



PRIM'S ALGORITHM

Minimum Spanning Tree Algorithm

Algorithm and Design Analysis Lab Internal

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5C7

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AIM: To implement Prim's Algorithm to find minimum Spanning Tree (MST).

Source Code

```
#include <bits/stdc++.h>
using namespace std;

#define V 5

int minKey(int key[], bool mstSet[])
{
    int min = INT_MAX, min_index;

    for (int v = 0; v < V; v++)
        if (mstSet[v] == false && key[v] < min)
            min = key[v], min_index = v;

    return min_index;
}

// printing edges and weight
void printMST(int parent[], int graph[V][V])
{
    cout << "Edge \tWeight\n";
    for (int i = 1; i < V; i++)
        cout << parent[i] << " - " << i << " \t" << graph[i][parent[i]] << "\n";
}
```

```

void prim(int graph[V][V])
{
    int parent[V];
    int key[V];

    bool mstSet[V];

    for (int i = 0; i < V; i++)
        key[i] = INT_MAX, mstSet[i] = false;

    key[0] = 0;
    parent[0] = -1;

    for (int count = 0; count < V - 1; count++)
    {
        int u = minKey(key, mstSet);
        mstSet[u] = true;
        for (int v = 0; v < V; v++)
            if (graph[u][v] && mstSet[v] == false && graph[u][v] < key[v])
                parent[v] = u, key[v] = graph[u][v];
    }

    printMST(parent, graph);
}

int main()
{
    int graph[V][V] = {{0, 9, 75, 0, 0},
                        {9, 0, 95, 19, 42},

```

```
{75, 95, 0, 51, 66},  
{0, 19, 51, 0, 31},  
{0, 42, 66, 31, 0}};
```

```
auto start = chrono::high_resolution_clock::now();  
ios_base::sync_with_stdio(false);
```

```
prim(graph);
```

```
auto end = chrono::high_resolution_clock::now();  
double time_taken = chrono::duration_cast<chrono::nanoseconds>(end -  
start).count();
```

```
time_taken *= 1e-9 * 1000;
```

```
cout << "\nTime taken by program is : " << time_taken << setprecision(6);  
cout << "msec" << endl;
```

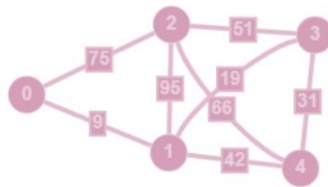
```
return 0;
```

```
}
```

Output

```
Edge    Weight
0 - 1    9
3 - 2   51
1 - 3   19
3 - 4   31

Time taken by program is : 0.052126msec
```



```
input
Edge    Weight
0 - 1    9
3 - 2   51
1 - 3   19
3 - 4   31

Time taken by program is : 0.052126msec

...Program finished with exit code 0
Press ENTER to exit console.
```

MST

