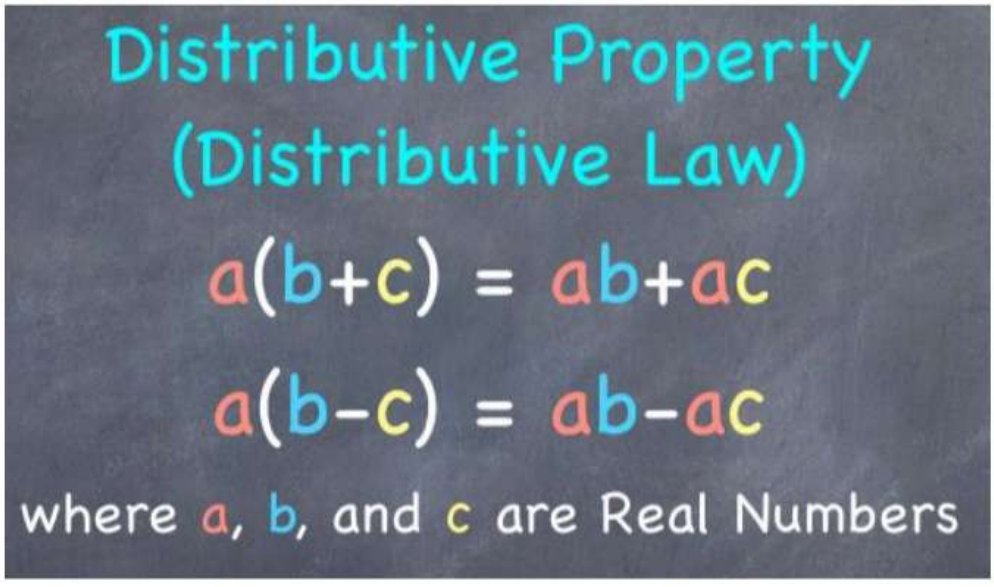
Aim: Write a Program for Distributive Law.

Explanation:

Distributive law, also called distributive property, in mathematics, the law relating the operations of multiplication and addition, stated symbolically as a(b + c) = ab + ac; that is, the monomial factor a is distributed, or separately applied, to each term of the binomial factor b + c, resulting in the product ab + ac. From this law it is easy to show that the result of first adding several numbers and then multiplying the sum by some number is the same as first multiplying each separately by the number and then adding the products.



Aim: Write a Program for FOl Algorithm.

Explanation:

First-order logic is another way of knowledge representation in artificial intelligence. It is an extension to propositional logic. FOL is sufficiently expressive to represent the natural language statements in a concise way.

First-order logic is also known as Predicate logic or First-order predicate logic. First-order logic is a powerful language that develops information about the objects in a more easy way and can also express the relationship between those objects.

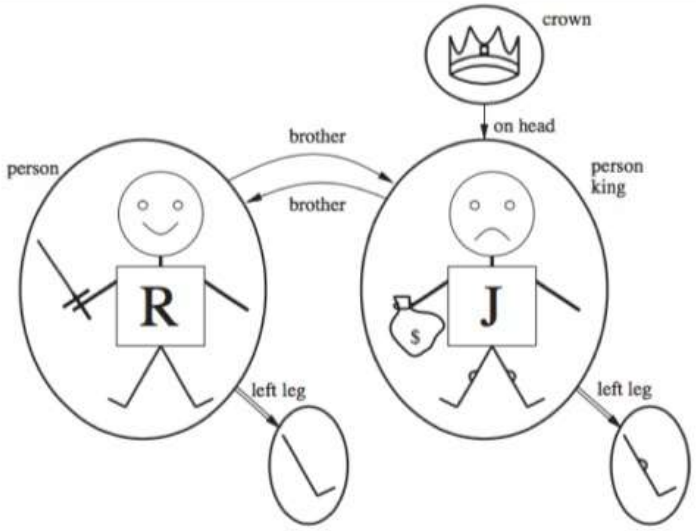
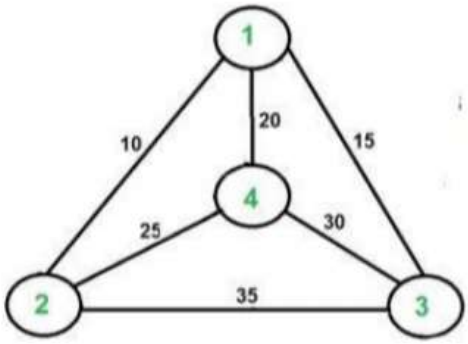


Figure 8.2 A model containing five objects, two binary relations, three unary relations (indicated by labels on the objects), and one unary function, left-leg.

