DATA STRUCTURE LAB

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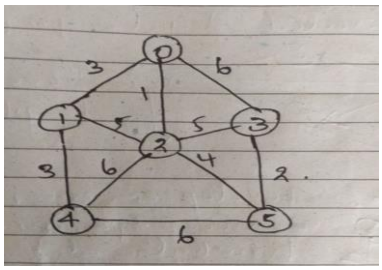
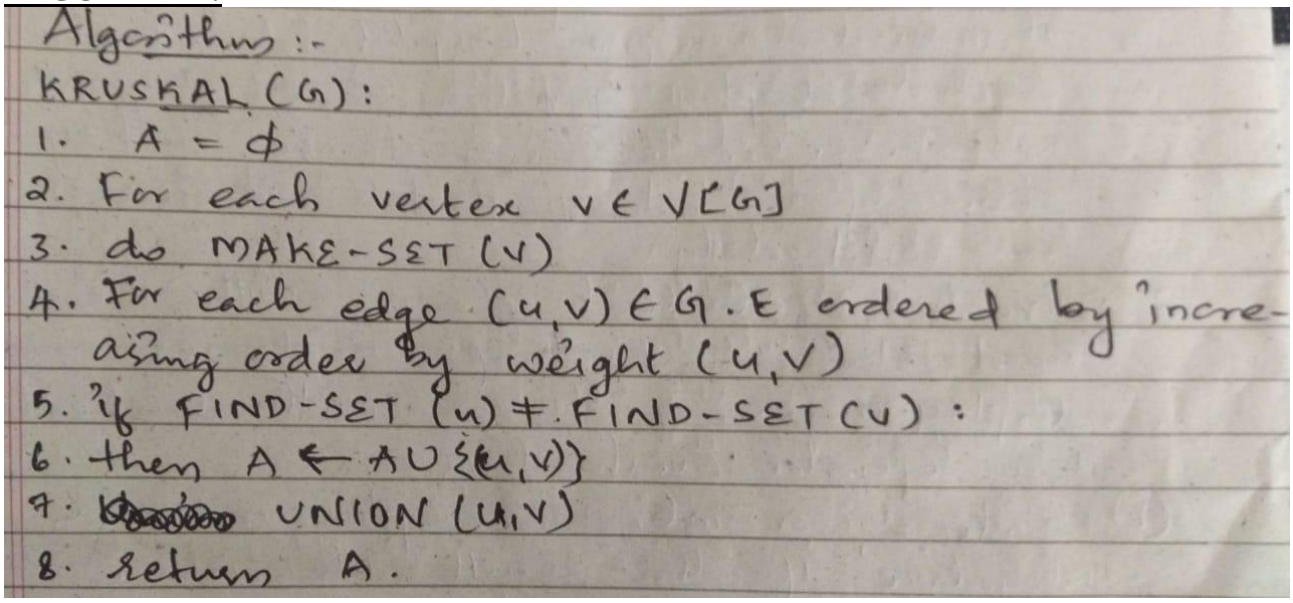
S1 MCA
TKM20MCA-2036

1. Develop a program to generate a minimum spanning tree using Kruskals algorithm from the given graph and compute total cost.



ALGORITHM:



