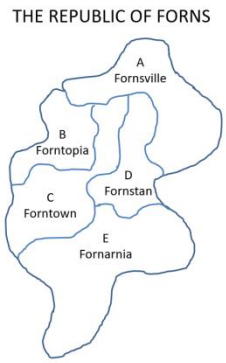
	Question
1	Illustrate Artificial Intelligence? Elaborate various applications of AI.
2	Classify between BFS and DFS. At what circumstances BFS is better than DFS? Also discuss its advantages and disadvantages.
3	Differentiate between Depth first search and Breadth first Search?
4	Consider of problem where branching factor is very high. Which will work better DFS or BFS? Justify your answer?
5	Prove each of the following statement or give s counter example. a. BFS is a special case of uniform cost search. b. DFS is a special case of Best First tree search.
6	Explain the following Basic search strategies with example: DFS, BFS, IDDFS, Bidirectional Search.
7	Consider the following graph. Find the path from start state (1) to the goal state (11) using BFS, DFS and IDDFS. 
8	There are two jugs of volume 4 liter and 3 liters. Neither has any measuring mark on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 liters of water into the 4 liter jug?
9	Explain Uniformed search. What is Notation of state, search problem?
10	Explain Nature of Environments? Elaborate with one example of PEAS environment of Agent type?
11	For An automated Driving System, give a PEAS description of the task environment.
12	For each of the following activities, give a PEAS description of the task environment a) Knitting a sweater b) Bidding on an item at an auction c) A medical diagnosis system d) A typing tutor e) An automated taxi
13	Explain with reasons which search algorithms can be used for the following problems? Justify your Answer: 1) A Robot finding its way in a maze.

	2) Finding a winning move in a chessboard
14	Enlist the operators used in Genetic Algorithms. Solve the 8 queens problem using Genetic Algorithms. Let the number of Initial population be 5 and number of generations be 5.
15	Consider of problem where branching factor is very high. Which will work better DFS or BFS? Justify your answer?
16	Explain Informed and un-informed search techniques in detail.
17	Difference between informed and uninformed search with example.
18	Find a solution to the following 8 puzzle problem using Start State 4 1 2 6 3 7 5 8 Goal State 1 2 3 4 5 6 7 8 a) Heuristic function as Manhattan distance b) Heuristic function as number of misplaced tiles Compare the performance of the resulting algorithms
19	Solve the following 8-puzzle problem using heuristic. Initial State 1 2 3 4 6 7 5 8 Goal State 1 2 3 4 5 6 7 8
20	Elaborate A* algorithm in detail with example.
21	Explain the following Informed Search strategies: BFS, Greedy BFS, A* Search, Analysis of A* Algorithm, Proof of optimality of A*, IDA*, DFS B&B, Admissible Heuristics.

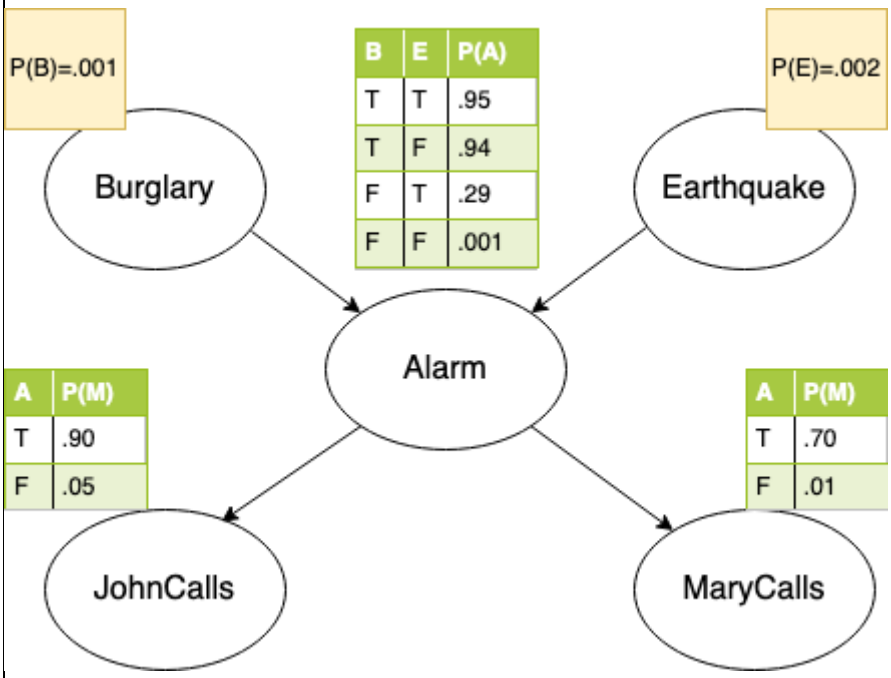
22	Apply the steps of the A* Search algorithm to find the shortest path from A to Z using the following graph: (Numbers in orange indicate Heuristic values and numbers in black indicate path cost) 
23	 Find the shortest path to travel from a to z using A* algorithm. The values below the node represent the heuristic cost and the values along the edges represent the path cost.
24	Prove that if a heuristic is consistent, it must be admissible. Construct an admissible heuristic that is not consistent.
25	Shows an 8 Puzzle Problem with Start State and the Goal State. Assuming that the heuristic Function h1 (N) counts the number of tiles out of place. Trace the steps involved to reach the goal state using the heuristic function. Start State 4 1 2 8 7 5 6 3 Goal State 1 2 3 4 5 6 7 8
26	Explain Greedy best-first search algorithm in detail.
27	Explain with Diagram and Algorithm the Simple Reflex Agent and Model Based Reflex Agent?
28	Differentiate between DFS Branch & Bound and IDA * Algorithms
29	Explain 8 Queen Problem with Algorithms? Explain its drawbacks?
30	Define and Explain A* Algorithm? By Considering the Below Fig. Elaborate A* algorithm From Arad to reach to Bucharest?

