

## **PROGRAM TITLE 07**

### **BREADTH – FIRST SEARCH**

#### **AIM:**

To Write the python program to implement BFS.

#### **PROCEDURE:**

##### **1. Initialize Data Structures:**

- Create a queue to keep track of nodes to visit.
- Create a set or array to keep track of visited nodes.

##### **2. Start at the Initial Node:**

- Enqueue the initial node.

##### **3. Explore Neighbors:**

- While the queue is not empty:
  - Dequeue a node.
  - If the node has not been visited:
    - Mark the node as visited.
    - Process the node (e.g., print its value or perform some operation).
    - Enqueue its unvisited neighbors.

##### **4. Termination:**

- The algorithm terminates when the queue is empty.

#### **CODING:**

```
from collections import deque
```

```

class Graph:
    def
    __init__(self):
        self.graph = {}

    def add_edge(self, u, v):
        if u not in self.graph:
            self.graph[u] = []
        self.graph[u].append(v)

    def bfs(self, start):
        visited = set()
        queue = deque([start])
        visited.add(start)

        while queue:
            vertex = queue.popleft()
            print(vertex, end=" ")

            if vertex in self.graph:
                for
                neighbor in self.graph[vertex]:
                    if neighbor not in visited:
                        visited.add(neighbor)
                        queue.append(neighbor)

if __name__ == "__main__":
    g = Graph()
    g.add_edge(0, 1)
    g.add_edge(0, 2)

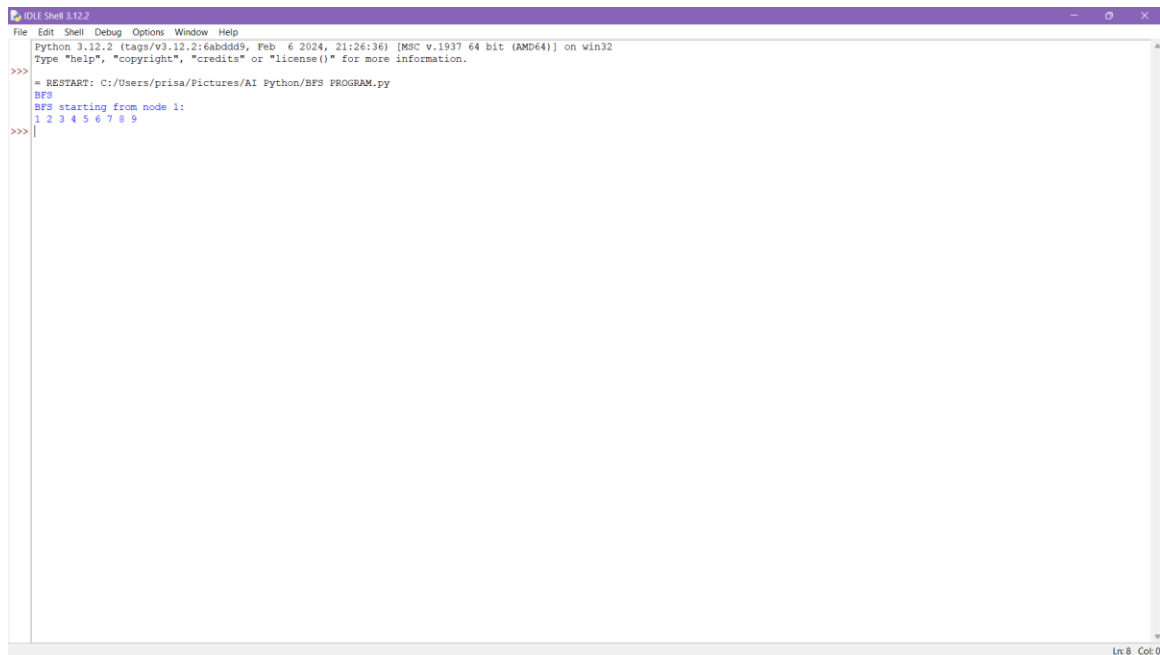
```

```
g.add_edge(1, 2)
g.add_edge(2, 0)
g.add_edge(2, 3)
g.add_edge(3, 3)

print("Breadth First Traversal (starting from vertex 2):")

g.bfs(2)
```

## OUTPUT:



```
IDLE Shell 3.12.2
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb  6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/prisa/Pictures/AI Python/BFS PROGRAM.py
BFS
BFS starting from node 1:
1 2 3 4 5 6 7 8 9
>>>
```

## RESULT:

Hence the program been successfully executed and verified.