Student Name:- Chaudhary Hamdan

Student Roll No.:- 1905387

Algorithm Lab. Program Test

CSE Group 1

Date: - 12th NOV. 2021

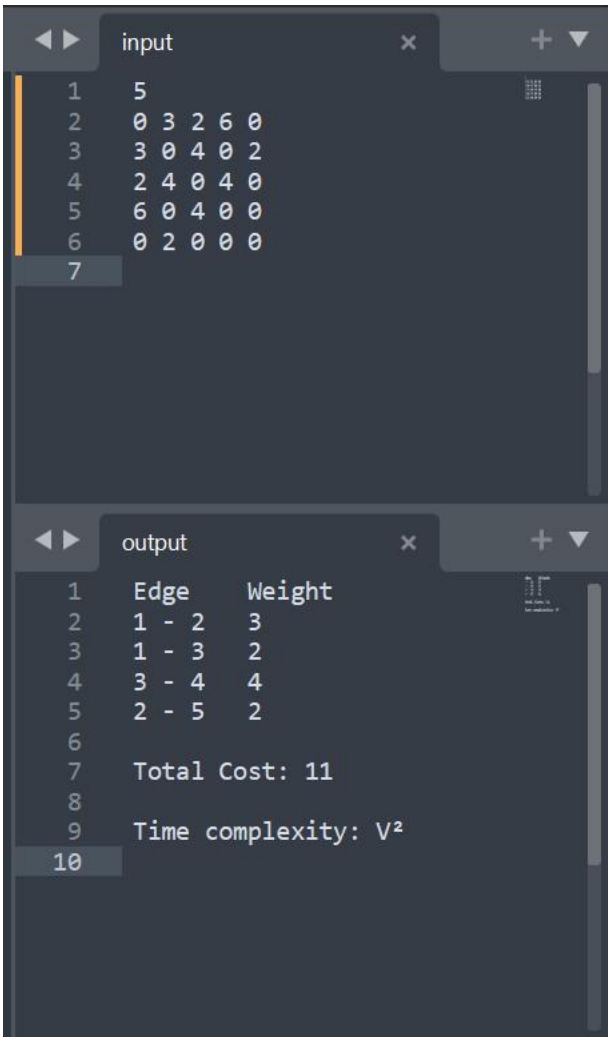
Program Screen short

```
// Author: Chaudhary Hamdan
// Generated at: Fri Nov 12 12:25:14 2021

#include <stdio.h>
#include <time.h>
#include <limits.h>
#include <stdbool.h>

#define sf(x)          scanf("%d", &x)
#define pf             printf
#define pfs(x)         printf("%d ", x)
#define pfn(x)         printf("%d\n", x)
#define pfc(x)         printf("%d, ", x)
#define FI(i,x,y,inc)  for(int i = x; i < y; i += inc)
#define F(i,x,y)       FI(i, x, y, 1)
#define F0(i,n)        FI(i, 0, n, 1)
#define RF(i,x,y)      for(int i = x; i >= y; i--)
#define pfarr(i,a,n)   for(int i = 0; i < n-1; i++) pfs(a[i]); pfn(a[n-1]);
```

```
void i_o_from_file() {

#ifndef ONLINE_JUDGE
	freopen("C:\\Users\\KIIT\\input", "r", stdin);
	freopen("C:\\Users\\KIIT\\output", "w", stdout);
#endif
}


/* **************************************************************** */


int V;

int minKey(int key[], bool mstSet[])
{
	int min = INT_MAX, min_index;

	F0(v, V) {
		if (mstSet[v] == false && key[v] < min) {
			min = key[v], min_index = v;
		}
	}
	return min_index;
}

int printMST(int parent[], int graph[V][V])
{
	int cost = 0;
	pf("Edge \tWeight\n");
```

```
    F(i, 1, V) {
        pf("%d - %d \t%d \n", parent[i] + 1, i + 1, graph[i][parent[i]]);
        cost += graph[i][parent[i]];
    }

    pf("\nTotal Cost: %d\n", cost);
}

void primsMST(int graph[V][V])
{
    int parent[V];
    int key[V];
    bool mstSet[V];

    F0(i, V) {
        key[i] = INT_MAX;
        mstSet[i] = false;
    }

    key[0] = 0;
    parent[0] = -1;

    F0(cnt, V - 1) {

        int u = minKey(key, mstSet);

        mstSet[u] = true;

        F0(v, V) {

            if (graph[u][v] && mstSet[v] == false && graph[u][v] < key[v]) {
                parent[v] = u;
                key[v] = graph[u][v];
            }
        }
    }
    printMST(parent, graph);
}

int main() {

    i_o_from_file();

    /* ********************************************* */

    sf(V);

    int graph[V][V];

    F0(i, V) {
        F0(j, V) {
            sf(graph[i][j]);
        }
    }

    primsMST(graph);

    pf("\nTime complexity: V²\n");

    return 0;
}
```

Output Screen short



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

```
Edge    Weight
1 - 2   3
1 - 3   2
3 - 4   4
2 - 5   2

Total Cost: 11

Time complexity: V²
```

(Upload the PDF only)