**Keegan Vaz**
**42**
**SECMPNB**

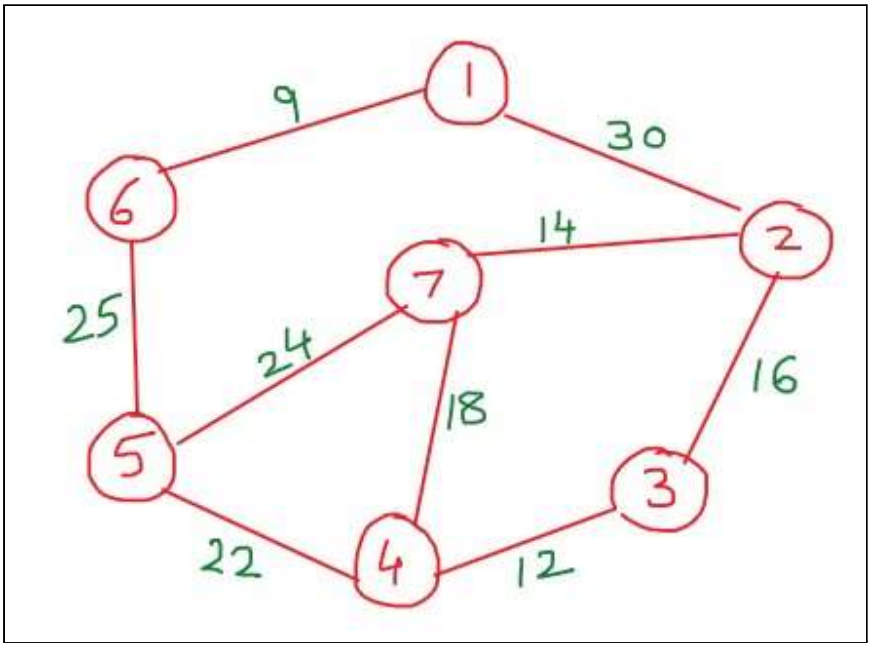
## EXPERIMENT 6

**Aim:** Implement **Prims** and **Kruskal's** algorithm for finding Minimum cost spanning tree using **Greedy** Method.

**Problem statement:**

Write a menu driven program to solve the Minimum cost spanning tree problem using Prims and Kruskals algorithm.

**Input :** For Prims algorithm input the below graph as a cost adjacency matrix.



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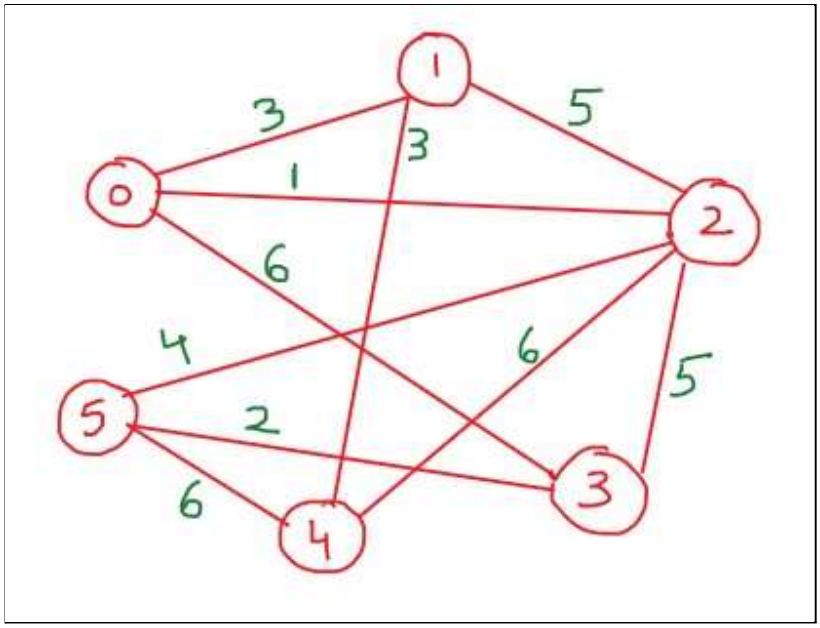
For Kruskals algorithm input the below graph as a cost adjacency matrix.




**Output:** Display the edges that are added to the MST along with their cost
Also display the final optimal cost of the MST.

