Lab-7

1)From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

```
#include<stdio.h>
int parent[10]={0};
int find_parent(int);
int is_cyclic(int,int);
int main()
{
   int cost[10][10],min_cost=0,min,i,j,n,no_e=1,a,b,u,v,x;
   printf("Enter number of vertices:\n");
   scanf("%d",&n);
   printf("Enter the weight in the form of an 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;
      }
   }


   while(no_e<n)
   {
      min=999;
```

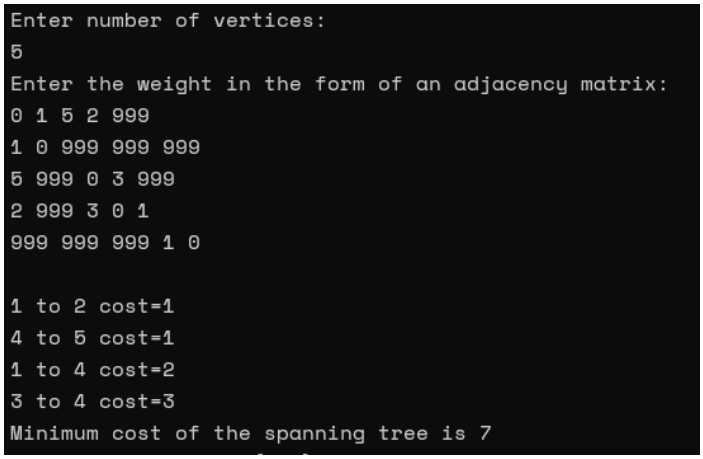
```
    for(i=1;i<=n;i++)
    {
        for(j=1;j<=n;j++)
        {
            if(cost[i][j]<min)
            {
                min=cost[i][j];
                a=u=i;
                b=v=j;
            }
        }
    }

    u=find_parent(u);
    v=find_parent(v);
    x=is_cyclic(u,v);
    if(x==1)
    {
        printf("\n%d to %d cost=%d",a,b,min);
        no_e++;
        min_cost+=min;
    }
    cost[a][b]=cost[b][a]=999;
}
printf("\nMinimum cost of the spanning tree is %d",min_cost);
return 0;
```

```
}


int find_parent(int a)
{
   while(parent[a]!=0)
     a=parent[a];
   return a;
}


int is_cyclic(int a ,int b)
{
   if(a!=b)
   {
      parent[b]=a;
      return 1;
   }
   return 0;
}
```
OUTPUT



PRIMS

```
#include<stdio.h>
int main()
{
   int cost[10][10],visited[10]={0},i,j,n,no_e=1,min,a,b,min_cost=0;
   printf("Enter the number of nodes:\n");
   scanf("%d",&n);
   printf("Enter the cost in form of 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]=1000;
      }
   }
```

```
visited[1]=1;
while(no_e<n)
{
   min=1000;

   for(i=1;i<=n;i++)
   {
      for(j=1;j<=n;j++)
      {
         if(cost[i][j]<min)
         {
            if(visited[i]!=0)
            {
               min=cost[i][j];
               a=i;
               b=j;
            }
         }
      }
   }

   if(visited[b]==0)
   {
      printf("\n%d to %d  cost=%d",a,b,min);
      min_cost=min_cost+min;
      no_e++;
```

```
        }
        visited[b]=1;

        cost[a][b]=cost[b][a]=1000;
    }
    printf("\nminimum weight is %d",min_cost);
    return 0;
}
```

```
Enter the number of nodes:
5
Enter the cost in form of adjacency matrix:
0 1 5 2 999
1 0 999 999 999
5 999 0 3 999
2 999 3 0 1
999 999 999 1 0

1 to 2  cost=1
1 to 4  cost=2
4 to 5  cost=1
4 to 3  cost=3
minimum weight is 7
```

2) From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

```
#include<stdio.h>
#include<conio.h>
#define INFINITY 9999
#define MAX 10

void dijkstra(int G[MAX][MAX],int n,int startnode);

int main()
{
    int G[MAX][MAX],i,j,n,u;
```

```
    printf("Enter no. of vertices:");
    scanf("%d",&n);
    printf("\nEnter the adjacency matrix:\n");
    for(i=0;i<n;i++)
    for(j=0;j<n;j++)
    scanf("%d",&G[i][j]);
    printf("\nEnter the starting node:");
    scanf("%d",&u);
    dijkstra(G,n,u);
    return 0;
}

void dijkstra(int G[MAX][MAX],int n,int startnode)
{

    int cost[MAX][MAX],distance[MAX],pred[MAX];
    int visited[MAX],count,mindistance,nextnode,i,j;
    for(i=0;i<n;i++)
    for(j=0;j<n;j++)
    if(G[i][j]==0)
    cost[i][j]=INFINITY;
    else
    cost[i][j]=G[i][j];
    for(i=0;i<n;i++)
    {
        distance[i]=cost[startnode][i];
        pred[i]=startnode;
        visited[i]=0;
    }
    distance[startnode]=0;
```

```
visited[startnode]=1;
count=1;
while(count<n-1)
{
   mindistance=INFINITY;
   for(i=0;i<n;i++)
   if(distance[i]<mindistance&&!visited[i])
   {
      mindistance=distance[i];
      nextnode=i;
   }
   visited[nextnode]=1;
   for(i=0;i<n;i++)
      if(!visited[i])
      if(mindistance+cost[nextnode][i]<distance[i])
      {
         distance[i]=mindistance+cost[nextnode][i];
         pred[i]=nextnode;
      }
      count++;
   }
   for(i=0;i<n;i++)
   if(i!=startnode)
   {
      printf("\nDistance of node %d=%d",i,distance[i]);
      printf("\nPath=%d",i);
      j=i;
      do
      {
         j=pred[j];
```

```
            printf("<-%d",j);
        }
        while(j!=startnode);
    }
}
```

OUTPUT