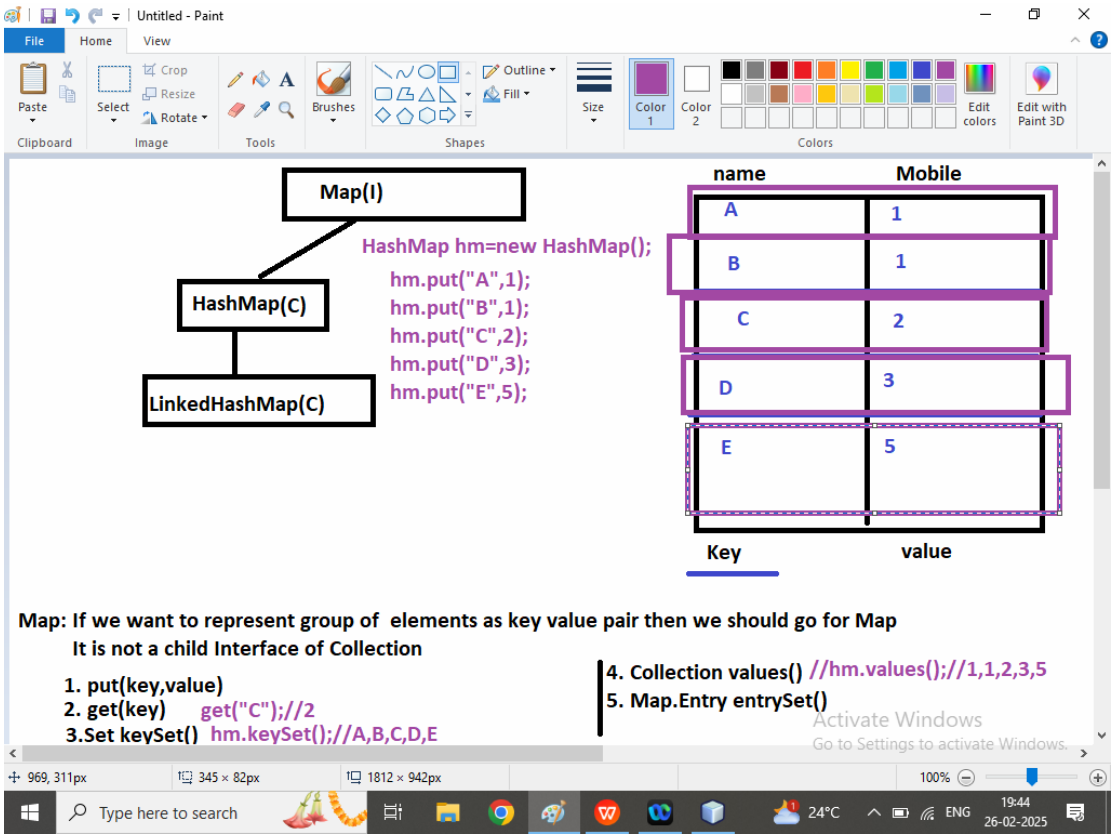
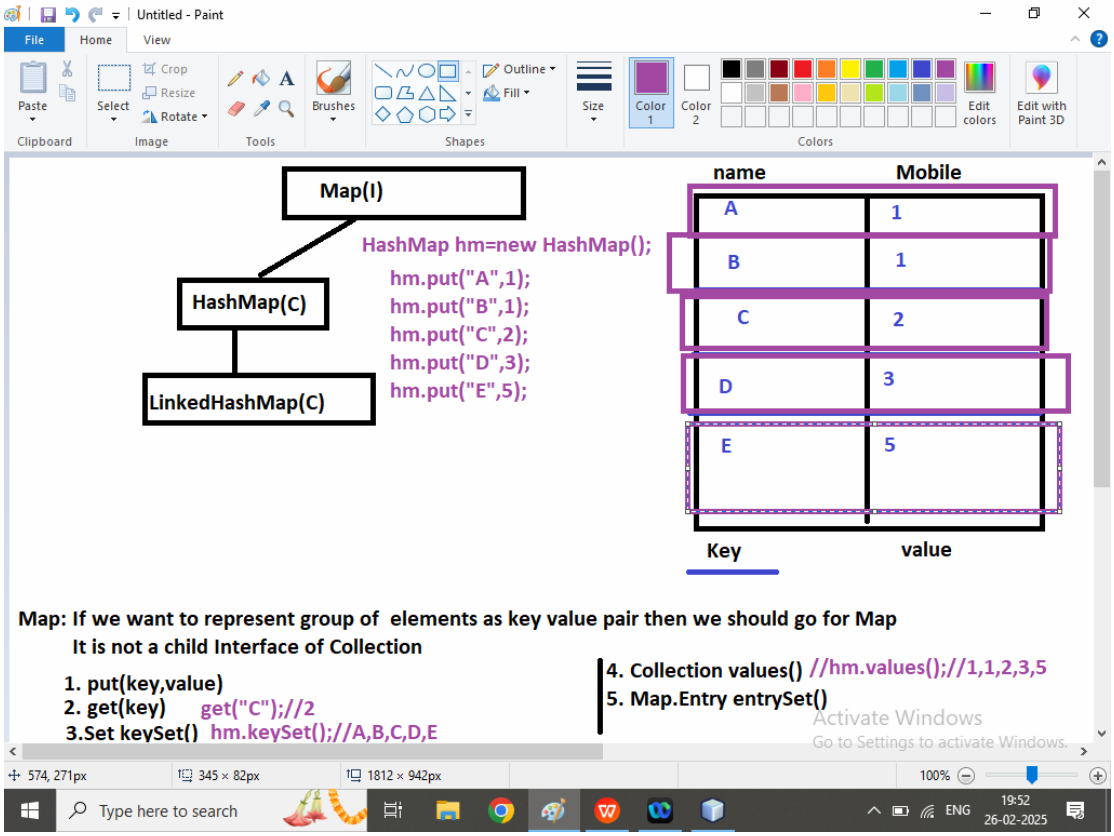
Q1. Explain HashMap?



