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Experiment - 8

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Branch: AIML   **Section/Group:** AIML 4 B
Semester: 5th   **Date of Performance:**   / /2022
Subject Name: Advanced Programming Lab   **Subject Code:** 20CSP-334

1. AIM:

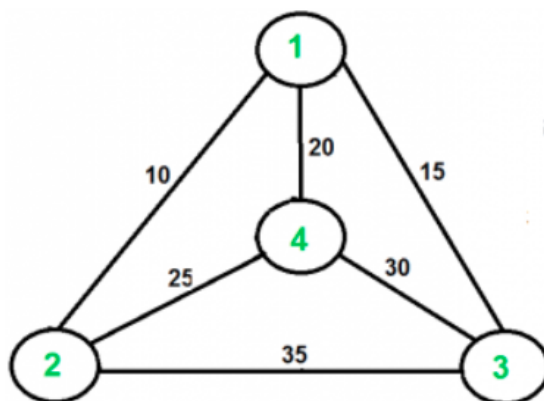Implement Travelling Salesperson problem using Dynamic programming

2. Apparatus:

- Texeditor
- Laptop / PC with C++ compiler

3. Algorithm/Theory

Travelling Salesman Problem: Given the cities represented by vertices the salesman has to cover or deliver the parcels in each and every city given distance from each city.
To ease the task of the salesman we have to provide a certain path which returns the minimum distance.

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4. Program/Code

```cpp
#include <bits/stdc++.h>
using namespace std;
#define V 4

int travllingSalesmanProblem(int graph[][V], int s)
{
    vector<int> vertex;
    for (int i = 0; i < V; i++)
        if (i != s)
            vertex.push_back(i);
    int min_path = INT_MAX;
    do {
        int current_pathweight = 0;
        int k = s;
        for (int i = 0; i < vertex.size(); i++) {
            current_pathweight += graph[k][vertex[i]];
            k = vertex[i];
        }
        current_pathweight += graph[k][s];
        // update minimum
        min_path = min(min_path, current_pathweight);
    } while (
        next_permutation(vertex.begin(), vertex.end()));
    return min_path;
}
int main()
{
    int graph[][V] = { { 0, 10, 15, 20 },
                       { 10, 0, 35, 25 },
                       { 15, 35, 0, 30 },
                       { 20, 25, 30, 0 } };
    int s = 0;

    cout<<"The Minimum distance to travel by the person to cover all the points is : ";
    cout << travllingSalesmanProblem(graph, s) << endl;
    return 0;
}
```
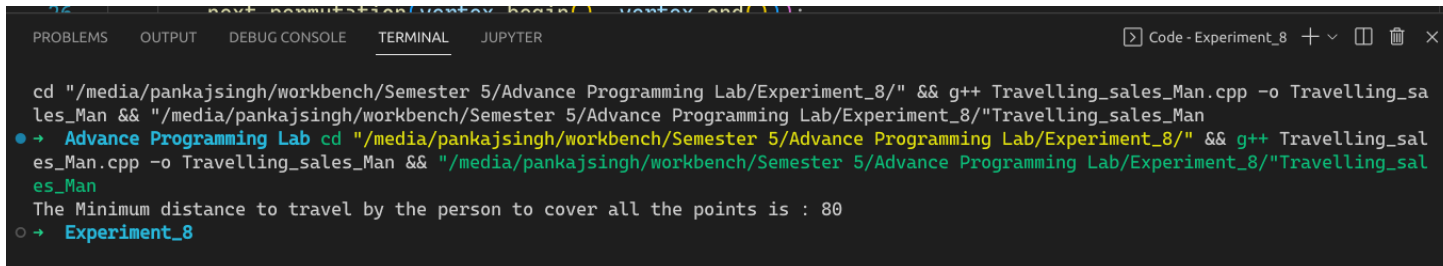
6. Output

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    JUPYTER                                    Code - Experiment_8  + ∨  □  🗑  ×

cd "/media/pankajsingh/workbench/Semester 5/Advance Programming Lab/Experiment_8/" && g++ Travelling_sales_Man.cpp -o Travelling_sa
les_Man && "/media/pankajsingh/workbench/Semester 5/Advance Programming Lab/Experiment_8/"Travelling_sales_Man
● → Advance Programming Lab cd "/media/pankajsingh/workbench/Semester 5/Advance Programming Lab/Experiment_8/" && g++ Travelling_sal
es_Man.cpp -o Travelling_sales_Man && "/media/pankajsingh/workbench/Semester 5/Advance Programming Lab/Experiment_8/"Travelling_sal
es_Man
The Minimum distance to travel by the person to cover all the points is : 80
○ → Experiment_8
```

7. Learning Outcomes:

1. Learned the concepts of the Greedy algorithm.

2. Learned the concepts of hamiltonian path in graphs.

3. Learned to write a program for the above problem.

4. Learned to use VS code effectively.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			