**Program 16-From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra’s algorithm.**

#include<stdio.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;

//pred[] stores the predecessor of each node

//count gives the number of nodes seen so far

//create the cost matrix

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];

//initialize pred[],distance[] and visited[]

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;

//nextnode gives the node at minimum distance

for(i=0;i<n;i++)

if(distance[i]<mindistance&&!visited[i])

{

mindistance=distance[i];

nextnode=i;

}

//check if a better path exists through nextnode

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++;

}

//print the path and distance of each node

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:**

