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ASSIGNMENT

MULTISTAGE GRAPH

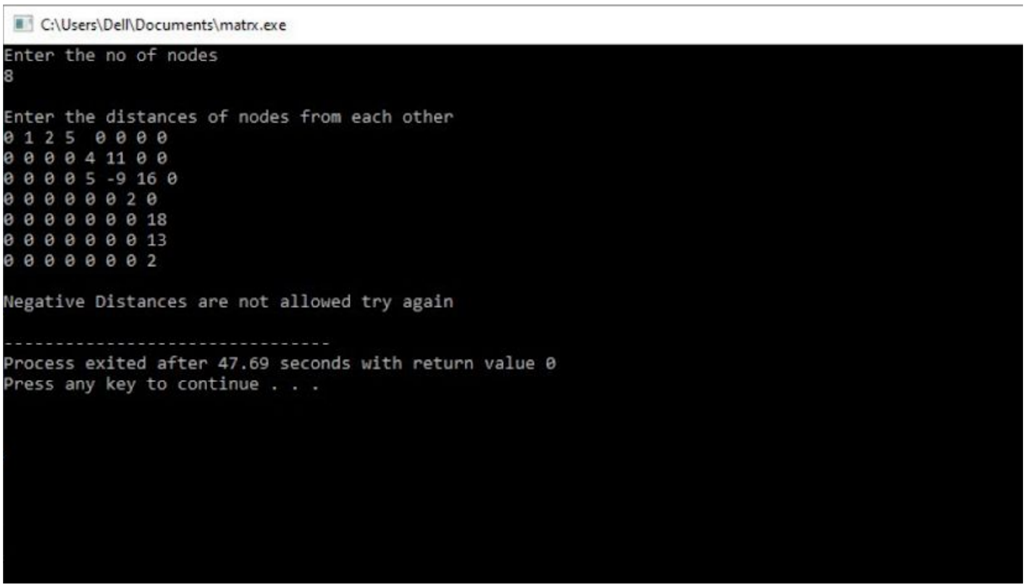
SOURCE CODE:

```
int main()
{
 int N;
 cout<<"Enter the no of nodes"<<endl;
 cin>>N;
cout<<endl<<"Enter the distances of nodes from each other "<<endl;
int graph[N][N];
for (int i =0;i<N-1;i++)
{
for(int j = 0;j<N;j++)
{
cin>>graph[i][j];
}
}
cout<<endl;
for (int i =0;i<N-1;i++)// making all 0 s INF
{
for(int j = 0;j<N;j++)
{
if (graph[i][j] == 0)
{
graph[i][j] = INF;
}
}
}
int dist[N];
dist[N-1] = 0; //last node is obviously having distance as 0
int x =0;
```

```
 for (int i = 0; i < N ; i++)
{
// checking whether there is any negative distances or not
for (int j = 0 ; j <N ; j++)
{
if (graph[i][j] <0) //if back connection is there
{
 cout<<"Negative Distances are not allowed try again"<<endl;
x =1;
break;
}
}
}
 for (int i = N-2 ; i >= 0 ; i--)
{
// Initialize distance from i to N-1 to get the min distances
dist[i] = INF;
// Check all nodes of next stages from
// i to N-1. to get the min distances from all nodes
for (int j = i ; j >=0 ; j--)
{
if (graph[i][j] != INF || graph[i][j]<0) //if back connection is there
{
 cout<<"Invalid User Input as hiher no node is coneected to lower
no.node "<<endl;
cout<<"try the input again"<<endl;
x =1;
break;
}
}
}
if (x ==0)
{
for (int i = N-2 ; i >= 0 ; i--)
{
// Initialize distance from i to N-1 to get the min distances
dist[i] = INF;
// Check all nodes of next stages from
// i to N-1. to get the min distances from all nodes
for (int j = i ; j < N ; j++)
{
if (graph[i][j] == INF) // If edge does not exist
continue;
//storing the min distances for a particular node in dist[i]
// and comparing with other its edges
dist[i] = min(dist[i], graph[i][j] + dist[j]);
}
}
cout<<"Nodes ";
cout<<" ";
for(int i=0;i<N;i++)
{
cout<<i<<" ";
}
cout<<endl;
cout<<"Respective shortest Distances ";
for(int i=0;i<N;i++)
{
cout<<dist[i]<<" ";
}
cout <<endl<<"Shortest Distance :"<< dist[0];
}
return 0;
}
```

OUTPUT :

1.



