

```
1  #include <iostream>
2  #include <limits.h>
3  using namespace std;
4
5  class FlightNetwork {
6      int n; // Number of cities
7      int adjacent[10][10]; // Adjacency matrix for flight costs
8      string city[10]; // City names
9
10 public:
11     void input();
12     void display();
13     void Prims();
14 };
15
16 // Function to input flight details
17 void FlightNetwork::input() {
18     cout << "\nEnter the number of cities: ";
19     cin >> n;
20
21     cout << "\nEnter the names of the cities:\n";
22     for (int i = 0; i < n; i++)
23         cin >> city[i];
24
25     cout << "\nEnter the flight time (or cost) between cities:\n";
26     for (int i = 0; i < n; i++)
27         for (int j = i; j < n; j++) {
28             if (i == j) {
29                 adjacent[i][j] = 0; // No self-loop
30                 continue;
31             }
32             cout << "Enter the cost to connect " << city[i] << " and " <<
city[j] << ": ";
33             cin >> adjacent[i][j];
34             adjacent[j][i] = adjacent[i][j]; // Undirected graph (bi-
directional flights)
35         }
36     }
37
38 // Function to display the adjacency matrix
39 void FlightNetwork::display() {
40     cout << "\nFlight Cost Adjacency Matrix:\n";
41     for (int i = 0; i < n; i++) {
42         for (int j = 0; j < n; j++)
43             cout << adjacent[i][j] << "\t";
44         cout << "\n";
45     }
46 }
47
48 // Function to find the Minimum Spanning Tree using Prim's Algorithm
49 void FlightNetwork::Prims() {
50     int visit[n], minCost = 0, count = n - 1, minIndex, cost = 0;
51 }
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52     for (int i = 0; i < n; i++)
53         visit[i] = 0;
54
55     cout << "\n\nOptimal Flight Route (Minimum Spanning Tree):\n";
56     visit[0] = 1;
57     cout << city[0] << " → ";
58
59     while (count--) {
60         minCost = INT_MAX;
61
62         for (int i = 0; i < n; i++) {
63             for (int j = 0; j < n; j++) {
64                 if (visit[i] == 1 && adjacent[i][j] != 0 && adjacent[i][j] <
minCost && visit[j] == 0) {
65                     minCost = adjacent[i][j];
66                     minIndex = j;
67                 }
68             }
69         }
70
71         visit[minIndex] = 1;
72         cout << city[minIndex] << " → ";
73         cost += minCost;
74     }
75
76     cout << "End\n";
77     cout << "Minimum Total Flight Cost: " << cost << "\n";
78 }
79
80 // Main function
81 int main() {
82     FlightNetwork network;
83     int choice;
84
85     do {
86         cout << "\n\nFLIGHT NETWORK (Minimum Spanning Tree Algorithm)";
87         cout << "\n1. Input Flight Data";
88         cout << "\n2. Display Flight Cost Matrix";
89         cout << "\n3. Find Optimal Flight Connections (MST)";
90         cout << "\n4. Exit";
91         cout << "\nEnter your choice: ";
92         cin >> choice;
93
94         switch (choice) {
95             case 1:
96                 network.input();
97                 break;
98             case 2:
99                 network.display();
100                break;
101             case 3:
102                 network.Prim's();
103                 break;
104         }
105     } while (choice != 4);
```

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106  
107     return 0;  
108 }  
109
```