LAB 7

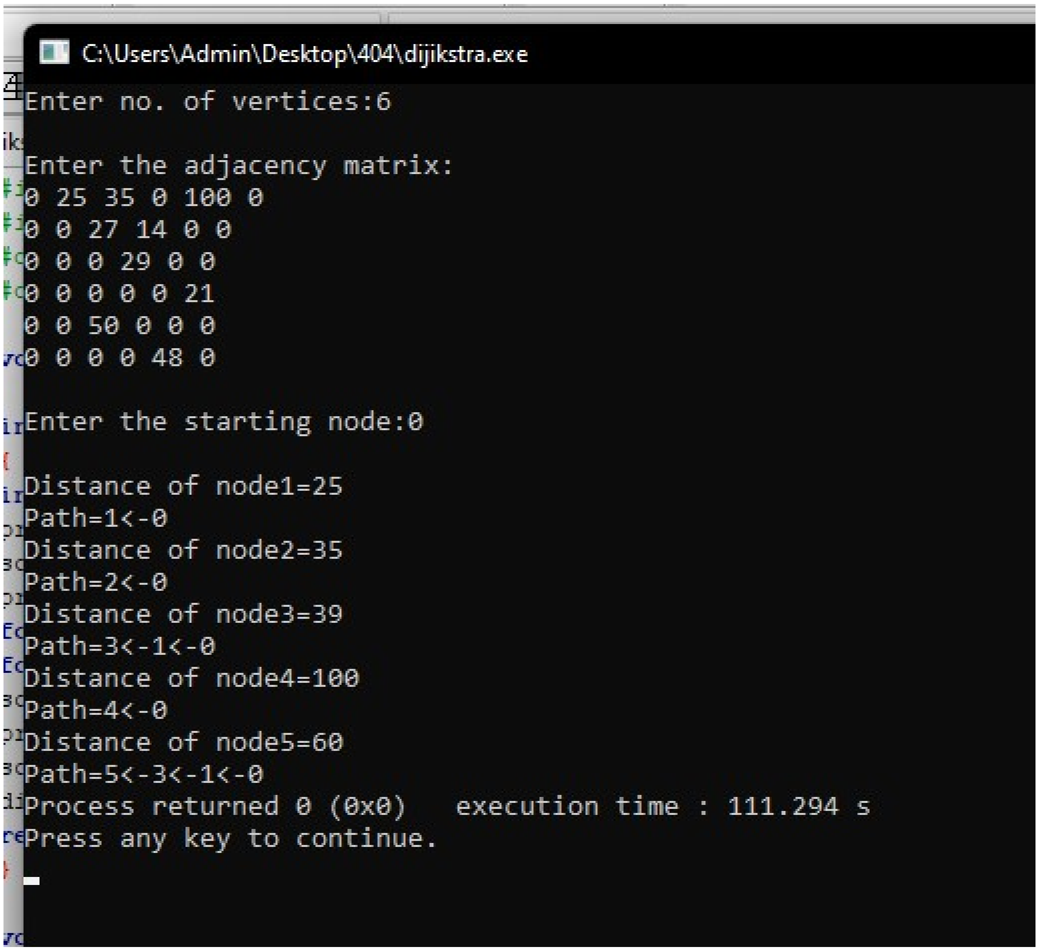
1)From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra’s algorithm.

CODE:

```
#include<stdio.h>
#include<conio.h>
#define INFINITY 999 #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:



```
Enter no. of vertices:6

Enter the adjacency matrix:
0 25 35 0 100 0
0 0 27 14 0 0
0 0 0 29 0 0
0 0 0 0 0 21
0 0 50 0 0 0
0 0 0 0 48 0

