

Experiment 2.3

Student Name: Gaurav Kumar

UID: 22MCC20177

Branch: CC-DevOps

Section/Group:- 1/B

Semester: One

Date of Performance: 29/11/2022

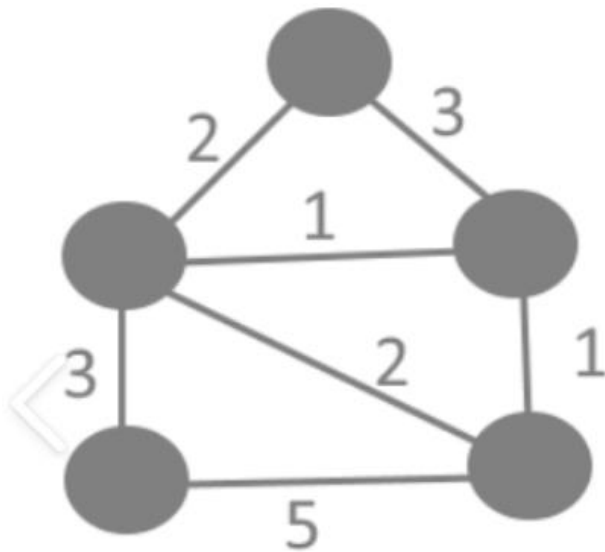
Subject Name:- Design & Analysis of Algorithms Lab

Subject Code: 22CAP-646

1) Task to be done:

Find Minimum Cost Spanning Tree of a given undirected graph

using Kruskal's algorithm.



2) **Steps for experiment/practical: copy and paste your code here/screenshots**

```
#include <iostream>
#include <algorithm>
using namespace std;
const int MAX = 1e4 + 5;
int id[MAX], nodes, edges;
pair<long long, pair<int, int>> p[MAX];

void init()
{
    for (int i = 0; i < MAX; ++i)
        id[i] = i;
}

int root(int x)
{
    while (id[x] != x)
    {
        id[x] = id[id[x]];
        x = id[x];
    }
    return x;
}

void union1(int x, int y)
{
    int p = root(x);
    int q = root(y);
    id[p] = id[q];
}

long long kruskal(pair<long long, pair<int, int>> p[])
{
    int x, y;
    long long cost, minimumCost = 0;
    for (int i = 0; i < edges; ++i)
    {
        x = p[i].second.first;
        y = p[i].second.second;
        cost = p[i].first;
        if (root(x) != root(y))
        {
            minimumCost += cost;
            union1(x, y);
        }
    }
    return minimumCost;
}
```

```
}  
  
int main()  
{  
    int x, y;  
    long long weight, cost, minimumCost;  
    init();  
    cout << "Enter Nodes and edges";  
    cin >> nodes >> edges;  
    for (int i = 0; i < edges; ++i)  
    {  
        cout << "Enter the value of X, Y and edges";  
        cin >> x >> y >> weight;  
        p[i] = make_pair(weight, make_pair(x, y));  
    }  
    sort(p, p + edges);  
    minimumCost = kruskal(p);  
    cout << "Minimum cost is " << minimumCost << endl;  
    return 0;  
}
```

3) Output (screenshots)

```
● PS D:\Gaurav\MCA\Sem-1\DAA> g++ .\minimumCostSpanningTree.cpp -o .\minimumCostSpanningTree.exe && .\minimumCostSpanningTree.exe  
Enter Nodes and edges5 7  
Enter the value of X, Y and edges1 2 2  
Enter the value of X, Y and edges1 3 3  
Enter the value of X, Y and edges2 3 1  
Enter the value of X, Y and edges2 5 2  
Enter the value of X, Y and edges2 4 3  
Enter the value of X, Y and edges3 5 1  
Enter the value of X, Y and edges3 2 1  
Minimum cost is 7
```

Evaluation Grid:

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Demonstration and Performance (Quiz)		22
2.	Worksheet		8