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PRN - B24CE1079
SUB - Mathematical Foundation For GenAI
ASSIGNMENT 5 -Warshall's Algorithm
CODE

```
#include <iostream>
#include <vector>
#define INF 99999   // Define a large number to represent infinity. This is used for intersections with no direct road.
using namespace std;

void floydWarshall(vector<vector<int>> &dist, int n) {
    for (int k = 0; k < n; k++) {
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++) {
                if (dist[i][k] != INF && dist[k][j] != INF &&
                    dist[i][k] + dist[k][j] < dist[i][j]) {
                    dist[i][j] = dist[i][k] + dist[k][j];
                }
            }
        }
    }
}

int main() {
    int n;
    cout << "Enter number of intersections: ";
    cin >> n;

    // Initialize the adjacency matrix with the given size.
    vector<vector<int>> dist(n, vector<int>(n));

    cout << "Enter travel time matrix (" << INF << " if no direct road):\n";
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            cin >> dist[i][j];
            if (i == j) {
                dist[i][j] = 0;
            }
        }
    }

    cout << "\nOriginal Travel Time Matrix:\n";
    for (int i = 0; i < n; i++) {
```

```
        for (int j = 0; j < n; j++) {
            if (dist[i][j] == INF) {
                cout << "INF ";
            } else {
                cout << dist[i][j] << " ";
            }
        }
        cout << "\n";
    }

    floydWarshall(dist, n);

    cout << "\nShortest Travel Time Between All Intersections:\n";
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            if (dist[i][j] == INF) {
                cout << "INF ";
            } else {
                cout << dist[i][j] << " ";
            }
        }
        cout << "\n";
    }
    return 0;
}
```

OUTPUT

```
Enter number of intersections: 4
Enter travel time matrix (99999 if no direct road):
1 5 99999 3
2 9 8 99999
3 10 84 90
0 99999 54 79

Original Travel Time Matrix:
0 5 INF 3
2 0 8 INF
3 10 0 90
0 INF 54 0

Shortest Travel Time Between All Intersections:
0 5 13 3
2 0 8 5
3 8 0 6
0 5 13 0
```