Enter the starting node:0

Distance of node1=25
Path=1<-0
Distance of node2=35
Path=2<-0
Distance of node3=39
Path=3<-1<-0
Distance of node4=100
Path=4<-0
Distance of node5=60
Path=5<-3<-1<-0
Process returned 0 (0x0)   execution time : 111.294 s
Press any key to continue.
```

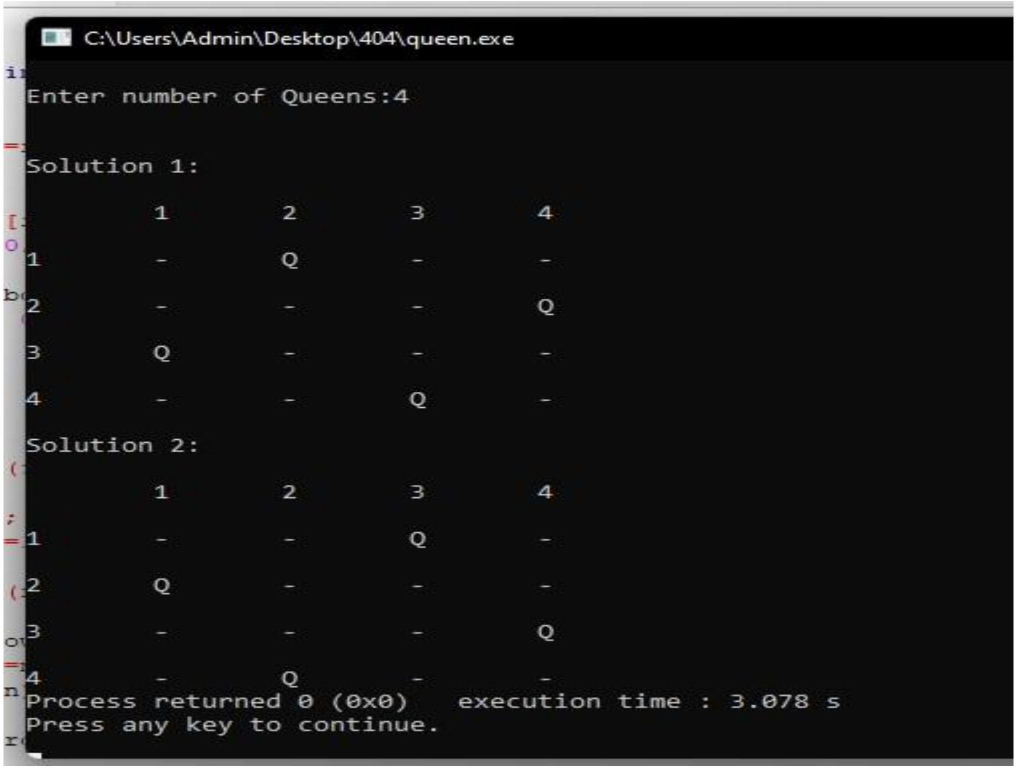
2)Implement the “N-Queens” problem using Backtracking.

CODE:

```
#include<stdio.h>

#include<math.h> int

board[20],count;


int main()
```

```
{ int n,i,j;
void queen(int row,int n); printf("\n\nEnter
no of Queens:"); scanf("%d",&n);
queen(1,n);
return 0;
}

void print(int n)
{ int i,j;
printf("\n\nOutput %d:\n\n",++count);

for(i=1;i<=n;++i) printf("\t%d",i);

for(i=1;i<=n;++i)
{
  printf("\n\n%d",i);
  for(j=1;j<=n;++j)
  { if(board[i]==j)
    printf("\tQ");
   else
    printf("\t-");
  }
}
}
int place(int row,int column)
{ int i;
for(i=1;i<=row-1;++i)
{
  if(board[i]==column)
   return 0;
  else
   if(abs(board[i]-column)==abs(i-row))
    return 0;
}
return 1;
}

void queen(int row,int n)
{
int column;
for(column=1;column<=n;++column)
{
  if(place(row,column))
  {
   board[row]=column; if(row==n)
    print(n);
   else
    queen(row+1,n);
  }
}
}
```

OUTPUT:



```
Enter number of Queens:4

Solution 1:

        1       2       3       4

1       -       Q       -       -

2       -       -       -       Q

3       Q       -       -       -

4       -       -       Q       -

Solution 2:

        1       2       3       4

1       -       -       Q       -

2       Q       -       -       -

3       -       -       -       Q

4       -       Q       -       -
Process returned 0 (0x0)   execution time : 3.078 s
Press any key to continue.
```