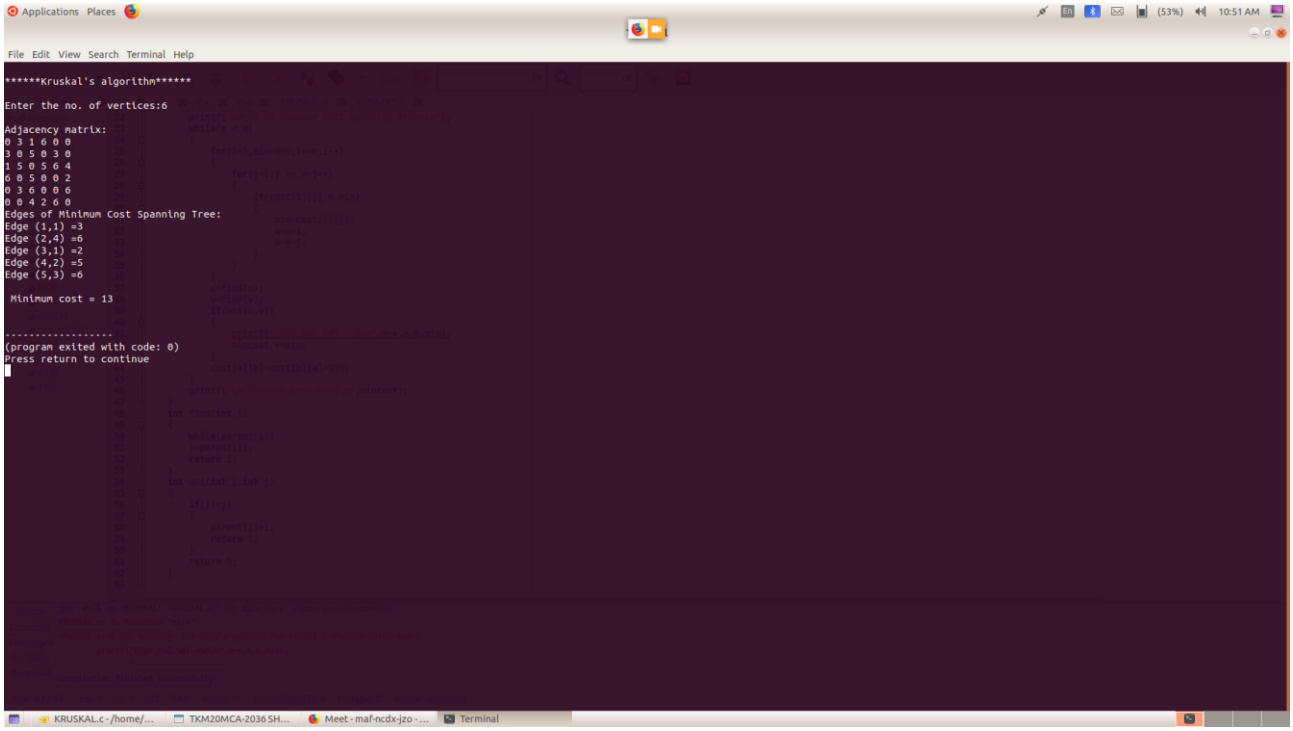
PROGRAM CODE:

```
#include<stdio.h>

#include<stdlib.h>

int i,j,k,a,b,u,v,n,m=1;

int min,mincost=0,cost[9][9],parent[9];

int find(int);

int uni(int,int);

int main()

{

        printf("\n******Kruskal's algorithm******\n");

        printf("\nEnter the no. of vertices:");
```

```
scanf("%d",&n);
printf("\nAdjacency 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("Edges of Minimum Cost Spanning Tree:\n");
while(m < 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);
```

