Name- ANUSHREE

Roll no- MCA139

University Registration no- TKM20MCA-2010

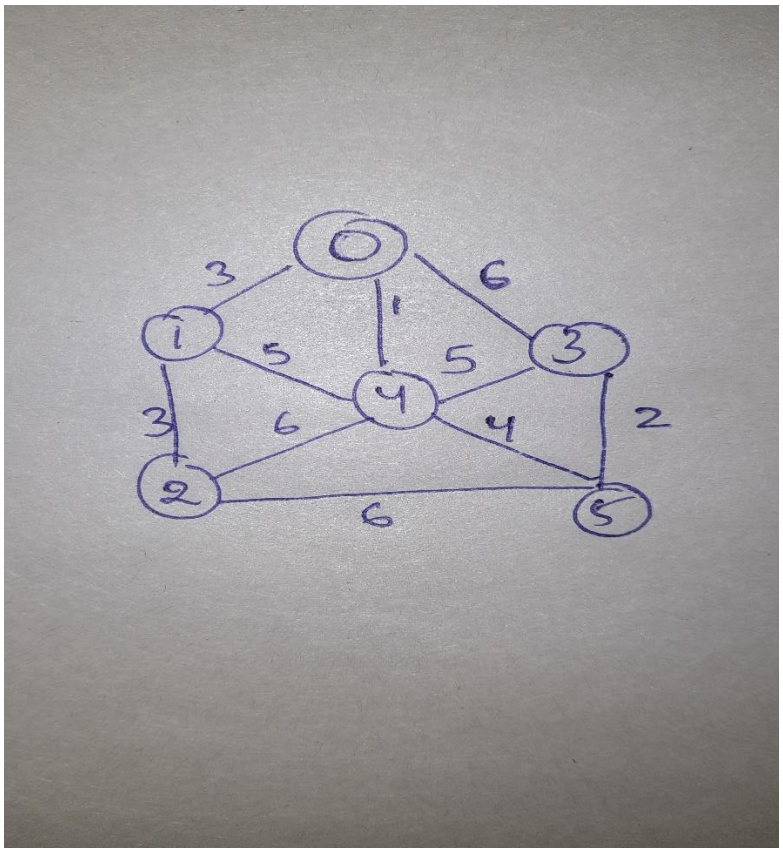
Git repository link - https://github.com/ANUSHREE-2021/Data-Structure/tree/main/EXTERNAL%20LAB%20EXAM

EXTERNAL LAB EXAM (1ST SEMESTER)