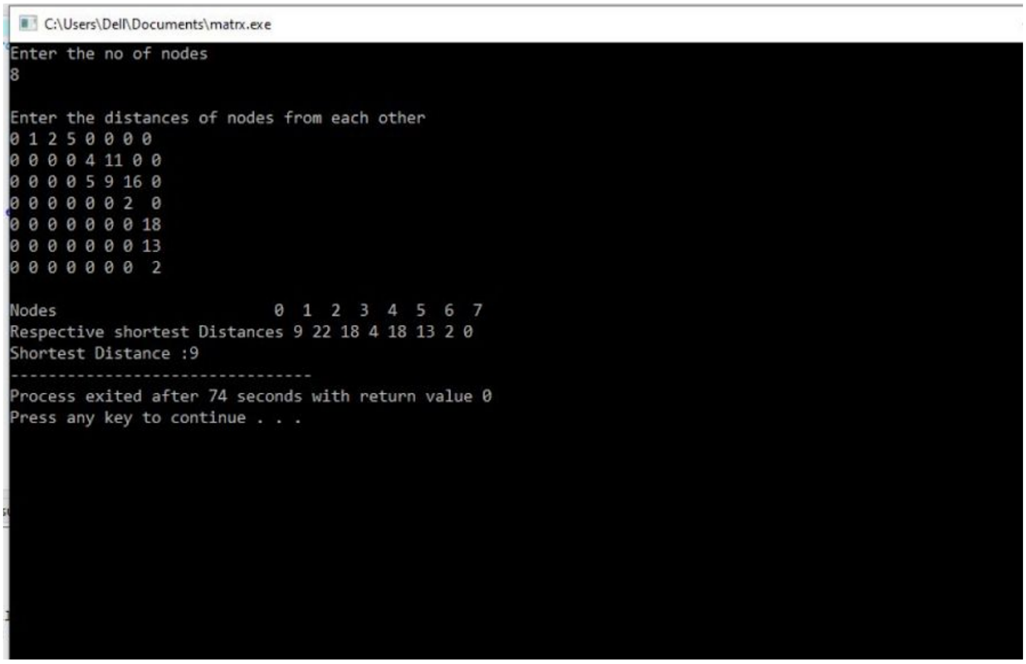
```
Enter the no of nodes
8

Enter the distances of nodes from each other
0 1 2 5  0 0 0 0
0 0 0 0 4 11 0 0
0 0 0 0 5 -9 16 0
0 0 0 0 0 0 2 0
0 0 0 0 0 0 0 18
0 0 0 0 0 0 0 13
0 0 0 0 0 0 0 2

Negative Distances are not allowed try again

--------------------------------
Process exited after 47.69 seconds with return value 0
Press any key to continue . . .
```

2.

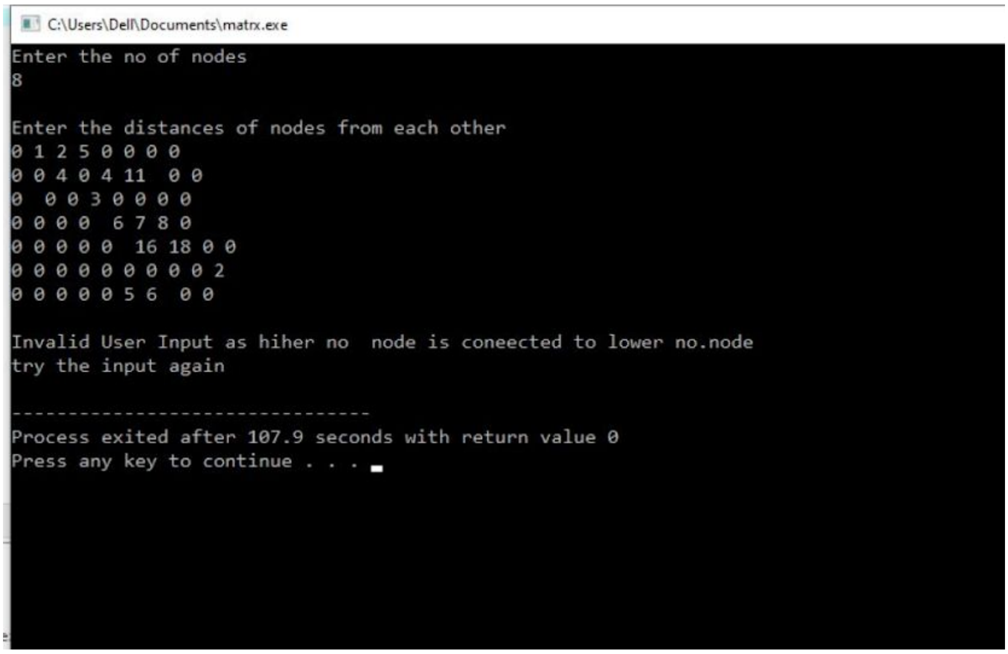


```
Enter the no of nodes
8

Enter the distances of nodes from each other
0 1 2 5 0 0 0 0
0 0 0 0 4 11 0 0
0 0 0 0 5 9 16 0
0 0 0 0 0 0 2  0
0 0 0 0 0 0 0 18
0 0 0 0 0 0 0 13
0 0 0 0 0 0 0  2

Nodes                        0  1  2  3  4  5  6  7
Respective shortest Distances 9 22 18 4 18 13 2 0
Shortest Distance :9
--------------------------------
Process exited after 74 seconds with return value 0
Press any key to continue . . .
```

3.



```
Enter the no of nodes
8

Enter the distances of nodes from each other
0 1 2 5 0 0 0 0
0 0 4 0 4 11  0 0
0  0 0 3 0 0 0 0
0 0 0 0  6 7 8 0
0 0 0 0 0  16 18 0 0
0 0 0 0 0 0 0 0 0 2
0 0 0 0 0 5 6  0 0

Invalid User Input as hiher no  node is coneected to lower no.node
try the input again

--------------------------------
Process exited after 107.9 seconds with return value 0
Press any key to continue . . .
```