Assignment No. 16

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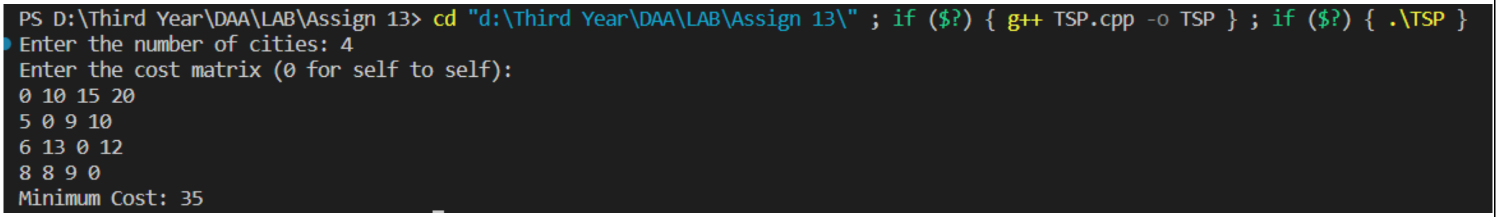
Batch : T7

Topic : Travelling Salesman Problem

Code :

```
#include<bits/stdc++.h>
using namespace std;
const int INF = INT_MAX;
int tsp(const vector<vector<int>>& graph, vector<int>& path, vector<bool>& visited, int
current, int n, int cost) {
    if (n == 1) {
        path.push_back(0); // Return to the starting city
        // printPath(path);
        path.pop_back();
        return cost + graph[current][0];
    }

    int minCost = INF;

    for (int i = 0; i < graph.size(); ++i) {
        if (!visited[i]) {
            visited[i] = true;
            path.push_back(i);

            int newCost = tsp(graph, path, visited, i, n - 1, cost + graph[current][i]);
            minCost = min(minCost, newCost);
            path.pop_back();
            visited[i] = false;
        }
    }

    return minCost;
}

int main() {
    int n; // Number of cities
    cout << "Enter the number of cities: ";
    cin >> n;

    vector<vector<int>> graph(n, vector<int>(n, 0));

    cout << "Enter the cost matrix (0 for self to self):" << endl;
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < n; ++j) {
            cin >> graph[i][j];
        }
    }

    vector<int> path = {0}; // Starting from city 0
    vector<bool> visited(n, false);
    visited[0] = true; // Mark the starting city as visited

    int minCost = tsp(graph, path, visited, 0, n, 0);

    cout << "Minimum Cost: " << minCost << endl;
    return 0;
}
```

Output –



```
PS D:\Third Year\DAA\LAB\Assign 13> cd "d:\Third Year\DAA\LAB\Assign 13\" ; if ($?) { g++ TSP.cpp -o TSP } ; if ($?) { .\TSP }
Enter the number of cities: 4
Enter the cost matrix (0 for self to self):
0 10 15 20
5 0 9 10
6 13 0 12
8 8 9 0
Minimum Cost: 35
```