	
31	Differentiate between: 1. Fully Observable vs. Partially Observable 2. Deterministic vs. Stochastic
32	Solve 4 queen problem using genetic Algorithm. Let the number of initial population be 3 and no. of generation be 5.
33	Differentiate between 4 Queen Problem (Backtracking) and 8 Queen Problem (Branch & Bound)
34	Solve the cryptarithmetic problem in the given figure by hand, using the strategy of backtracking with forward checking and the MRV and least-constraining value heuristics. $\begin{array}{r} T\ W\ O \\ +\ T\ W\ O \\ \hline F\ O\ U\ R \end{array}$
35	Trace the constraint satisfaction procedure for solving the following cryptarithmetic problem CROSS + ROADS ---------- DANGER
36	Solve the following constraint satisfaction problem. DONALD +GERALD ---------- ROBERT State your constraints. How will you represent this problem? Also show the steps followed to solve this problem

37	Illustrate constrain satisfaction? Trace the constrain satisfaction procedure by solving the following cryptarithmetic problem. APPLE + LEMON = BANANA
38	Consider the Game tree shown below. Calculate the value at the root of the tree using minimax algorithm, perform alpha beta pruning to show which nodes will be pruned. 
39	What is alpha-Beta pruning? How does it improve the efficiency of the Min-Max Algorithm? Explain with example.
40	Elaborate Hill Climbing algorithm and explain the terms: i) Ridge ii) Platue iii) Local Maximum
41	With an illustration explain the process of converting well-formed formulas into clause form.
42	Explain MiniMax Algorithm with Suitable Example?
43	Provide the solution to the map coloring problem of the republic of the form with K=3, Red, Green, Blue. 
44	Provide a solution to the Map Coloring problem of the Republic of Forns with K=3 colors: Red, Green, and Blue.

	
45	Write the difference between predicate logic and propositional logic.
46	Explain different approaches to knowledge representation.
47	Explain Bayesian Networks with example.
48	Suppose we know from statistical data that flu causes fever in 80% of the cases, approximately 1 in 10000 people have flu at a given time, and approximately 1 out of every 50 people is suffering from fever. Given a patient with fever, does she have flu? Answer by applying Bayes rule.
49	What is semantic network? Represent the following statements using semantic network. 1. The dog bit the mail carrier. 2. Every dog has bitten a mail carrier.
50	What is semantic net? Draw semantic net for following also find V(S), A(S) and λ(S.) "Heart is a part of cardiovascular system" "Artery is a part of cardiovascular system" "Large artery is an artery".
51	Harry installed a new burglar alarm at his home to detect burglary. The alarm reliably responds at detecting a burglary but also responds for minor earthquakes. Harry has two neighbors David and Sophia, who have taken a responsibility to inform Harry at work when they hear the alarm. David always calls Harry when he hears the alarm, but sometimes he got confused with the phone ringing and calls at that time too. On the other hand, Sophia likes to listen to high music, so sometimes she misses to hear the alarm. Here we would like to compute the probability of Burglary Alarm. **Problem:** **Calculate the probability that alarm has sounded, but there is neither a burglary, nor an earthquake occurred, and David and Sophia both called the Harry.**
52	*You are at work and your neighbor John calls you to say your house alarm is ringing and you are really worried there is a burglar at home and you want to estimate what is the actual probability that it is the case or just a small earthquake.* You should consider that: • Your neighbor Mary didn't call you. • John always calls when he hears the alarm, but sometimes confuses the telephone ringing with the alarm.

- Mary likes rather loud music and sometimes misses the alarm.
- The probability of burglary at home is small (0,001%) and an earthquake is just double than that.
- The alarm is good but not perfect, there are chances of false positives and negatives.



Find the probability that the alarm sounded but neither burglary nor an earthquake has occurred and both John and Mary call

Find the probability that John Calls

What is the probability that there is a burglary given that John and Mary calls.