1. What are UNION, FIND operations?
Union Operation: Merge a smaller set to a larger set if two elements are disjoint.
Find Operation: Find root parent and determine if two elements are in the same set.

2 .Define Heap?
The heap is one maximally efficient implementation of an abstract data type called a priority queue, and in fact, priority queues are often referred to as "heaps", regardless of how they may be implemented. In a heap, the highest (or lowest) priority element is always stored at the root.

3.Explain the UNION algorithm using weighting rule?
Weighted Union. A low-cost approach to reducing the height is to be smart about how two trees are joined together. One simple technique, called the weighted union rule, joins the tree with fewer nodes to the tree with more nodes by making the smaller tree's root point to the root of the bigger tree.

1. What are the requirements that are needed for performing Backtracking?

To solve any problem using backtracking, it requires that all the solutions satisfy a complex set of constraints. They are:

i. Explicit constraints.

ii. Implicit constraints.

2.Define explicit constraint.

They are rules that restrict each x to take on values only from a give set. They i depend on the particular instance I of the problem being solved. All tuples that satisfy the explicit constraints define a possible solution space.

3. Define implicit constraint.

They are rules that determine which of the tuples in the solution space of I satisfy the criteria function. It describes the way in which the x must relate to each other.

4.Define state space tree.

The tree organization of the solution space is referred to as state space tree.

5. Define state space of the problem.

All the paths from the root of the organization tree to all the nodes is called as state space of the problem

6.Define answer states.

Answer states are those solution states s for which the path from the root to s defines a tuple that is a member of the set of solutions of the problem.

7.What are static trees?

The tree organizations that are independent of the problem instance being solved

are called as static tree.

8.What are dynamic trees?

The tree organizations those are independent of the problem instance being solved are called as static tree.

9.Define a live node.

A node which has been generated and all of whose children have not yet been generated is called as a live node.

10. Define a E – node.

E – node (or) node being expanded. Any live node whose children are currently being generated is called as a E – node.

11.Define a dead node.

Dead node is defined as a generated node, which is to be expanded further all of whose children have been generated.

12. What are the factors that influence the efficiency of the backtracking algorithm?

The efficiency of the backtracking algorithm depends on the following four factors. They are:

The ti i. me needed to generate the next x k

ii. The number of x satisfying the explicit constraints. k

iii. The time for the bounding functions B

iv. The number of x satisfying the B

13.State 8 – Queens problem.

The problem is to place eight queens on a 8 x 8 chessboard so that no two queen "attack" that is, so that no two of them are on the same row, column or on the diagonal.

14.State Sum of Subsets problem.

Given n distinct positive numbers usually called as weights , the problem calls for finding all the combinations of these numbers whose sums are m.

15. State m – colorability decision problem.

Let G be a graph and m be a given positive integer. We want to discover whether the nodes of G can be colored in such a way that no two adjacent nodes have the same color yet only m colors are used.

16.Define chromatic number of the graph.

The m – colorability optimization problem asks for the smallest integer m for which the graph G can be colored. This integer is referred to as the chromatic number of the graph.

Essay Questions

1.Explain about Disjoint set operations.

2. Discuss union and find algorithms in detail with an example.

3) Briefly explain n-queen problem using Backtracking. Explain its applications.

4) Briefly explain Hamiltonian cycles using backtracking.

5) What is Graph coloring? Write an algorithm for it and explain with an example.

6) Write an algorithm for how Eight Queen's problem can be solved using back tracking and explain with an example

7. Explain any one application back tracking with example?

8. Describe in detail 8-queens problem using back tracking?

9. Describe in detail graph coloring using back tracking? [8M]