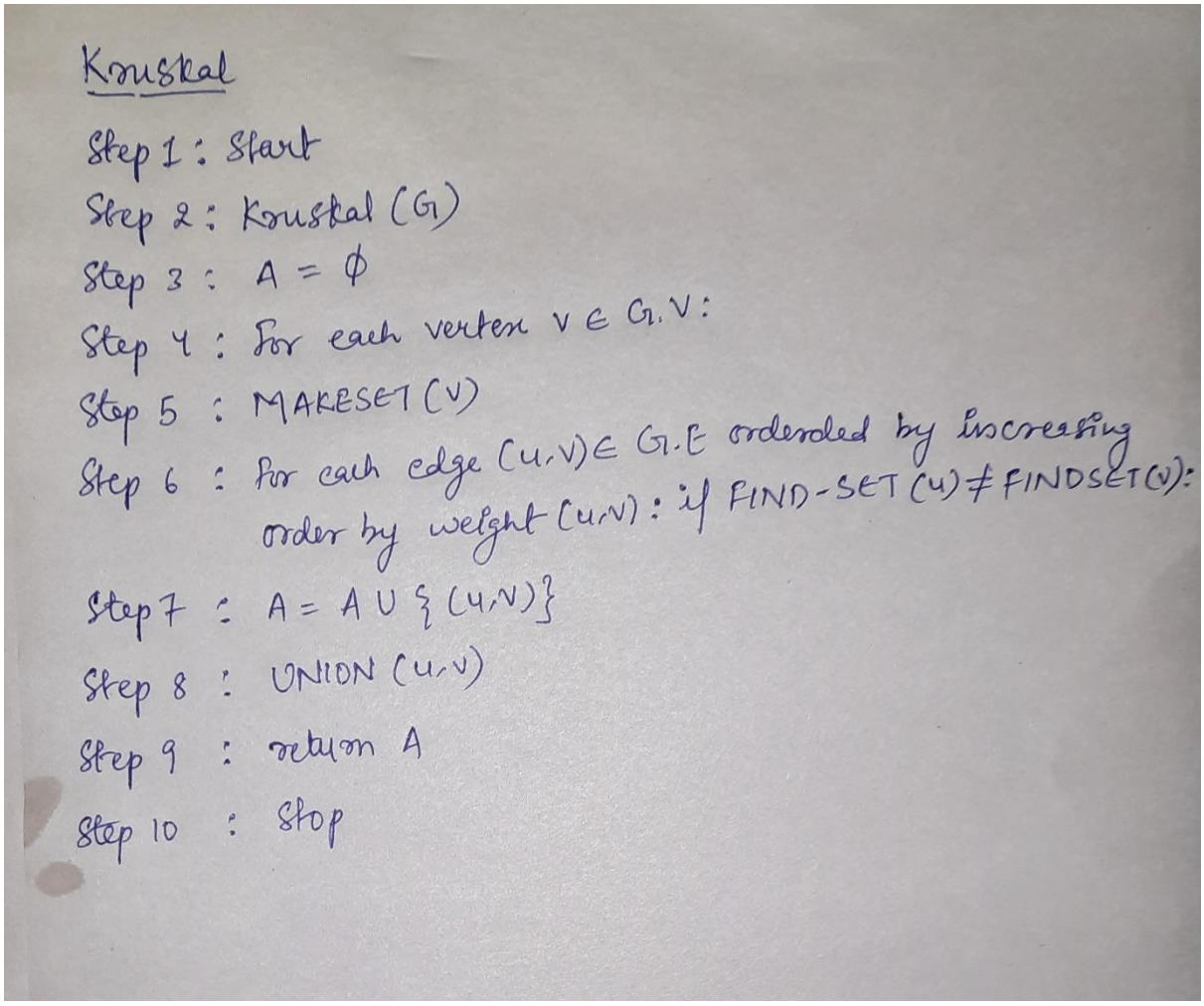
DATA STRUCTURE LAB

QUESTION 1

Develop a program to generate a minimum spanning tree using Kruskal algorithm for the given graph and compute the total cost.



ALGORITHM



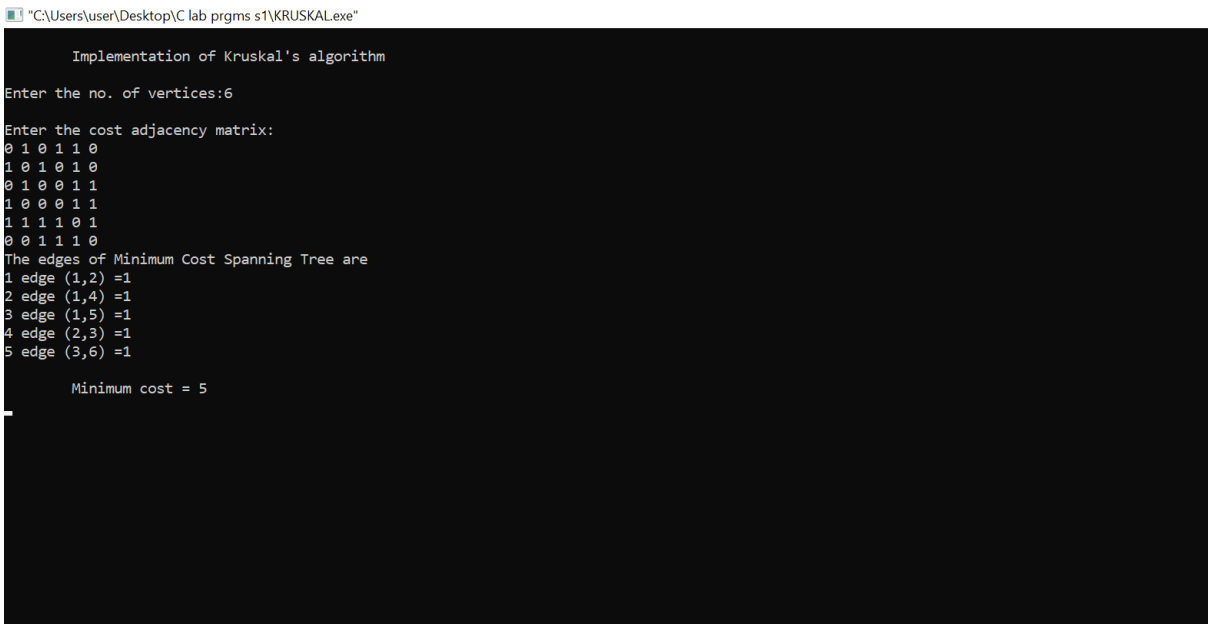
PROGRAM CODE

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
int i,j,k,a,b,u,v,n,ne=1;
int min,mincost=0,cost[9][9],parent[9];
int find(int);
int uni(int,int);
void main()
```

```
{
        printf("\n\tImplementation of Kruskal's algorithm\n");
        printf("\nEnter the no. of vertices:");
        scanf("%d",&n);
        printf("\nEnter the cost adjacency matrix:\n");
        for(i=1;i<=n;i++)
        {
                for(j=1;j<=n;j++)
                {
                        scanf("%d",&cost[i][j]);
                        if(cost[i][j]==0)
                                cost[i][j]=999;
                }
        }
        printf("The edges of Minimum Cost Spanning Tree are\n");
        while(ne < n)
        {
                for(i=1,min=999;i<=n;i++)
                {
                        for(j=1;j <= n;j++)
                        {
                                if(cost[i][j] < min)
                                {
                                        min=cost[i][j];
                                        a=u=i;
                                        b=v=j;
                                }
                        }
                }
```

```
                u=find(u);
                v=find(v);
                if(uni(u,v))
                {
                        printf("%d edge (%d,%d) =%d\n",ne++,a,b,min);
                        mincost +=min;
                }
                cost[a][b]=cost[b][a]=999;
        }
        printf("\n\tMinimum cost = %d\n",mincost);
        getch();
}
int find(int i)
{
        while(parent[i])
        i=parent[i];
        return i;
}
int uni(int i,int j)
{
        if(i!=j)
        {
                parent[j]=i;
                return 1;
        }
        return 0;
}
```

OUTPUT



QUESTION 2

Develop a program to implement DFS and BFS.

ALGORITHM

//DFS

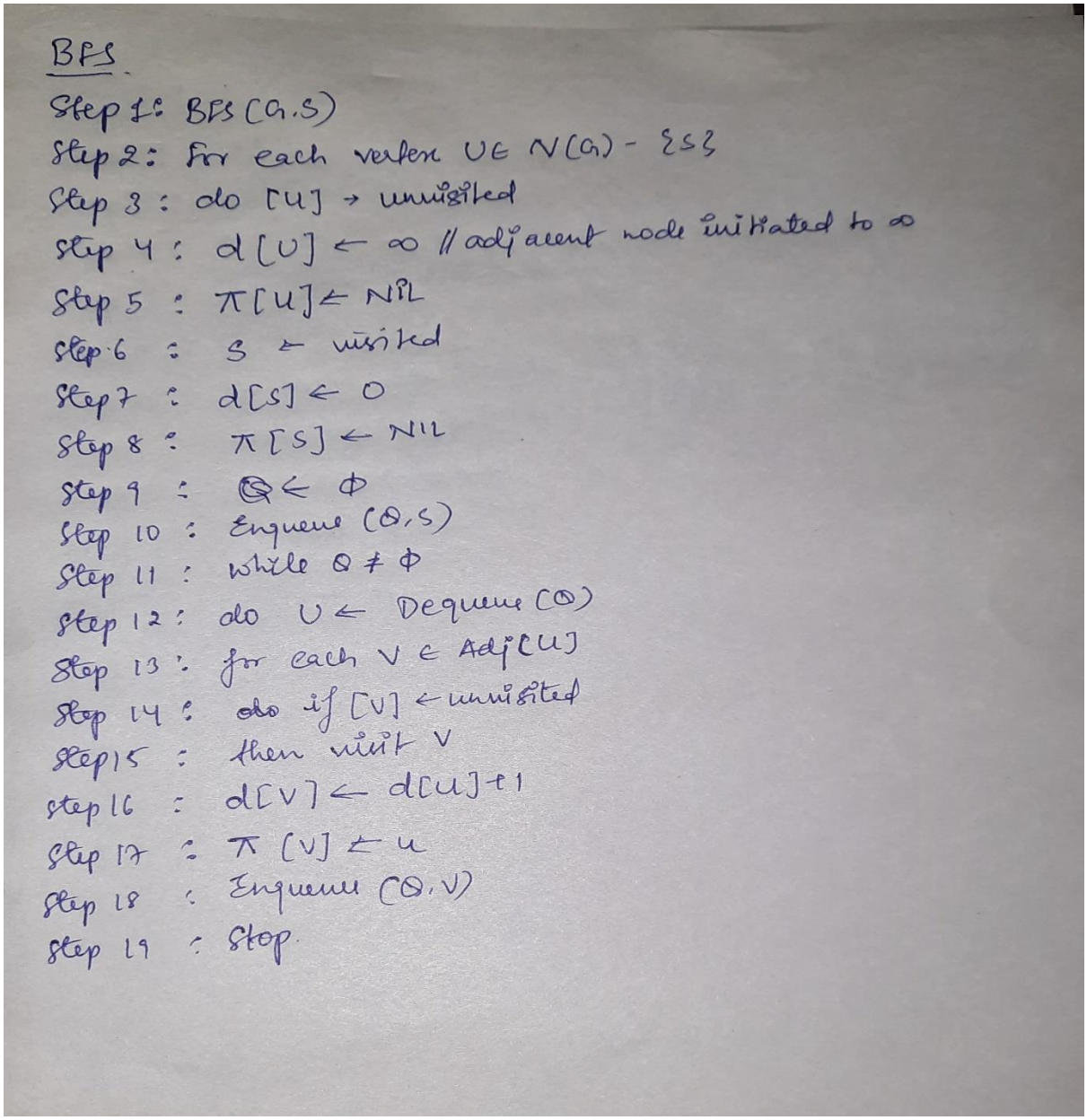
DFS

Step 1: Start
Step 2: DFS (G, u)
Step 3: u.visited = true
Step 4: For each v ∈ G.Adj[u]
Step 5: if v.visted == false
Step 6: DFS (G, v)

```
init() {
 For each u ∈ G
 u.visited = false
 For each u ∈ G
 DFS (G, u)
}
```

Step 7: stop

//BFS



PROGRAM CODE

//DFS

```
#include<stdio.h>
int a[20][20],reach[20],n; int dfs(int v)
{
   int i; reach[v]=1;
   for (i=1;i<=n;i++) if(a[v][i] && !reach[i])
   {
      printf("\n %d->%d",v,i); dfs(i);
   }
```

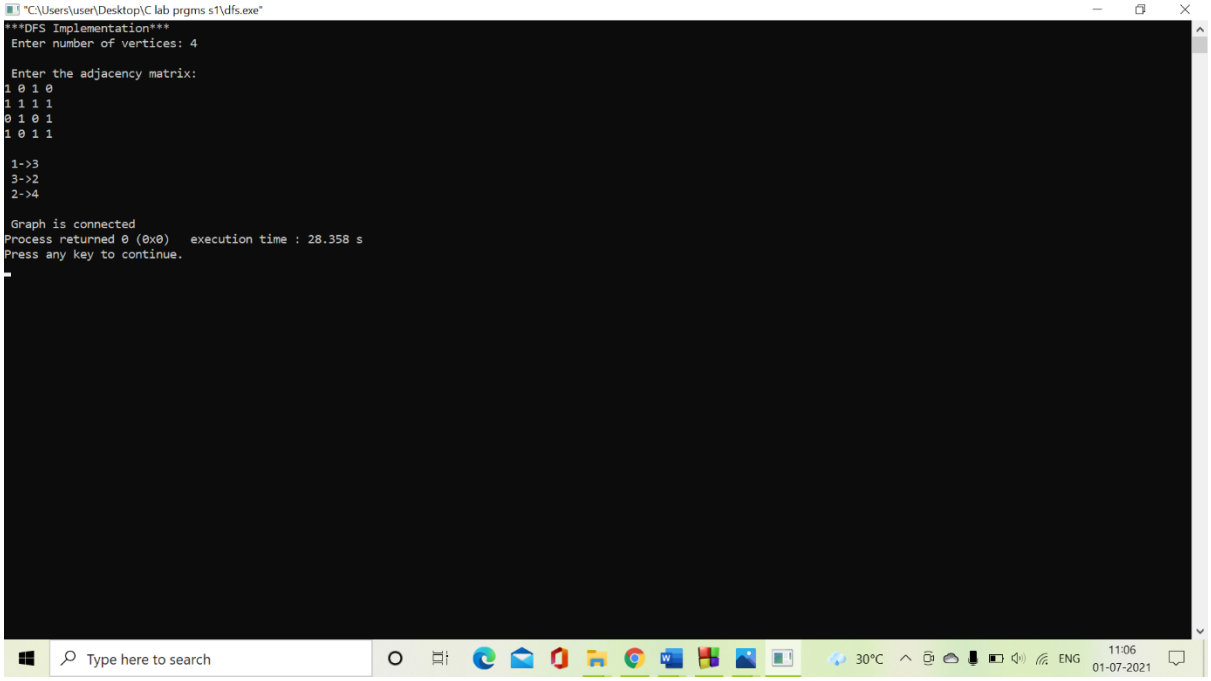
```
}
int main()
{
   int i,j,count=0;
   printf("***DFS Implementation***");
   printf("\n Enter number of vertices:"); scanf("%d",&n);
   for (i=1;i<=n;i++)
   {
      reach[i]=0;
   for (j=1;j<=n;j++)
      a[i][j]=0;
   }
   printf("\n Enter the adjacency matrix:\n");
for (i=1;i<=n;i++)
   for (j=1;j<=n;j++)
      scanf("%d",&a[i][j]);
      dfs(1);
      printf("\n");
   for (i=1;i<=n;i++)
   {
      if(reach[i]) count++;
   }
   if(count==n)
      printf("\n Graph is connected");
   else
      printf("\n Graph is not connected");
return 0;
}
```

//BFS

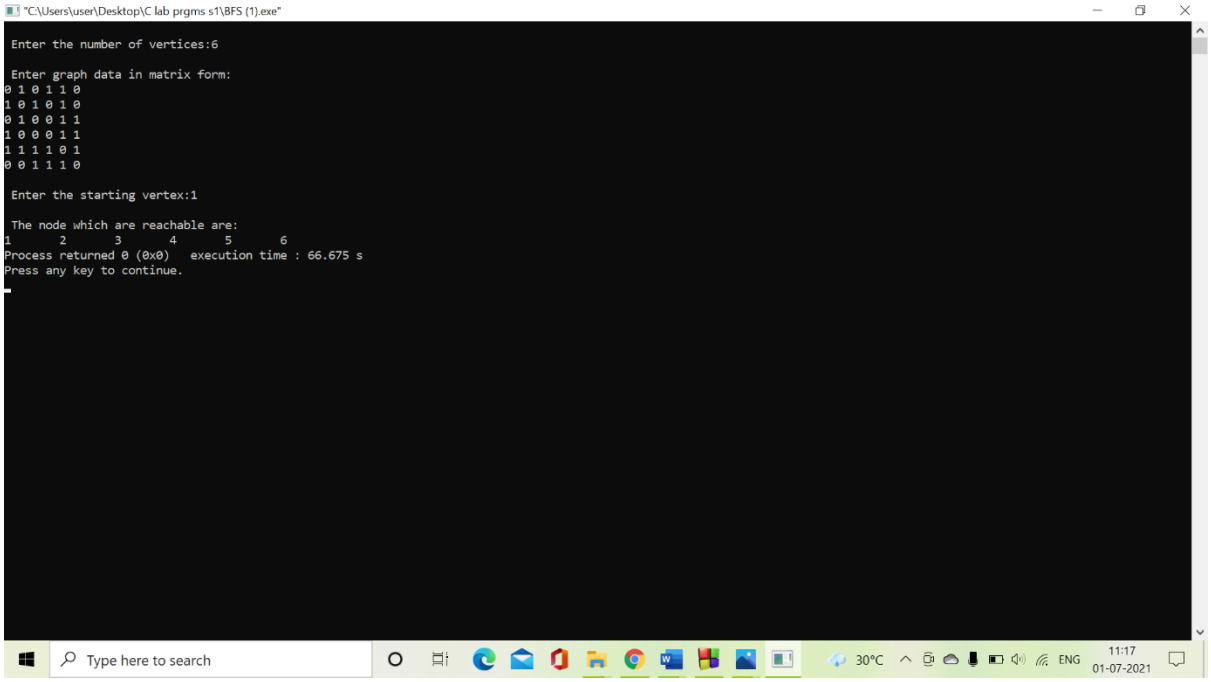
```
#include<stdio.h>
int a[20][20], q[20], visited[20], n, i, j, f = 0, r = -1;
void bfs(int v)
 {
        for(i = 1; i <= n; i++)
        if(a[v][i] && !visited[i])
        q[++r] = i;
 if(f <= r)
{
         visited[q[f]] = 1;
        bfs(q[f++]);
 }
}
int main()
{
         int v;
        printf("\n Enter the number of vertices:");
        scanf("%d", &n);
 for(i=1; i <= n; i++)
 {
        q[i] = 0;
        visited[i] = 0;
 }
 printf("\n Enter graph data in matrix form:\n");
 for(i=1; i<=n; i++)
{
         for(j=1;j<=n;j++)
        {
                scanf("%d", &a[i][j]);
        }
```

```
}
 printf("\n Enter the starting vertex:");
scanf("%d", &v);
bfs(v);
printf("\n The node which are reachable are:\n");
for(i=1; i <= n; i++)
{
        if(visited[i])
        printf("%d\t", i);
else
 {
        printf("\n Bfs is not possible. Not all nodes are reachable");
        break;
}
}
}
```

Output (DFS)


"C:\Users\user\Desktop\C lab prgms s1\dfs.exe"
DFS Implementation
Enter number of vertices: 4
Enter the adjacency matrix:
1 0 1 0
1 1 1 1
0 1 0 1
1 0 1 1
1->3
3->2
2->4
Graph is connected
Process returned 0 (0x0) execution time : 28.358 s
Press any key to continue.
Type here to search
30°C
ENG
11:06
01-07-2021

Output (BFS)


"C:\Users\user\Desktop\C lab prgms s1\BFS (1).exe"
Enter the number of vertices:6
Enter graph data in matrix form:
0 1 0 1 1 0
1 0 1 0 1 0
0 1 0 0 1 1
1 0 0 0 1 1
1 1 1 1 0 1
0 0 1 1 1 0
Enter the starting vertex:1
The node which are reachable are:
1 2 3 4 5 6
Process returned 0 (0x0) execution time : 66.675 s
Press any key to continue.
Type here to search
30°C
ENG
11:17
01-07-2021