If we want to store data inform of key value pair where insertion order not preserved(on the basis of key) and duplicate keys are not allowed but values can be duplicated.




```
import java.util.HashMap;
import java.util.Map;
import java.util.Set;

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 */

/**
 *
 * @author Admin
 */
public class H1 {
   public static void main(String[] args) {
      HashMap<String,Integer> hm=new HashMap();
      hm.put("A",1);
      hm.put("B",1);
      hm.put("C",2);
      hm.put("D",3);
      hm.put("E",5);

      Set keys=hm.keySet();

      System.out.println("print element of HasMap using Map.Entry");
  for(Map.Entry<String,Integer> k:hm.entrySet()){
       System.out.println("Key is : "+k.getKey()+"   Value is "+k.getValue());
    }
```

```
    }
}


import java.util.HashMap;
import java.util.LinkedHashMap;
import java.util.Map;
import java.util.Set;

/*
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 */

/**
 *
 * @author Admin
 */
public class H1 {
    public static void main(String[] args) {
     HashMap<Integer,String> hm=new HashMap<>();
        hm.put(100,"A");
        hm.put(10,"B");
        hm.put(200,"C");
        hm.put(30,"D");
        hm.put(500,"E");

        System.out.println(""+hm);

        Set keys=hm.keySet();

        System.out.println("print element of HasMap using Map.Entry");
   for(Map.Entry<Integer,String> k:hm.entrySet()){
         System.out.println("Key is : "+k.getKey()+"   Value is "+k.getValue());
      }

    }
}
```

Q2. Explain LinkedHashMap?

Ans: It is the Child Class of HashMap, where Duplicates keys are not allowed and Insertion Order are preserved then we should go for LinkedHashMap

```
import java.util.HashMap;
import java.util.LinkedHashMap;
import java.util.Map;
import java.util.Set;

/*
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Headers in Project Properties.
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 */

/**
 *
 * @author Admin
 */
public class H1 {
   public static void main(String[] args) {
       LinkedHashMap<Integer,String> hm=new
LinkedHashMap<>();
       hm.put(100,"A");
       hm.put(10,"B");
       hm.put(200,"C");
       hm.put(30,"D");
       hm.put(500,"E");
```

```
        System.out.println(""+hm);

        Set keys=hm.keySet();

        System.out.println("print element of HasMap
using Map.Entry");
   for(Map.Entry<Integer,String> k:hm.entrySet()){
         System.out.println("Key is : "+k.getKey()+"
Value is "+k.getValue());
      }

    }
}
```

Q3. Explain TreeMap class in java?

Ans: If we want to represent group of elements in key value pair where duplicates key not allowed. Data stored in default natural sorting order on the basis of key

```
import java.util.HashMap;
import java.util.LinkedHashMap;
import java.util.Map;
import java.util.Set;
import java.util.TreeMap;

/*
```

```
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 * and open the template in the editor.
 */

/**
 *
 * @author Admin
 */
public class H1 {
   public static void main(String[] args) {
      TreeMap<Integer,String> hm=new
TreeMap<>();
      hm.put(100,"A");
      hm.put(10,"B");
      hm.put(200,"C");
      hm.put(30,"D");
      hm.put(500,"E");

      System.out.println(""+hm);

      Set keys=hm.keySet();

      System.out.println("print element of HasMap
using Map.Entry");
  for(Map.Entry<Integer,String> k:hm.entrySet()){
```
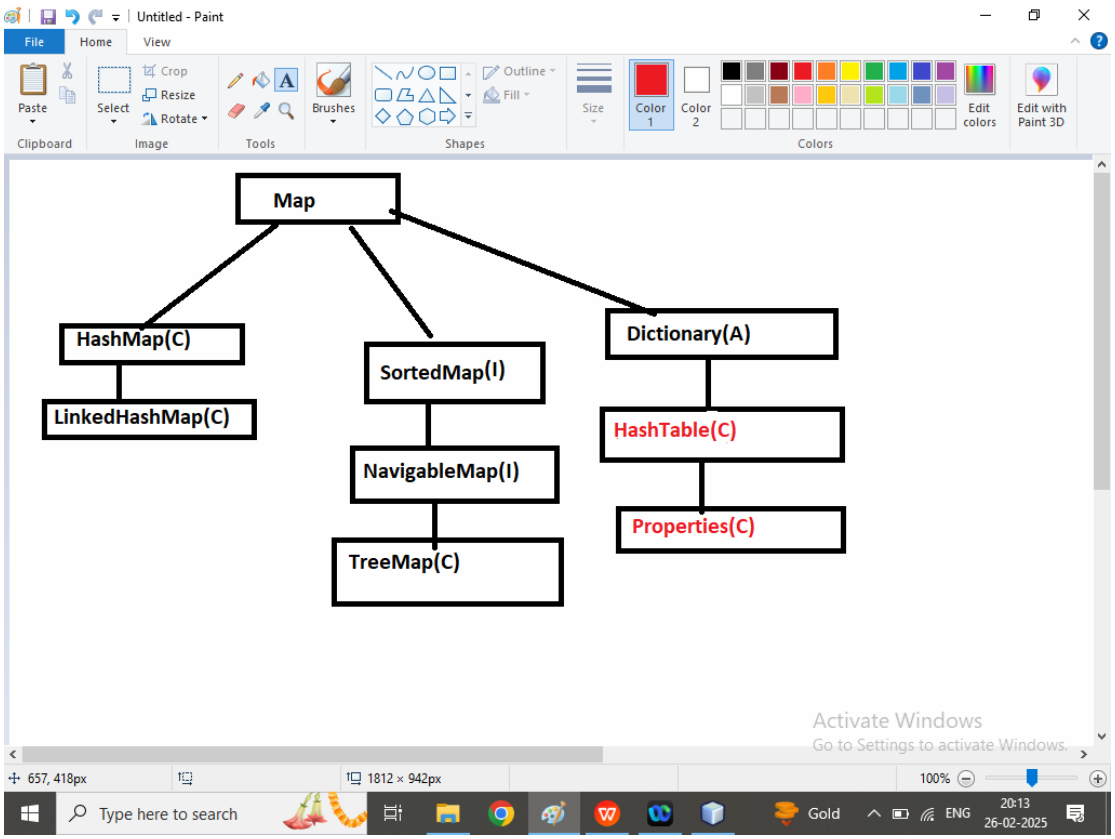

```
        System.out.println("Key is : "+k.getKey()+"
Value is "+k.getValue());
    }

   }
}
```



Q4. Explain HashTable class in java?

Ans: if we want to represent group of entity in key value pair where duplicates keys are not allowed ,insertion order not preserved and thread safety is required then we should go for HashTable

```
import java.util.HashMap;
import java.util.Hashtable;
import java.util.LinkedHashMap;
import java.util.Map;
import java.util.Set;
import java.util.TreeMap;

/*
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 * and open the template in the editor.
 */

/**
 *
 * @author Admin
 */
public class H1 {
   public static void main(String[] args) {
      Hashtable<Integer,String> hm=new
Hashtable<Integer, String>();
       hm.put(100,"A");
       hm.put(10,"B");
       hm.put(200,"C");
       hm.put(30,"D");
```

```
        hm.put(500,"E");
        hm.put(100, "AAAA");

        System.out.println(""+hm);

        Set keys=hm.keySet();

        System.out.println("print element of HasMap
using Map.Entry");
   for(Map.Entry<Integer,String> k:hm.entrySet()){
         System.out.println("Key is : "+k.getKey()+"
Value is "+k.getValue());
      }

    }
}
```

```
import java.util.HashMap;
import java.util.Hashtable;
import java.util.LinkedHashMap;
import java.util.Map;
import java.util.Set;
import java.util.TreeMap;

/*
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Headers in Project Properties.
```

```
 * To change this template file, choose Tools |
Templates
 * and open the template in the editor.
 */

/**
 *
 * @author Admin
 */
public class H1 {
   public static void main(String[] args) {
      Hashtable<Integer,String> hm=new
Hashtable<Integer, String>();
       hm.put(100,"A");
       hm.put(10,"B");
       hm.put(200,"C");
       hm.put(30,"D");
       hm.put(500,"E");
       hm.put(100, "AAAA");

       System.out.println(""+hm);

       Set keys=hm.keySet();

       System.out.println("Contains Key :
"+hm.containsKey(30));
       System.out.println("value check
"+hm.containsValue("D"));
```

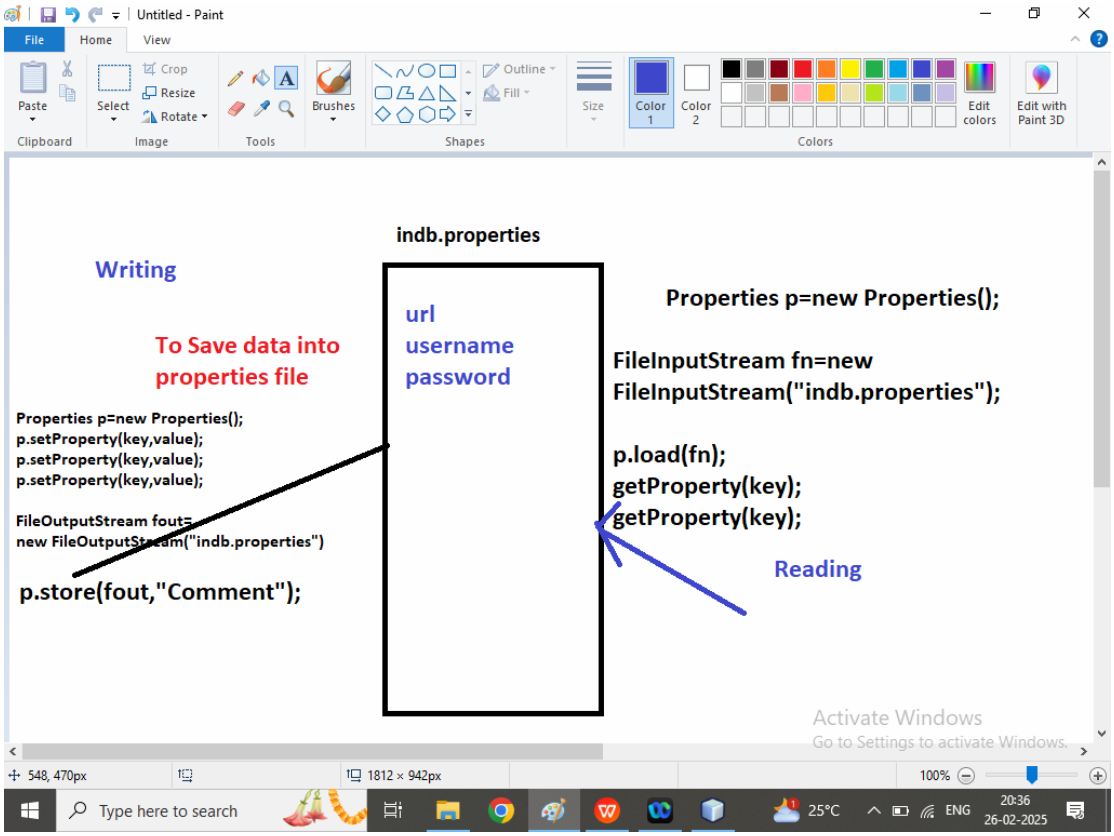
```
        System.out.println("print element of HasMap
using Map.Entry");
   for(Map.Entry<Integer,String> k:hm.entrySet()){
         System.out.println("Key is : "+k.getKey()+"
Value is "+k.getValue());
      }

    }
}
```

Q3.Explain Properties class in java?

Ans: if we want to represent data inform of key value pair where key and value must String type then we should go for Properties class

Properties class/ properties file is used to set configuration of particular application