Aim: Solve traveling salesman problem using artificial intelligence technique.

Description: You are given a list of n cities with the distance between any two cities. Now, you have to start with your office and to visit all the cities only once each and return to your office. What is the shortest path can you take? This problem is called the Traveling Salesman Problem (TSP).

Diagram:



Code:

Aim: Design an application to simulate number puzzle problem.

Explanation:

Given a 4x4 board with 8 tiles and one empty space.

The objective is to place the numbers on tiles to match the final configuration using the empty space. We can slide four adjacent tiles into the empty space.

Diagram:

Code:

Aim: Write a program to shuffle Deck of cards.

Explanation:

A deck of cards is a set of 52 cards divided into four suits: clubs, diamonds , hearts , and spades. Each suit has thirteen cards: ace (A), two, three, four, five, six, seven, eight, nine, ten, jack (J), queen (Q), and king (K).

The ace is the highest-ranking card in most games, but it can also be used as a one. The jack, queen, and king are called face cards.

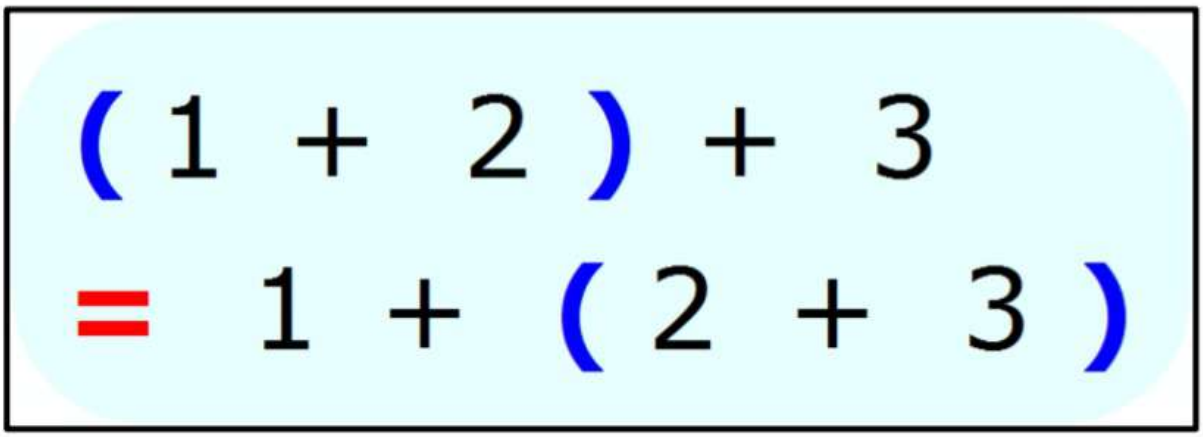
Diagram:

Aim: Drive the expression based on Associative Law.

Explanation:

Associative law, in mathematics, either of two laws relating to number operations of addition and multiplication, stated symbolically: $a + (b + c) = (a + b) + c$, and $a(bc) = (ab)c$; that is, the terms or factors may be associated in any way desired. While associativity holds for ordinary arithmetic with real or imaginary numbers, there are certain applications—such as non associative algebras—in which it does not hold.

GRAPH :