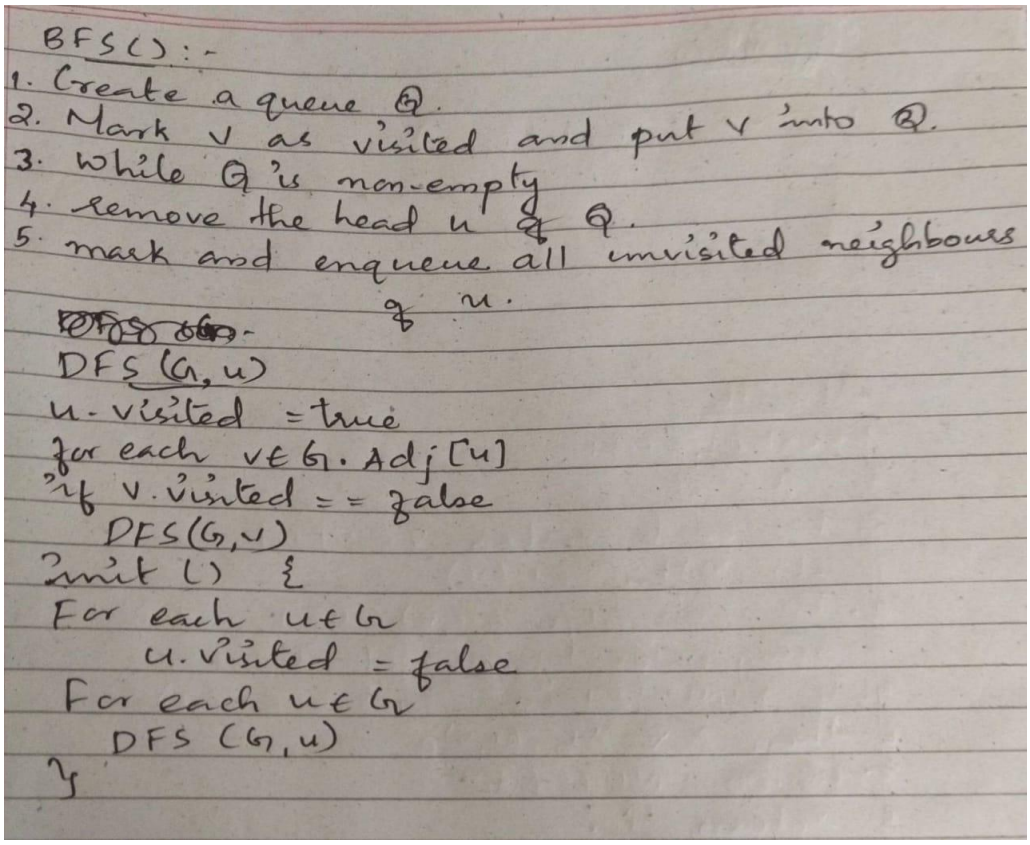
```
                if(uni(u,v))
                {
                        printf("Edge (%d,%d) =%d\n",m++,a,b,min);
                        mincost +=min;
                }
                cost[a][b]=cost[b][a]=999;
        }
        printf("\n Minimum cost = %d\n",mincost);
}
int find(int i)
{
        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:



2. Develop a program to implement BFS and DFS.

ALGORITHM:



PROGRAM CODE:

1. 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;
 }
 }
}
```

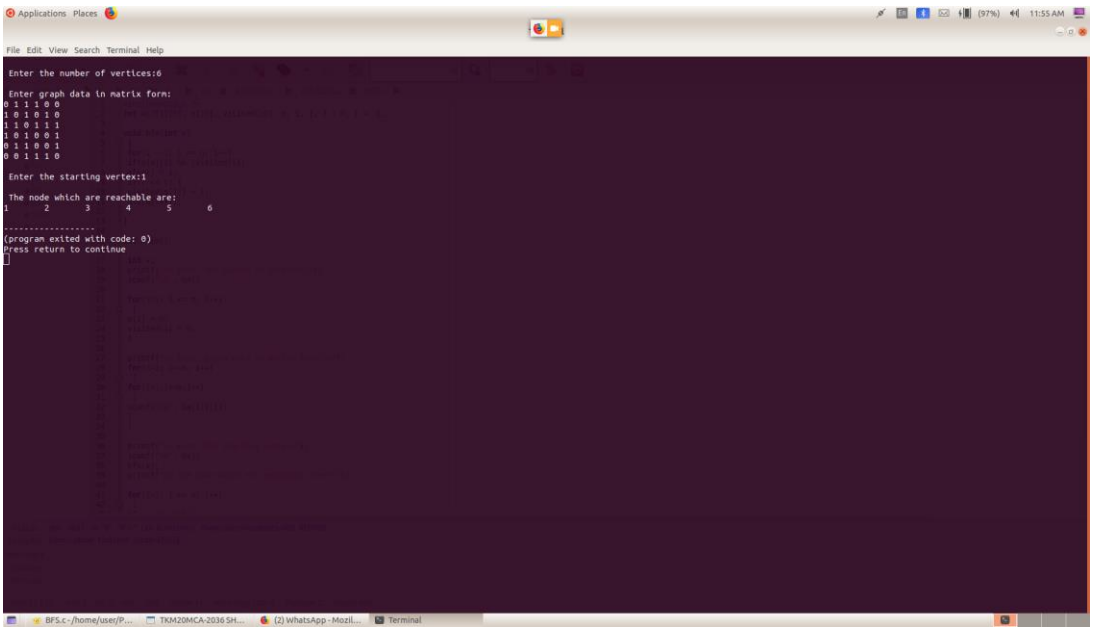
2. DFS:-

```
 #include<stdio.h>
    int a[20][20],reach[20],n;
    int dfs(int v)
```

