Sardar Patel Institute of Technology

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(Autonomous College Affiliated to University of Mumbai)

PRACTICAL NO. 09	DESIGN AND ANALYSIS OF ALGORITHMS
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BATCH	D4
PROBLEM STATEMENT	**Approximation algorithms (Travelling Salesman Problem)**
CODE	

```
#include <stdio.h>
#define n 4
#define MAX 1000000

int dist[n + 1][n + 1] = {
        { 0, 0, 0, 0, 0 }, { 0, 0, 10, 15, 20 },
        { 0, 10, 0, 25, 25 }, { 0, 15, 25, 0, 30 },
        { 0, 20, 25, 30, 0 },
};

int memo[n + 1][1 << (n + 1)];

int fun(int i, int mask)
{

        if (mask == ((1 << i) | 3))
                return dist[1][i];

        if (memo[i][mask] != 0)
                return memo[i][mask];
```

```
        int res = MAX;

        for (int j = 1; j <= n; j++)
                if ((mask & (1 << j)) && j != i && j != 1)
                        res = (res < fun(j, mask & (~(1 << i)))+ dist[j][i]) ? res : fun(j, mask & (~(1 << i)))+ dist[j][i];
        return memo[i][mask] = res;
}


int main()
{
        int ans = MAX;
        for (int i = 1; i <= n; i++)
        ans = (ans < fun(i, (1 << (n + 1)) - 1)+ dist[i][1]) ? ans : fun(i, (1 << (n + 1)) - 1)+ dist[i][1];
       printf("The cost of most efficient tour = %d\n", ans);

        return 0;
}
```

OUTPUT