EXERCISE-24

AIM: To write a C program to find the Minimum Spanning Tree (MST) of a connected, weighted undirected graph using Prim's **Algorithm**

Algorithm:

1. Start.
2. Input the number of vertices and the cost adjacency matrix of the graph.
3. Choose any vertex as the starting vertex.
4. Initialize:
    - selected[] array to track included vertices.
    - no_of_edges = 0
5. Repeat until no_of_edges = n - 1:
    - Find the smallest edge connecting a selected vertex to an unselected vertex.
    - Include that edge in MST and mark the vertex as selected.
    - Increase the count of edges.
6. Print the MST and its total cost.
7. End.

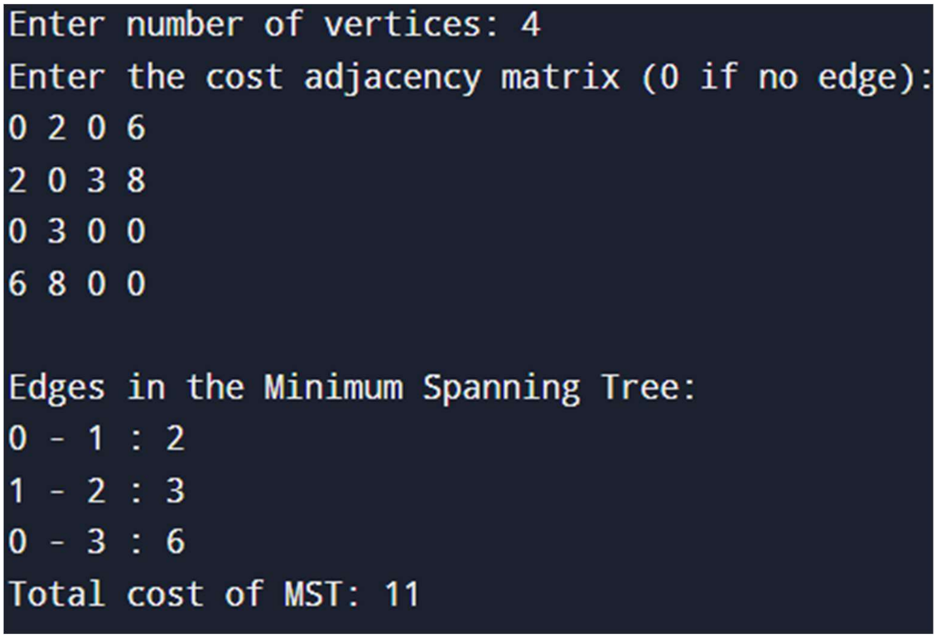
Program Code:

```
#include <stdio.h>

#define MAX 20

#define INF 9999

int main() {
```

```
int cost[MAX][MAX];
int n, i, j;
int visited[MAX] = {0};
int no_of_edges = 0, min, a = 0, b = 0, total_cost = 0;
printf("Enter number of vertices: ");
scanf("%d", &n);
printf("Enter the cost adjacency matrix (0 if no edge):\n");
for (i = 0; i < n; i++)
    for (j = 0; j < n; j++) {
        scanf("%d", &cost[i][j]);
        if (cost[i][j] == 0)
            cost[i][j] = INF;
    }
visited[0] = 1;
printf("\nEdges in the Minimum Spanning Tree:\n");
while (no_of_edges < n - 1) {
    min = INF;
    for (i = 0; i < n; i++) {
        if (visited[i]) {
            for (j = 0; j < n; j++) {
                if (!visited[j] && cost[i][j] < min) {
                    min = cost[i][j];
                    a = i;
```

```
                        b = j;
                    }
                }
            }
        }
        printf("%d - %d : %d\n", a, b, cost[a][b]);
        total_cost += cost[a][b];
        visited[b] = 1;
        no_of_edges++;
    }
    printf("Total cost of MST: %d\n", total_cost);
    return 0;
}
```

Input and Output:



```
Enter number of vertices: 4
Enter the cost adjacency matrix (0 if no edge):
0 2 0 6
2 0 3 8
0 3 0 0
6 8 0 0

Edges in the Minimum Spanning Tree:
0 - 1 : 2
1 - 2 : 3
0 - 3 : 6
Total cost of MST: 11
```

Result:

The program successfully constructs a Minimum Spanning Tree using Prim’s Algorithm and displays the total cost of the MST**.**