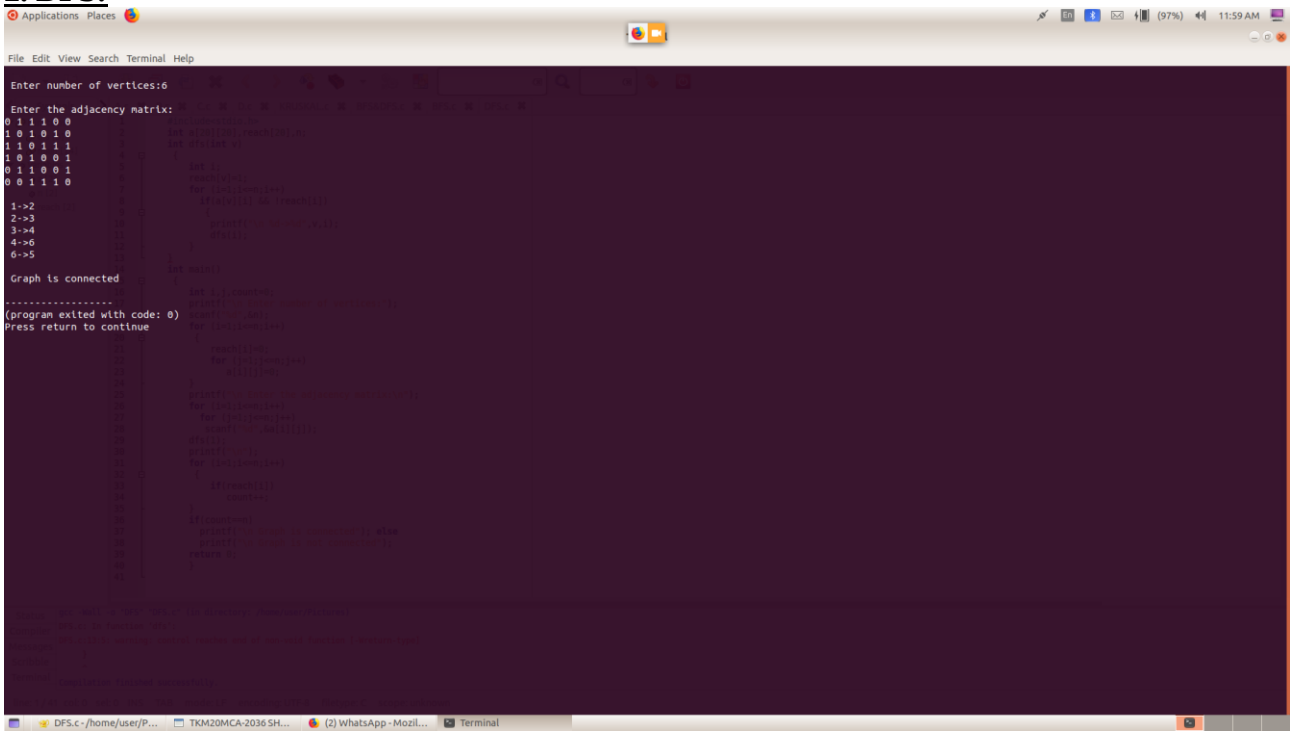
```
 {
        int i;
        reach[v]=1;
        for (i=1;i<=n;i++)
          if(a[v][i] && !reach[i])
           {
                printf("\n %d->%d",v,i);
                dfs(i);
        }
}
int main()
 {
        int i,j,count=0;
        printf("\n Enter number of vertices:");
        scanf("%d",&n);
        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;
        }
```

OUTPUT:

1. BFS:



2. DFS:



GIT LINK: