National University of Computer and Emerging Sciences

Lab Manual

for

Data Structure

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Lab Manual 12

Objectives:

After performing this lab, students shall be able to revise:

- ✔ Graphs

Problem 1

Implement a class Graphs using adjacency matrix for **directed** and **undirected** graphs (two different implementations) with following functions structure.

```
class Graphs
{
private:
        int** Matrix;
        int vertices;// total number of vertices
        bool isDirected; // 0 for undirected, 1 for directed

public:
        Graphs(int Tvertices, bool dir);
        Graphs(const Graphs& obj);
        Graphs(string fName);
        bool addEdge(int x,int y);
        bool removeEdge(int x,int y);
        bool isConnected(int x, int y);
        int getIndegree();
        int getOutdegree();
        void printAllAdjc();
        bool isComplete();// is every node connected to any other node
        void printGraph();// print the whole Matrix
        ~Graphs();
};
```

Problem 2

Now use adjacency list to implement the above class.

directedGraph.txt

```
6 0
0 1 3
1 2 3 5
2 1
3 4 5
4 1 2 3 5
5 0 2
```

undirectedGraph.txt

```
6 1
0 1 3
1 0 2 3 4 5
2 1 5
3 0 1 5
4 1
5 1 2 3
```