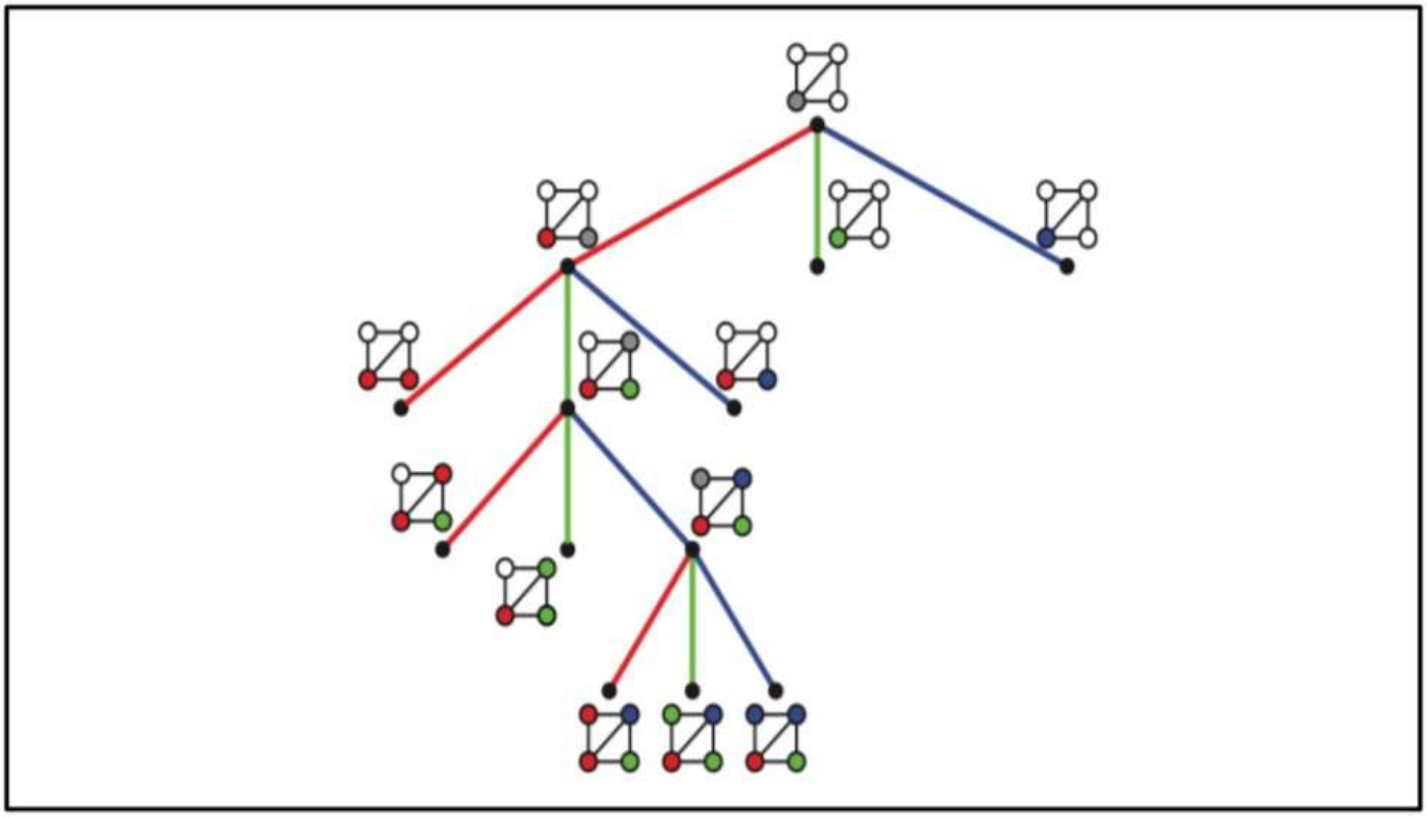


Explanation:

Constraint Satisfaction Problem (CSP) is a fundamental topic in artificial intelligence (AI) that deals with solving problems by identifying constraints and finding solutions that satisfy those constraints.CSP has a wide range of applications, including scheduling, resource allocation, and automated reasoning.

CSP is a specific type of problem-solving approach that involves identifying constraints that must be satisfied and finding a solution that satisfies all the constraints. CSP has been used in a variety of applications, including scheduling, planning, resource allocation, and automated reasoning.

GRAPH :



Date:31/08/2023

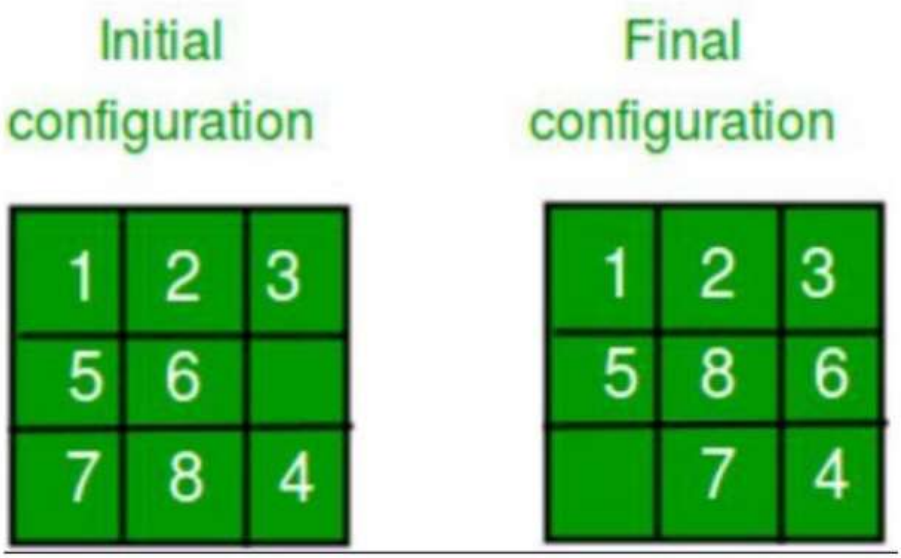
Aim: Write a program to simulate number puzzle problem.

Explanation:

In this puzzle solution of the 8 puzzle problem is discussed.

Given a 3×3 board with 8 tiles (every tile has one number from 1 to 8) and one empty space. The objective is to place the numbers on tiles to match the final configuration using the empty space. We can slide four adjacent (left, right, above, and below) tiles into the empty space.

Diagram:



Code:

```
import copy from heapq import
heappush, heappop
```

Practical No 5

AIM: Write a program to solve the Missionaries and Cannibals problem

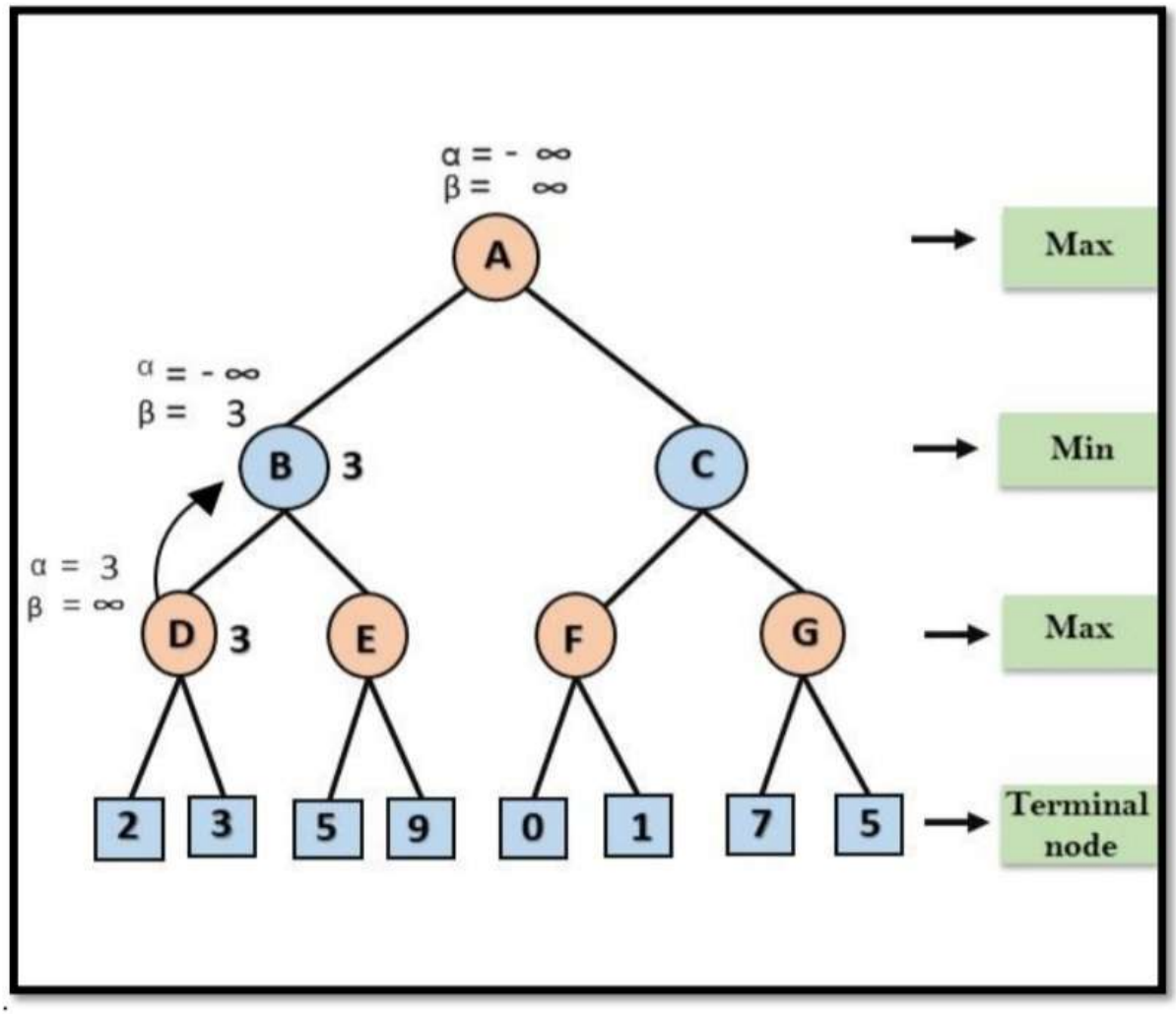
The missionaries and cannibals problem, and the closely related jealous husbands problem, are classic river-crossing logic puzzles. The missionaries and cannibals problem is a well-known toy problem in artificial intelligence, where it was used by Saul Amarel as an example of problem representation.

Diagram:

Aim :Write a program to implement alpha beta search.

Alpha–beta pruning is a search algorithm that seeks to decrease the number of nodes that are evaluated by the minimax algorithm in its search tree. It is an adversarial search algorithm used commonly for machine playing of two-player games.

Diagram:

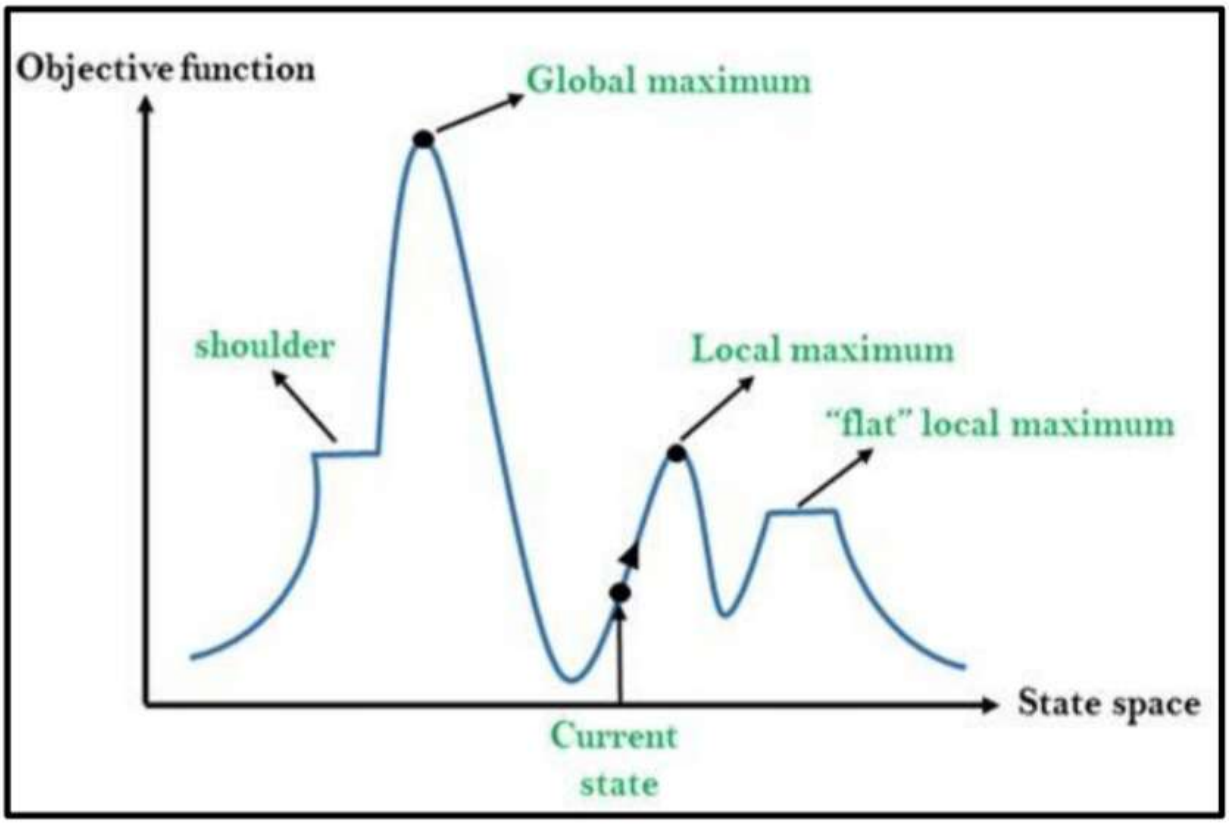


Code:

Write a program for Hill Climbing Problem.

In numerical analysis, **Hill climbing** is a mathematical optimization technique which belongs to the family of local search. It is an iterative algorithm that starts with an arbitrary solution to a problem, then attempts to find a better solution by making an incremental change to the solution.

Diagram:

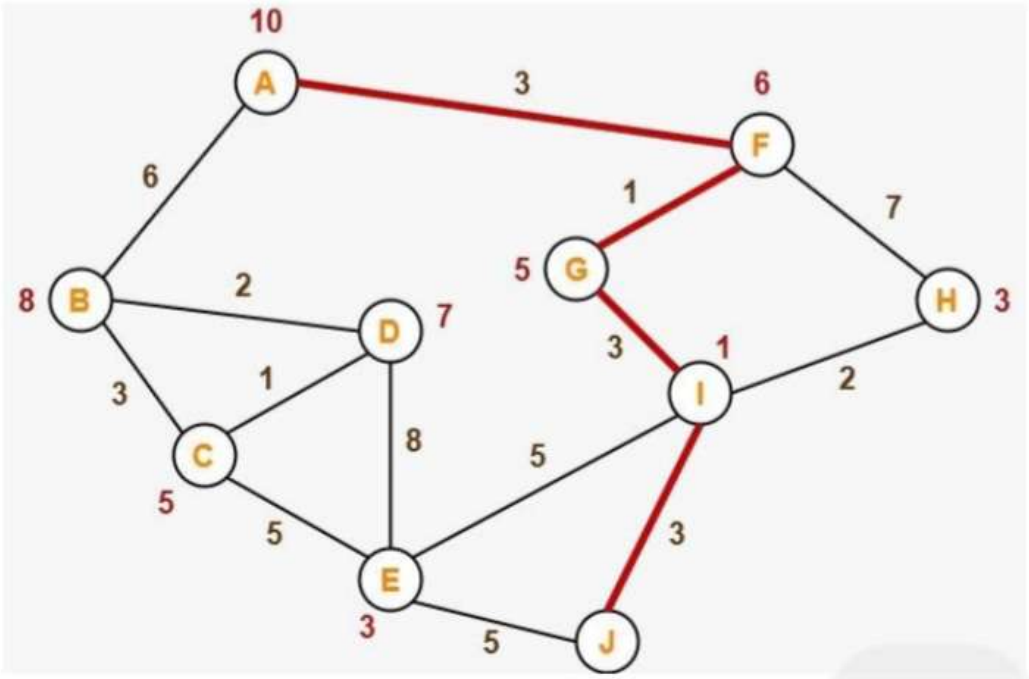


The A* (pronounced "A-star") algorithm is a popular and widely used path finding algorithm in computer science and artificial intelligence. It is primarily used to find the shortest path between two points on a graph or grid while efficiently exploring the most promising nodes along the way. The A* algorithm combines the advantages of a heuristic search.

The AO* algorithm is based on AND-OR graphs to break complex problems into smaller ones and then solve them. The AND side of the graph represents those tasks that need to be done with each other to reach the goal, while the OR side stands alone for a single task.

Note: Install Following python packages.

- pip install simpleai
- pip install pydot flask



Aim: Write a program to solve the water jug problem.

Water jug problem:

The water jug problem is a classic puzzle that involves two or three jugs and the task of measuring a specific quantity of water using those jugs.

The constraints of the problem are as follows:

I. You can fill the jugs completely from the water source.
II. You can empty the jugs completely onto the ground.
III. You can transfer water from one jug to another until the source jug is empty or the target jug is full.

Diagram:

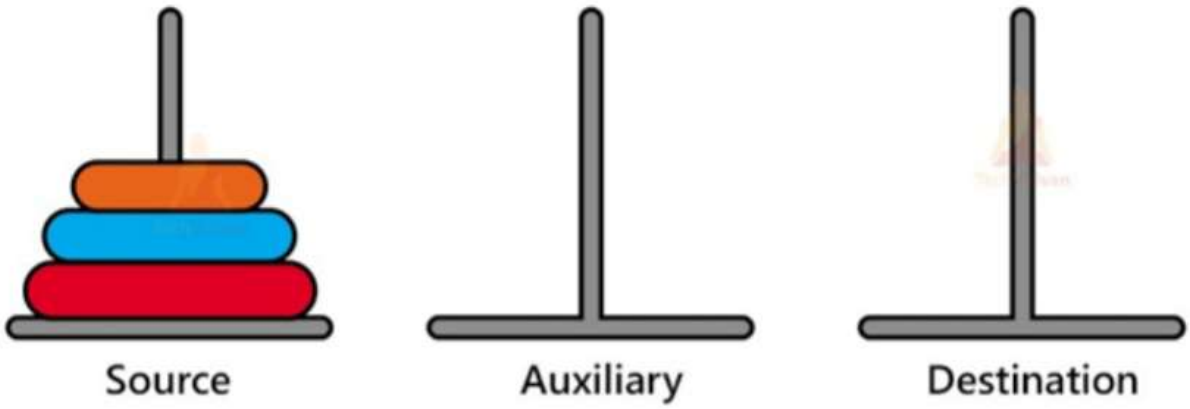
5 Liters

7 Liters

Tower of Hanoi:

The Tower of Hanoi is a mathematical puzzle that consists of three rods and a number of disks of different sizes that can slide onto any rod. The objective of the puzzle is to move the entire stack of disks from one rod to another

Diagram:

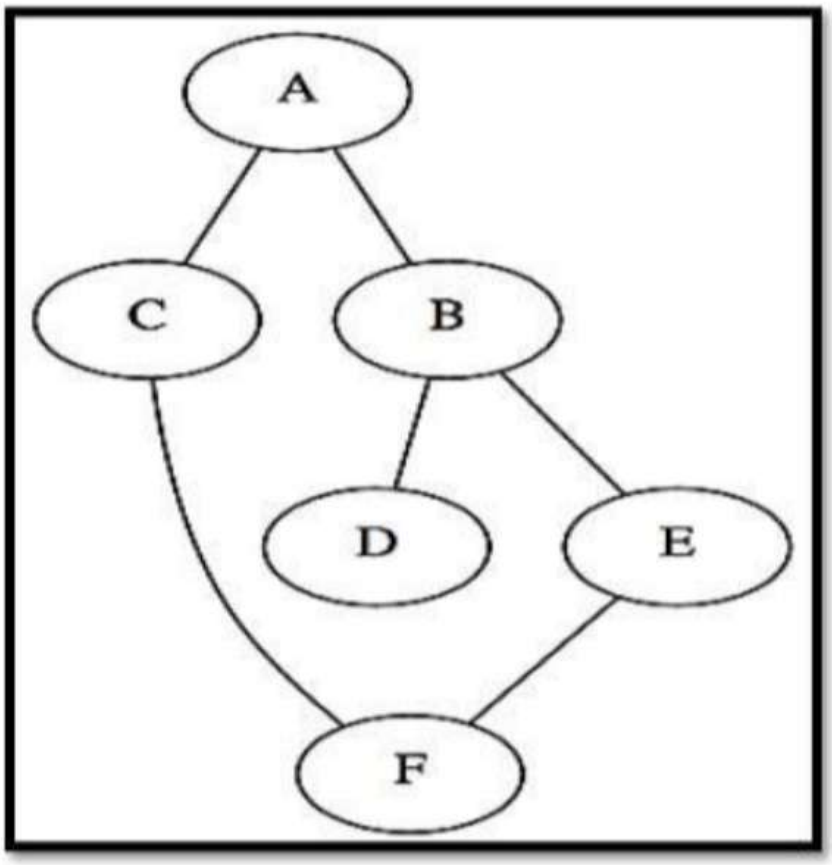


Aim: Write a Program to implement Breadth first search algorithm.

Breadth first search algorithm:

BFS stands for Breadth-First Search, which is another graph traversal algorithm used to explore or search through a graph or tree data structure. Unlike DFS, which explores the depth of a graph first, BFS explores the vertices at the same level before moving to the next level.

Diagram:



Aim: Write a Program to Implement Depth first search algorithm.

Depth first search algorithm:

DFS stands for Depth-First Search, which is a graph traversal algorithm used to explore or search through a graph or tree data structure. It starts at a given node and explores as far as possible along each branch before backtracking.

Diagram: