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Experiment No.	6

AIM:	Experiment on Greedy Approach- Single Source Shortest path-Dijkstra's Algorithm.
Program 1	
Algorithm:	1 INITIALIZE-SINGLE-SOURCE(G, S) 2 S ← Ø 3 Q ← V[G] 4 while Q ≠ Ø 5 do u ← EXTRACT-MIN(Q) 6 S ← S U {u} 7 for each vertex v ∈ Adj[u] 8 do if dist[v] > dist[u] + w(u,v) 9 then d[v] ←d[u] + w(u,v) INITIALIZE-SINGLE-SOURCE(Graph g, Node s) dist[s] = 0; for each vertex v in Vertices V[G] - s dist[v] ← ∞

PROGRAM:

```
#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)
{
```

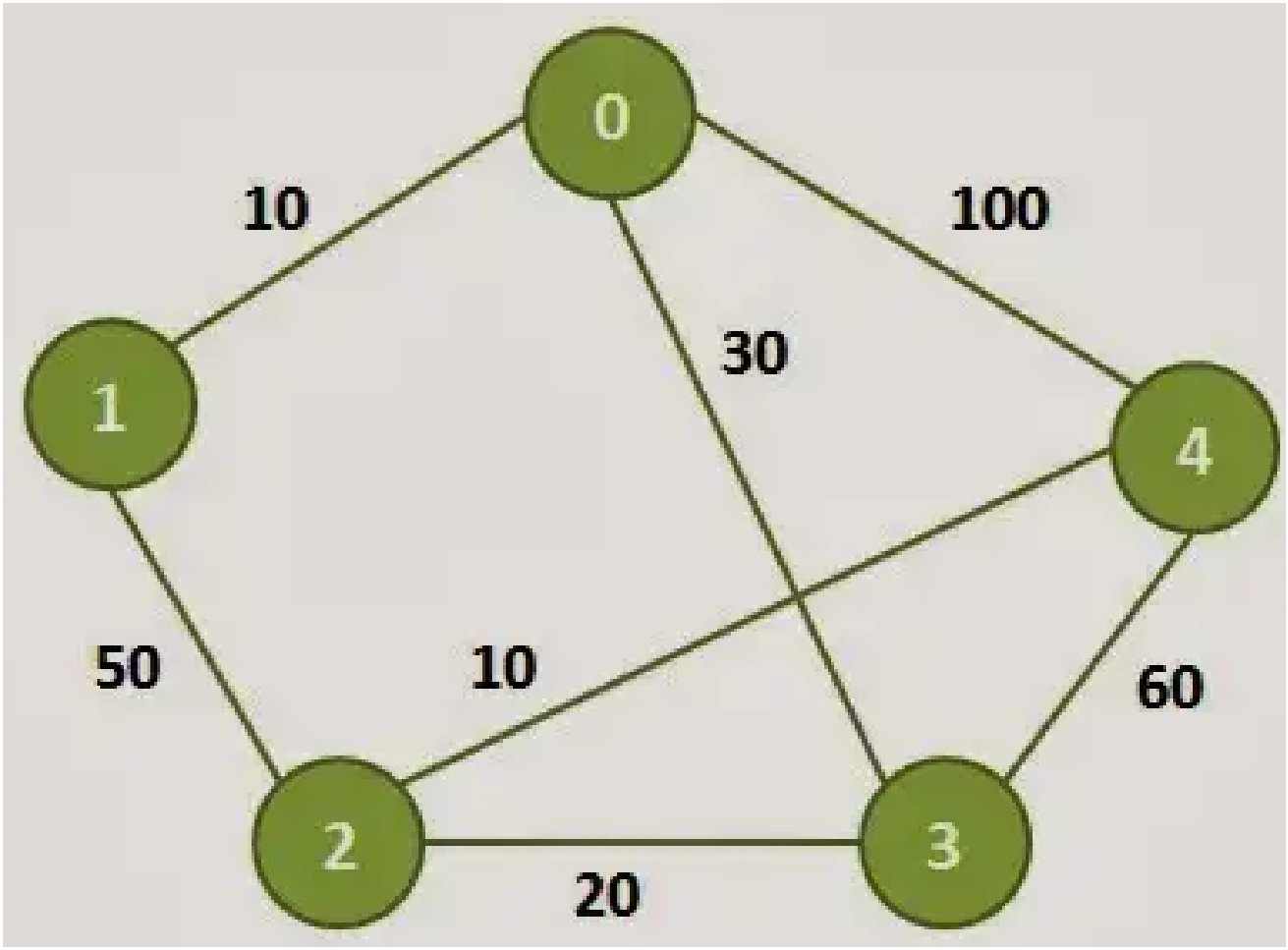
```
int cost[MAX][MAX],distance[MAX],pred[MAX];
int visited[MAX],count,mindistance,nextnode,i,j;
//pred[] stores the predecessor of each node
//count gives the number of nodes seen so far
//create the cost matrix
for(i=0;i<n;i++)
for(j=0;j<n;j++)
if(G[i][j]==0)
cost[i][j]=INFINITY;
else
cost[i][j]=G[i][j];
//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
```

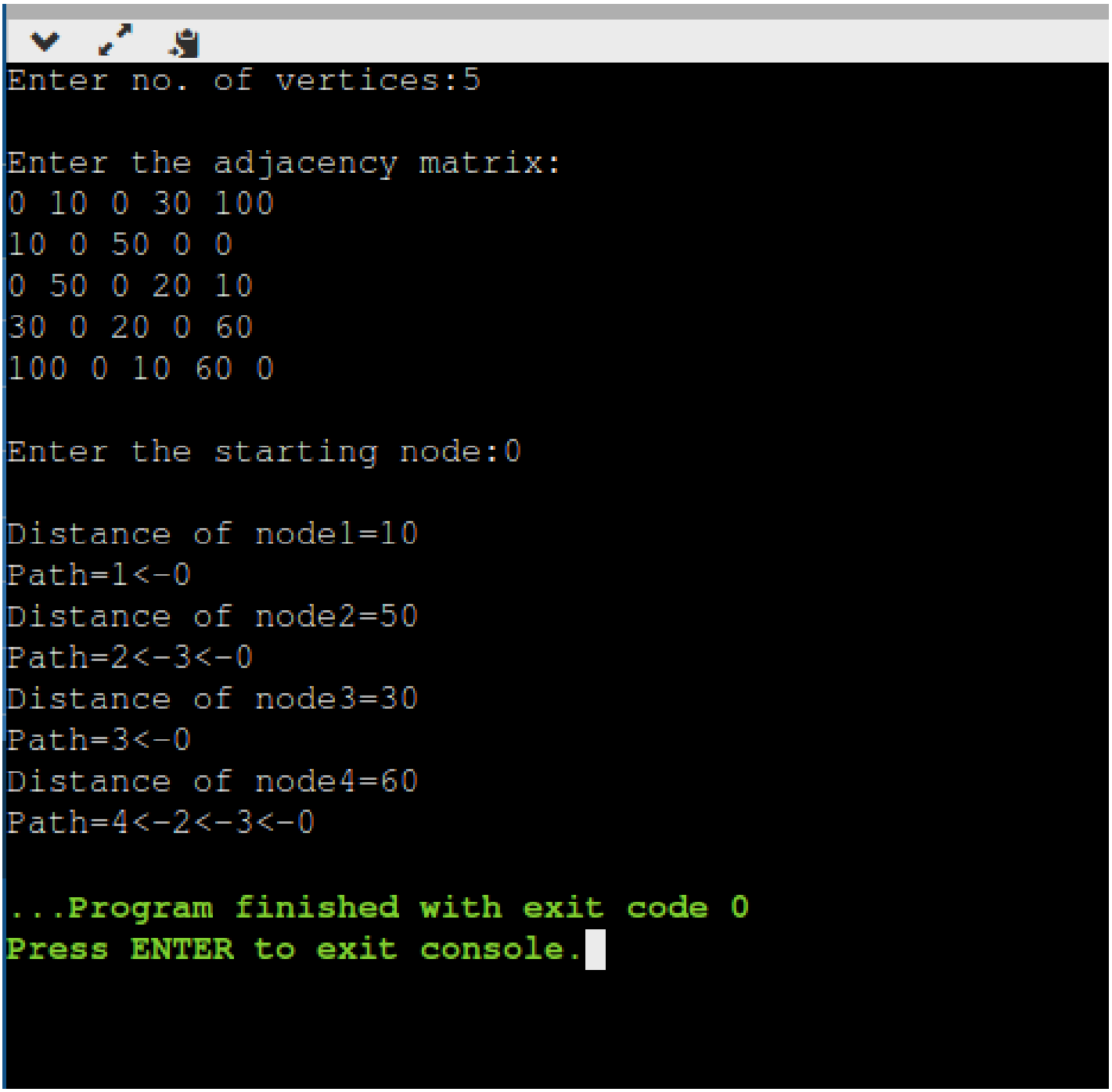
```
for(i=0;i<n;i++)
if(distance[i]<mindistance&&!visited[i])
{
mindistance=distance[i];
nextnode=i;
}
//check if a better path exists through nextnode
visited[nextnode]=1;
for(i=0;i<n;i++)
if(!visited[i])
if(mindistance+cost[nextnode][i]<distance[i])
{
distance[i]=mindistance+cost[nextnode][i];
pred[i]=nextnode;
}
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:





CONCLUSION:	Thus, we have implemented the dijkstra algorithm single source shortest path through a greedy approach.