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**(Paste your code and output below)**
**Code:**

```
#include<stdio.h>
#include<stdlib.h>
#define MAX 30

int a,b,u,v,n,i,j,ne=1; int i,j,total_cost; int
visited[10]={0},min,mincost=0,cost[10][10];

typedef struct edge
{
        int u,v,w;
}edge;

typedef struct edgelist
{ edge data[MAX];
        int n;
}edgelist;

edgelist elist;
int G[MAX][MAX],n;
edgelist spanlist; void kruskal(); int
find(int belongs[],int vertexno); void
union1(int belongs[],int c1,int c2); void
sort(); void print(); void prim();

int main()
{
        int ch; while(1){ printf(" \n 1. Prim's Algo \n 2. Kruskal's Algo\n 3.Exit \n Enter your
        choice: "); scanf("%d",&ch); switch(ch){ case 1 : prim(); break;
                case 2 : kruskal();
                                break;
                case 3 : exit(0); default : printf("\n Enter a
                valid choice!"); break;
                }
        }
        return 0;
}

void prim()
{ printf("\nEnter the number of nodes:");
        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;
```

```
        }
        visited[1]=1;
        printf("\n");
        while(ne < n)
        { for(i=1,min=999;i<=n;i++)
                for(j=1;j<=n;j++)
                if(cost[i][j]< min)
                if(visited[i]!=0)
                {
                        min=cost[i][j];
                a=u=i; b=v=j; }
                if(visited[u]==0 || visited[v]==0)
                { printf("\n Edge %d:(%d %d) cost:%d",ne++,a,b,min);
                        mincost+=min; visited[b]=1;
                }
                cost[a][b]=cost[b][a]=999;
        } printf("\n Minimum
        cost=%d",mincost);
}

void kruskal()
{ int belongs[MAX],i,j,cno1,cno2; elist.n=0;
        printf("\nEnter number of vertices:");
        scanf("%d",&n); printf("\nEnter the cost
        adjacency matrix:\n"); for(i=0;i<n;i++)
        for(j=0;j<n;j++){ scanf("%d",&G[i][j]);
        } for(i=1;i<n;i++){
        for(j=0;j<i;j++)
                {
                        if(G[i][j]!=0)
                        {
                                elist.data[elist.n].u=i;
                                elist.data[elist.n].v=j;
                                elist.data[elist.n].w=G[i][j];
                                elist.n++;
                        }
                }
        }
        sort();
        for(i=0;i<n;i++){
        belongs[i]=i;
        }
        spanlist.n=0;
        for(i=0;i<elist.n;i++)
        {
                cno1=find(belongs,elist.data[i].u);
                cno2=find(belongs,elist.data[i].v);
                if(cno1!=cno2)
```

```
                {
                        spanlist.data[spanlist.n]=elist.data[i];
                        spanlist.n=spanlist.n+1;
                        union1(belongs,cno1,cno2);
                }
        }
        print();
}

int find(int belongs[],int vertexno)
{ return(belongs[vertexno]);
}

void union1(int belongs[],int c1,int c2)
{
        int i;
        for(i=0;i<n;i++){
                if(belongs[i]==c2){
                belongs[i]=c1;
                }
        }
}

void sort()
{
        int i,j;
        edge temp; for(i=1;i<elist.n;i++){ for(j=0;j<elist.n-
        1;j++){ if(elist.data[j].w>elist.data[j+1].w)
                        {
                                temp=elist.data[j];
                                elist.data[j]=elist.data[j+1];
                                elist.data[j+1]=temp;
                        }
                }
        }
}
void print()
{
        int i,cost=0;
        for(i=0;i<spanlist.n;i++)
        {
                printf("\n%d -- %d : Cost = %d",spanlist.data[i].u,spanlist.data[i].v,spanlist.data[i].w);
cost=cost+spanlist.data[i].w;
        } printf("\n\nCost of the spanning
        tree=%d",cost);
}
```

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**Output:**

```
 1. Prim's Algo
 2. Kruskal's Algo
 3.Exit
 Enter your choice: 1

Enter the number of nodes:7

Enter the cost adjacency matrix:
0 30 0 0 0 9 0
30 0 16 0 0 0 14
0 16 0 12 0 0 0
0 0 12 0 22 0 18
0 0 0 22 0 25 24
9 0 0 0 25 0 0
0 14 0 18 24 0 0


 Edge 1:(1 6) cost:9
 Edge 2:(6 5) cost:25
 Edge 3:(5 4) cost:22
 Edge 4:(4 3) cost:12
 Edge 5:(3 2) cost:16
 Edge 6:(2 7) cost:14
 Minimum cost=98
 1. Prim's Algo
 2. Kruskal's Algo
 3.Exit
 Enter your choice: 2

Enter number of vertices:6

Enter the cost adjacency matrix:
0 3 1 6 0 0
3 0 5 0 3 0
1 5 0 5 6 4
6 0 5 0 0 2
0 3 6 0 0 6
0 0 4 2 6 0

2 -- 0 : Cost = 1
5 -- 3 : Cost = 2
1 -- 0 : Cost = 3
4 -- 1 : Cost = 3
5 -- 2 : Cost = 4

Cost of the spanning tree=13
 1. Prim's Algo
 2. Kruskal's Algo
 3.Exit
 Enter your choice: 3
```