

# **DATA STRUCTURES**

# **LABORATORY**

## **Assignment 6**

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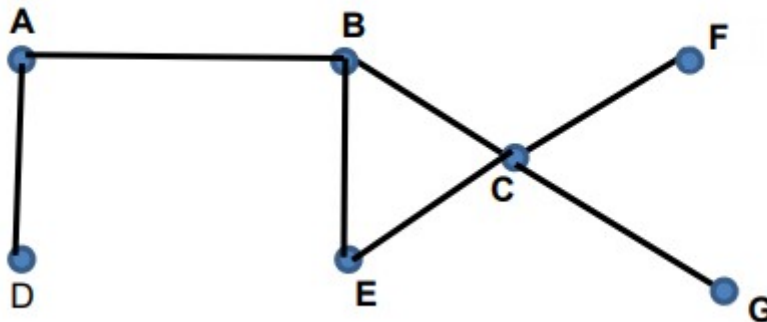
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## **Problem Statement 1**

Write a menu driven C++ program to implement a graph using adjacency list (linked list) without using STL. Perform following operations on the graph. 1. Inset edge 2. BFS traversal 3. DFS traversal 4. Cycle finding in the graph 5. Calculate diameter of the graph

**Input:**



**Output:**

2. A B D E C F G
3. A B C G F E D
4. Yes
5. Diameter: 4

## **Problem Statement 2:**

A binomial heap is implemented as a set of binomial trees, which are defined recursively as follows: x A binomial tree of order 0 is a single node x A binomial tree of order k has a root node whose children are roots of binomial trees of orders  $k-1, k-2, \dots, 2, 1, 0$  (in this order). x A binomial tree of order k has  $2^k$  nodes, height k. Write a C++ program to implement a binomial heap using heap

data structures (without using STL). Print the order of each binomial heap and use Graphviz to show the forest of binomial heap.

### **Problem Statement 3:**

Write a C++ program to implement Bentley-Ottmann Algorithm to find and print all the intersection points of  $n$  given lines. Use of STL is allowed. The specific type of data structure that must be used include Priority Queue and BST. Using least square method find the linear fit of the  $M$  found intersection points and print the line in the form  $ax+b$ . The student should demonstrate this on a GUI using QT library. The input should be given in following format: 1. Input number of line segments,  $N$  2.  $N$  lines where  $2N$  points are provided, i.e., 2 points in each line