## **Program Code:**

```
#include <iostream>
#include <queue>
#include <stack>
#include <omp.h>
using namespace std;
class Graph {
private:
  int vertices;
  int** adjMatrix;
public:
  Graph(int v) {
     vertices = v;
     adjMatrix = new int*[vertices];
     for (int i = 0; i < vertices; i++) {
       adjMatrix[i] = new int[vertices]();
     }
  }
  void addEdge(int u, int v) {
     adjMatrix[u][v] = 1;
     adjMatrix[v][u] = 1; // Undirected graph
  }
  void parallelBFS(int start) {
     bool* visited = new bool[vertices]();
     queue<int> q;
     q.push(start);
     visited[start] = true;
     while (!q.empty()) {
       int size = q.size();
       int* currentLevel = new int[size];
       #pragma omp parallel for shared(q, visited)
```

```
for (int i = 0; i < size; i++) {
       int node;
       #pragma omp critical
          node = q.front();
          q.pop();
       }
       currentLevel[i] = node;
       #pragma omp parallel for shared(q, visited)
       for (int j = 0; j < vertices; j++) {
          if (adjMatrix[node][j] == 1 && !visited[j]) {
             visited[j] = true;
             q.push(j);
          }
        }
     #pragma omp critical
     {
       for (int i = 0; i < size; i++) {
          cout << currentLevel[i] << " ";</pre>
        }
     }
     delete[] currentLevel;
  cout << endl;</pre>
  delete[] visited;
void parallelDFS(int start) {
  bool* visited = new bool[vertices]();
  stack<int> s;
  s.push(start);
  while (!s.empty()) {
     int node;
     #pragma omp critical
```

}

}

```
node = s.top();
          s.pop();
        if (!visited[node]) {
          visited[node] = true;
          cout << node << " ";
        }
        #pragma omp parallel for shared(s, visited)
        for (int j = 0; j < vertices; j++) {
          if (adjMatrix[node][j] == 1 && !visited[j]) {
             s.push(j);
          }
        }
     }
     cout << endl;</pre>
     delete[] visited;
  }
  ~Graph() {
     for (int i = 0; i < vertices; i++) {
        delete[] adjMatrix[i];
     }
     delete[] adjMatrix;
  }
};
int main() {
  int vertices, edges, u, v, startNode;
  cout << "Enter number of vertices and edges: ";
  cin >> vertices >> edges;
  Graph g(vertices);
  cout << "Enter edges (u v):\n";</pre>
  for (int i = 0; i < edges; i++) {
     cin >> u >> v;
```

```
g.addEdge(u, v);
}

cout << "Enter start node for traversal: ";
cin >> startNode;

cout << "Parallel BFS Traversal: ";
g.parallelBFS(startNode);

cout << "Parallel DFS Traversal: ";
g.parallelDFS(startNode);

return 0;
}</pre>
```

## Output:

```
Enter number of vertices and edges: 5 6
Enter edges (u v):
0 1
0 2
1 3
1 4
2 3
3 4
Enter start node for traversal: 0
Parallel BFS Traversal: 0 2 1 4 3
Parallel DFS Traversal: 0 2 3 4 1

Process exited after 26.55 seconds with return value 0
Press any key to continue . . .
```