Example : Write data into indb.properties file

```
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.IOException;
import java.util.Properties;

/*
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 */
```

```
/**
 *
 * @author Admin
 */
public class P1 {
   public static void main(String[] args) throws
FileNotFoundException, IOException {

       FileOutputStream fout=new
FileOutputStream("indb.properties");
       Properties p=new Properties();
       p.setProperty("url",
"jdbc:mysql://localhost:3306/db");
       p.setProperty("un", "root");
       p.setProperty("ps", "Ram@1234");
       p.store(fout,"This File is Created By  Me");
       System.out.println("Data Written success");

   }
}
```

```
import java.io.FileInputStream;
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.IOException;
import java.util.Properties;
```

```
/*
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Headers in Project Properties.
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Templates
 * and open the template in the editor.
 */

/**
 *
 * @author Admin
 */
public class P1 {
   public static void main(String[] args) throws
FileNotFoundException, IOException {

       FileInputStream fin=new
FileInputStream("indb.properties");
       Properties p=new Properties();
       p.load(fin);
       System.out.println("UserName :
"+p.getProperty("un"));
       System.out.println("Password :
"+p.getProperty("ps"));
       System.out.println("URL :
"+p.getProperty("url"));
```
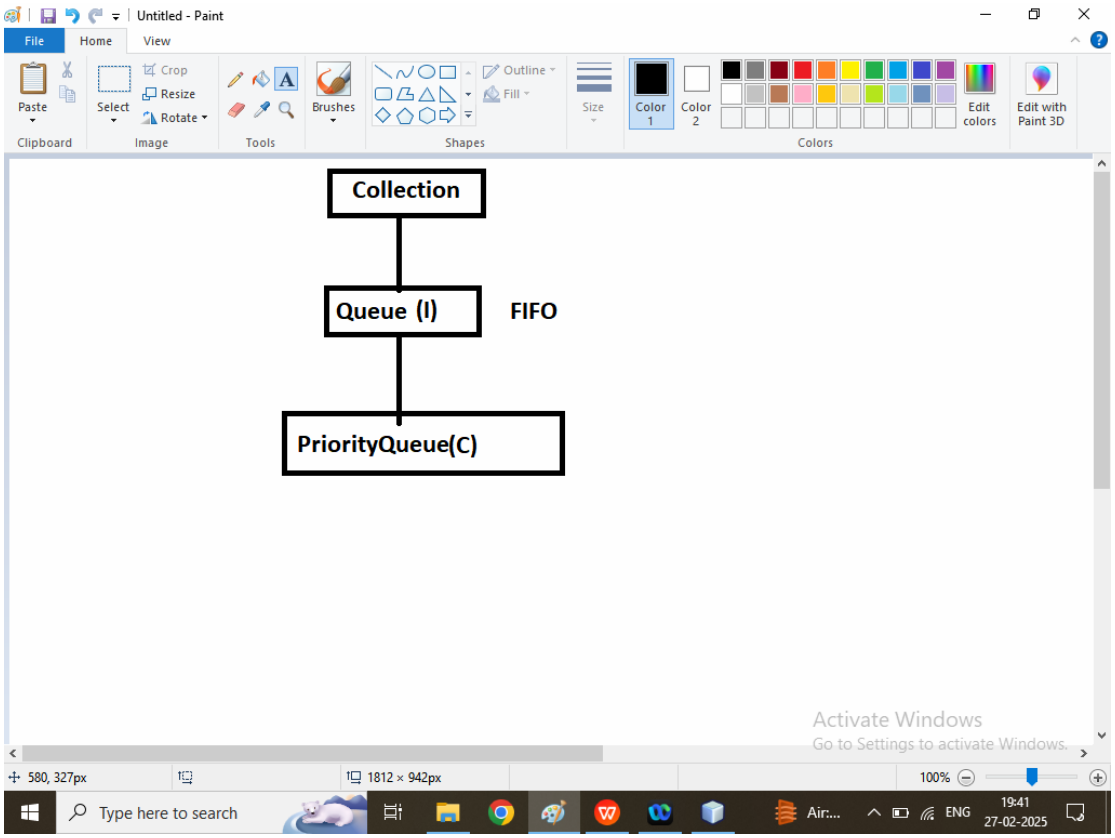
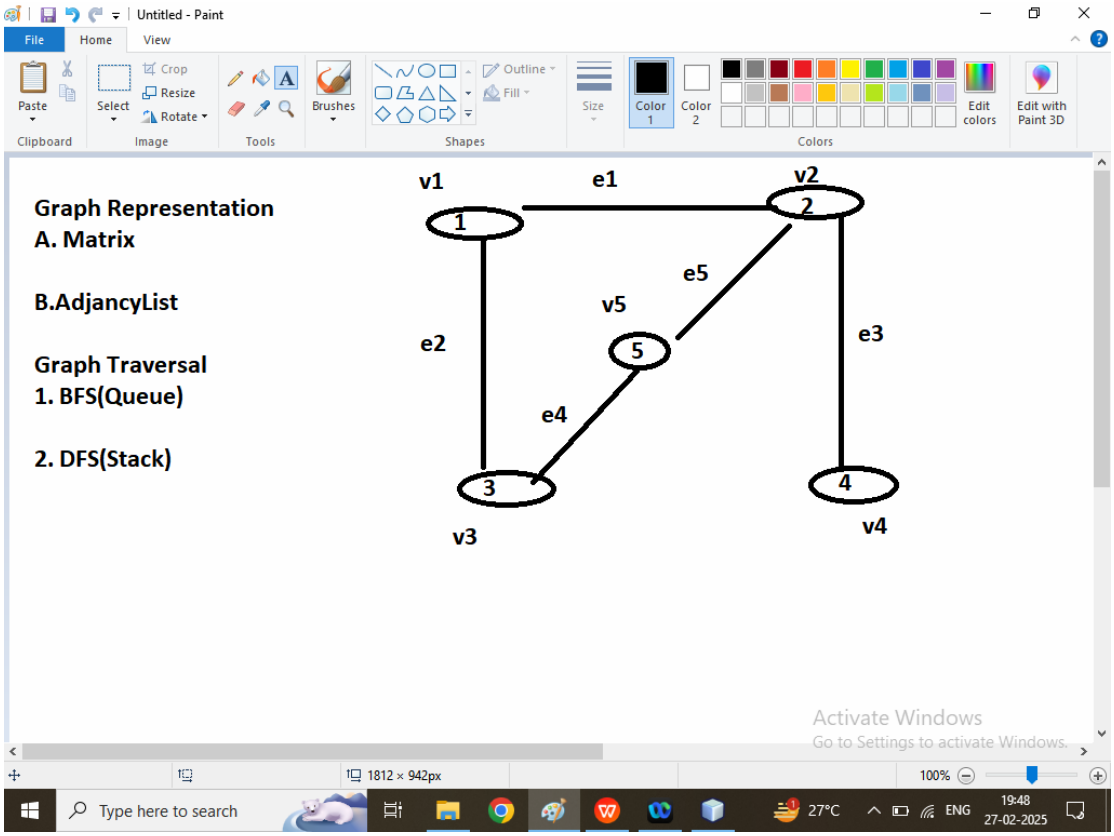
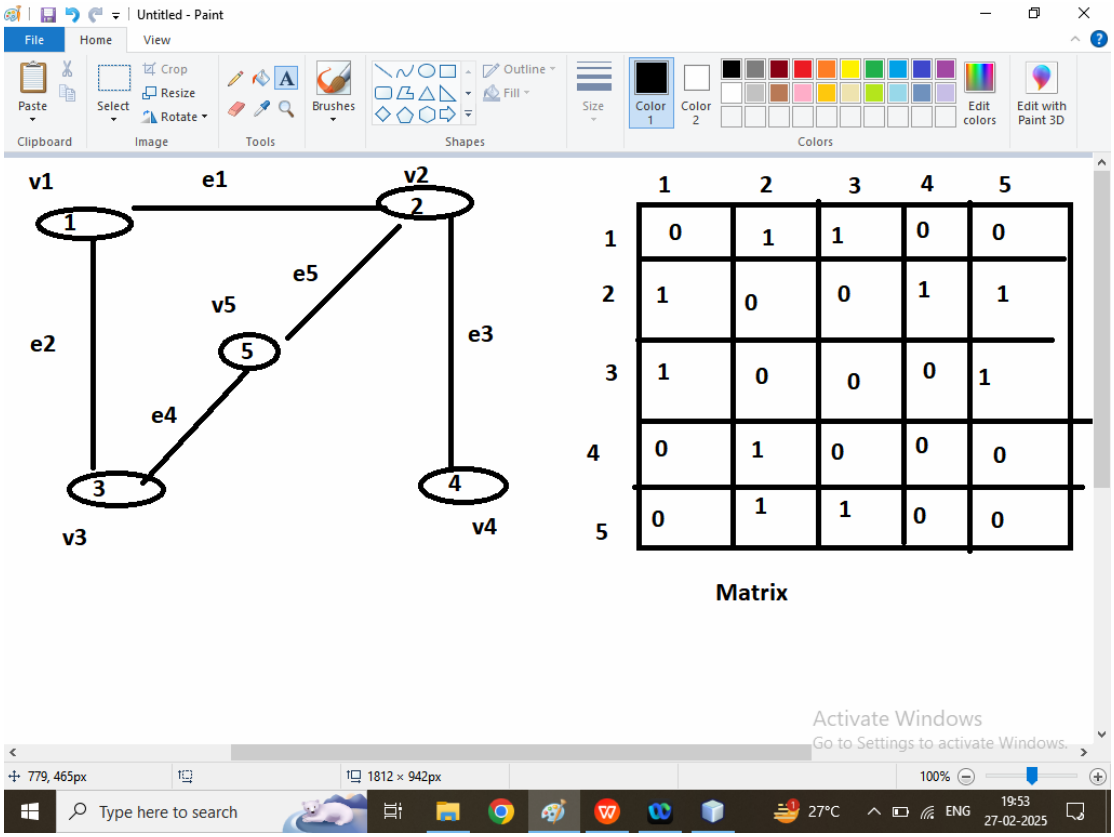

```
    }
}
```



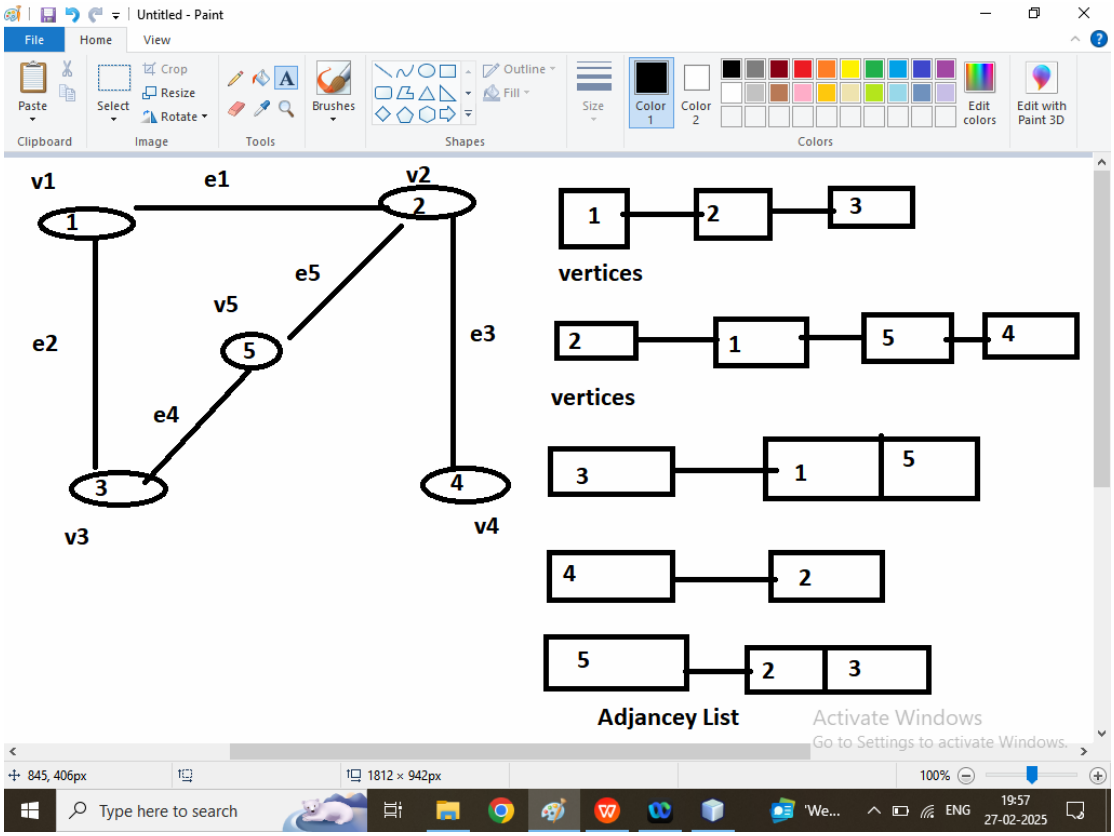

```
import java.util.PriorityQueue;


public class P2 {
   public static void main(String[] args) {

      PriorityQueue<Integer> pq=new PriorityQueue<Integer>();


      pq.add(1);
      pq.add(2);
      pq.add(3);

      System.out.println(""+pq);
      System.out.println("Delete Element : "+pq.remove());
      System.out.println(""+pq);

   }
}
```

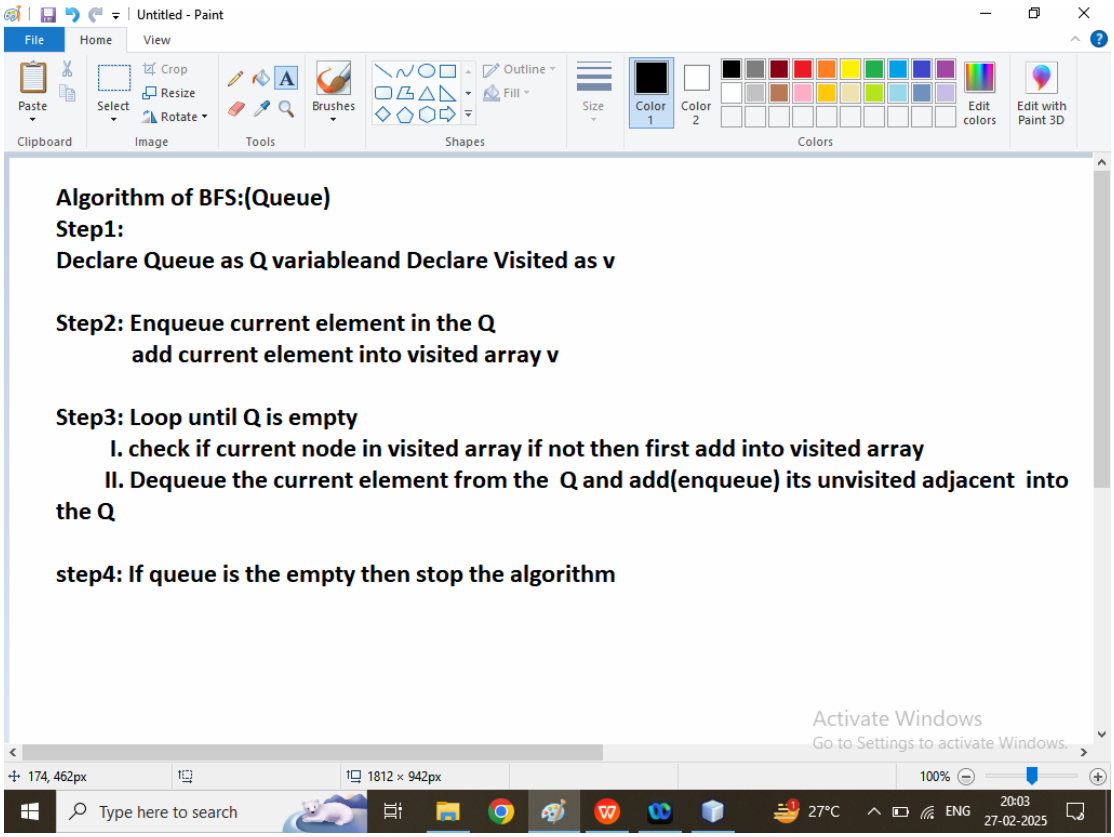
```
import java.util.ArrayDeque;
import java.util.PriorityQueue;


public class P2 {
   public static void main(String[] args) {

      PriorityQueue<Integer> pq=new PriorityQueue<Integer>();


      pq.add(1);
      pq.add(2);
      pq.add(3);


      System.out.println(""+pq);
      System.out.println("Delete Element : "+pq.remove());
      System.out.println(""+pq);
       ArrayDeque<Integer> ad=new ArrayDeque<>();
       ad.add(10);
       ad.add(20);
       ad.add(30);

       System.out.println(""+ad);
       ad.addFirst(5);//insert data using front end
       ad.addLast(40);//insert data using rear end
       System.out.println(""+ad);
   }
}
```

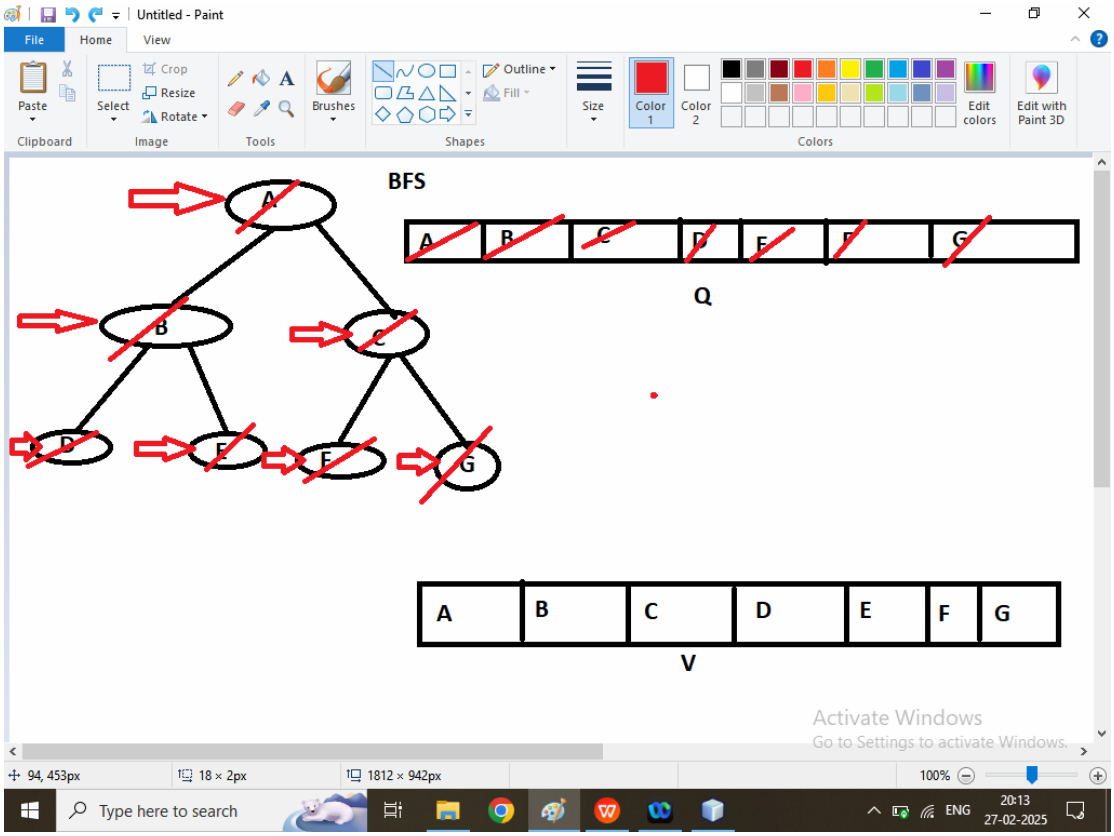


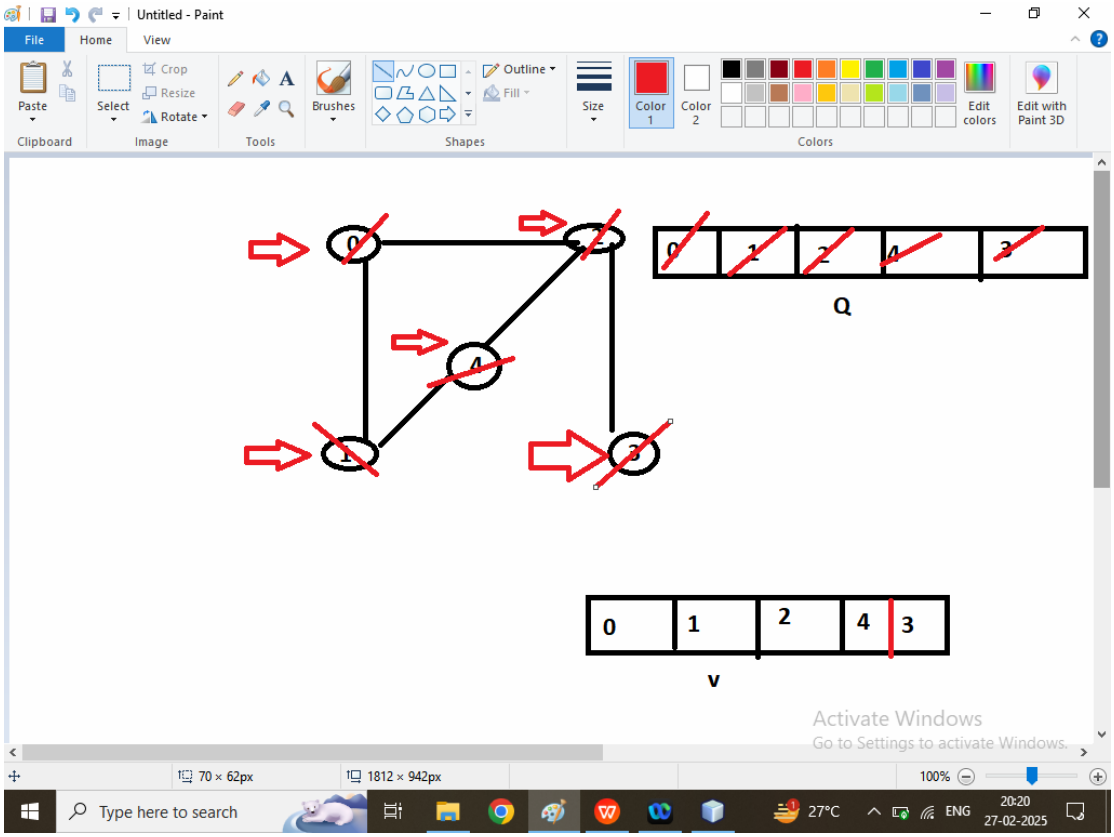


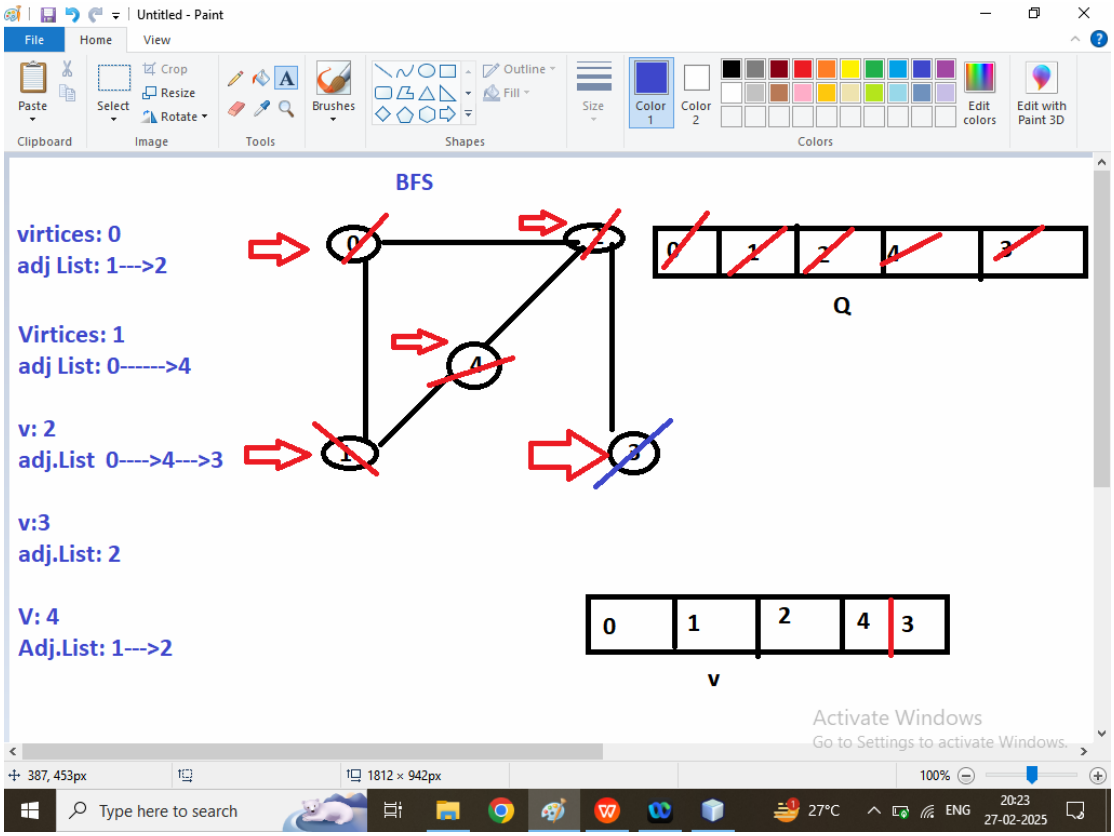
	1	2	3	4	5
1	0	1	1	0	0
2	1	0	0	1	1
3	1	0	0	0	1
4	0	1	0	0	0
5	0	1	1	0	0

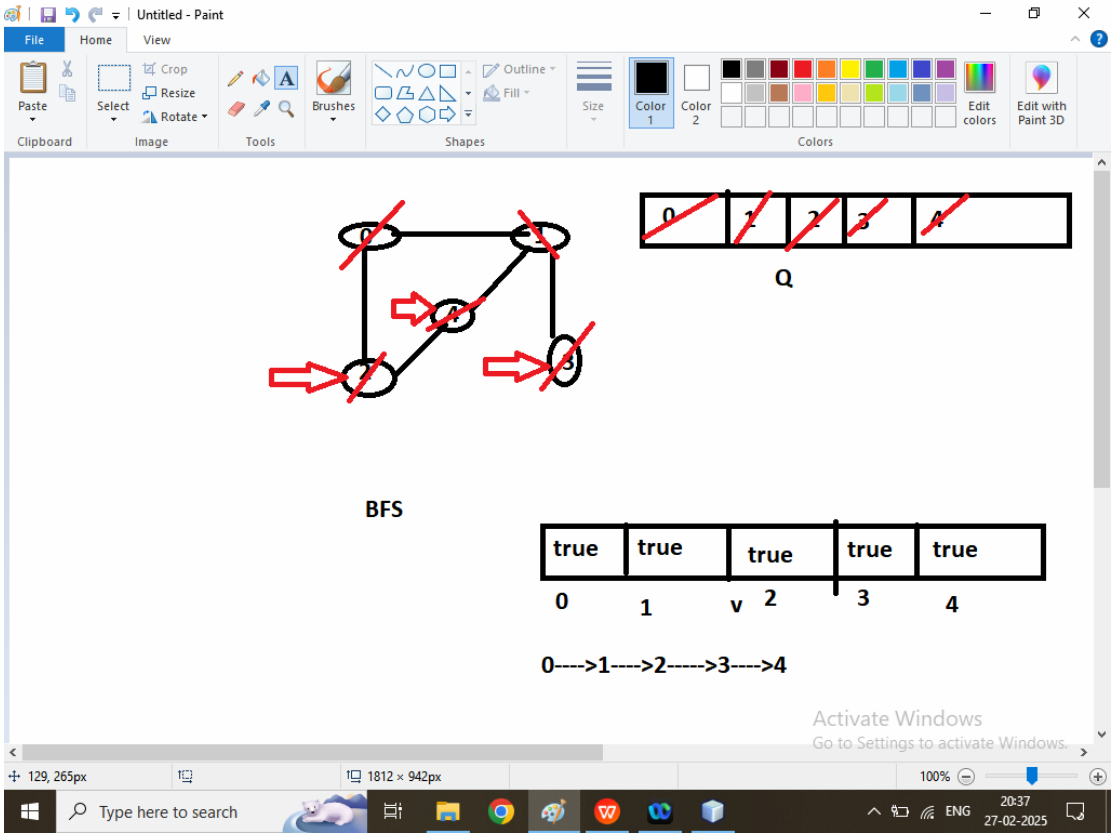

Untitled - Paint
v1
e1
v2
1
2
e5
v5
e2
5
e3
e4
3
4
v3
v4
1
2
3
vertices
2
1
5
4
vertices
3
1
5
4
2
5
2
3
Adjancey List


Untitled - Paint
Algorithm of BFS:(Queue)
Step1:
Declare Queue as Q variableand Declare Visited as v
Step2: Enqueue current element in the Q
add current element into visited array v
Step3: Loop until Q is empty
I. check if current node in visited array if not then first add into visited array
II. Dequeue the current element from the Q and add(enqueue) its unvisited adjacent into the Q
step4: If queue is the empty then stop the algorithm


Untitled - Paint
BFS
A
B
C
D
E
F
G
Q
V
Activate Windows
Go to Settings to activate Windows.


Untitled - Paint
0
1
2
3
4
Q
v
Activate Windows
Go to Settings to activate Windows.


Untitled - Paint
BFS
virtices: 0
adj List: 1--->2
Virtices: 1
adj List: 0------>4
v: 2
adj.List 0---->4--->3
v:3
adj.List: 2
V: 4
Adj.List: 1--->2
0
1
2
4
3
Q
0
1
2
4
3
v
Activate Windows
Go to Settings to activate Windows.


Untitled - Paint
0
1
2
3
4
Q
BFS
true
true
true
true
true
0
1
v
2
3
4
0---->1---->2----->3---->4
Activate Windows
Go to Settings to activate Windows.

```
/*
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 */

/**
 *
 * @author Admin
 */
import java.util.LinkedList;
import java.util.Queue;

// Class to represent a graph using adjacency list
class Graph {

    int vertices;//5
    LinkedList<Integer>[] adjList;

    Graph(int vertices) {//v=5
        this.vertices = vertices;
        adjList = new LinkedList[vertices];
        for (int i = 0; i < vertices; ++i) {
            adjList[i] = new LinkedList<>();
        }
    }

    // Function to add an edge to the graph
    void addEdge(int u, int v) {
        adjList[u].add(v);
    }

    // Function to perform Breadth First Search on a graph
    // represented using adjacency list
    void bfs(int startNode) {
        // Create a queue for BFS
        Queue<Integer> queue = new LinkedList<>();
        boolean[] visited = new boolean[vertices];

        // Mark the current node as visited and enqueue it
        visited[startNode] = true;
        queue.add(startNode);

        // Iterate over the queue
        while (!queue.isEmpty()) {
            // Dequeue a vertex from queue and print it
            int currentNode = queue.poll();
            System.out.print(currentNode + " ");//0

            // Get all adjacent vertices of the dequeued
            // vertex currentNode If an adjacent has not
            // been visited, then mark it visited and
            // enqueue it
            for (int neighbor : adjList[currentNode]) {
                if (!visited[neighbor]) {
                    visited[neighbor] = true;
```

```
                queue.add(neighbor);
            }
        }
    }
  }
}

class Main {

  public static void main(String[] args) {
    // Number of vertices in the graph
    int vertices = 5;

    // Create a graph
    Graph graph = new Graph(vertices);

    // Add edges to the graph
    graph.addEdge(0, 1);
    graph.addEdge(0, 2);
    graph.addEdge(1, 3);
    graph.addEdge(1, 4);
    graph.addEdge(2, 4);

    // Perform BFS traversal starting from vertex 0
    System.out.print(
          "Breadth First Traversal starting from vertex 0: ");
    graph.bfs(0);
  }
}
```