**Ex 14: Dijkstra Algorithm**

**PROGRAM :**

#include <stdio.h>

#include <limits.h>

#define MAX\_VERTICES 100

int minDistance(int dist[], int sptSet[], int vertices) {

int min = INT\_MAX, minIndex;

for (int v = 0; v < vertices; v++) {

if (!sptSet[v] && dist[v] < min) {

min = dist[v];

minIndex = v;

}

}

return minIndex;

}

void printSolution(int dist[], int vertices) {

printf("Vertex \tDistance from Source\n");

for (int i = 0; i < vertices; i++) {

printf("%d \t%d\n", i, dist[i]);

}

}

void dijkstra(int graph[MAX\_VERTICES][MAX\_VERTICES], int src, int vertices) {

int dist[MAX\_VERTICES];

int sptSet[MAX\_VERTICES];

for (int i = 0; i < vertices; i++) {

dist[i] = INT\_MAX;

sptSet[i] = 0;

}

dist[src] = 0;

for (int count = 0; count < vertices - 1; count++) {

int u = minDistance(dist, sptSet, vertices);

sptSet[u] = 1;

for (int v = 0; v < vertices; v++) {

if (!sptSet[v] && graph[u][v] && dist[u] != INT\_MAX && dist[u] + graph[u][v] < dist[v]) {

dist[v] = dist[u] + graph[u][v];

}

}

}

printSolution(dist, vertices);

}

int main() {

int vertices;

printf("Input the number of vertices: ");

scanf("%d", &vertices);

if (vertices <= 0 || vertices > MAX\_VERTICES) {

printf("Invalid number of vertices. Exiting...\n");

return 1;

}

int graph[MAX\_VERTICES][MAX\_VERTICES];

printf("Input the adjacency matrix for the graph (use INT\_MAX for infinity):\n");

for (int i = 0; i < vertices; i++) {

for (int j = 0; j < vertices; j++) {

scanf("%d", &graph[i][j]);

}

}

int source;

printf("Input the source vertex: ");

scanf("%d", &source);

if (source < 0 || source >= vertices) {

printf("Invalid source vertex. Exiting...\n");

return 1;

}

dijkstra(graph, source, vertices);

return 0;

}

**OUTPUT:**

