Experiment 6

Prim’s MST Algorithm

Program:

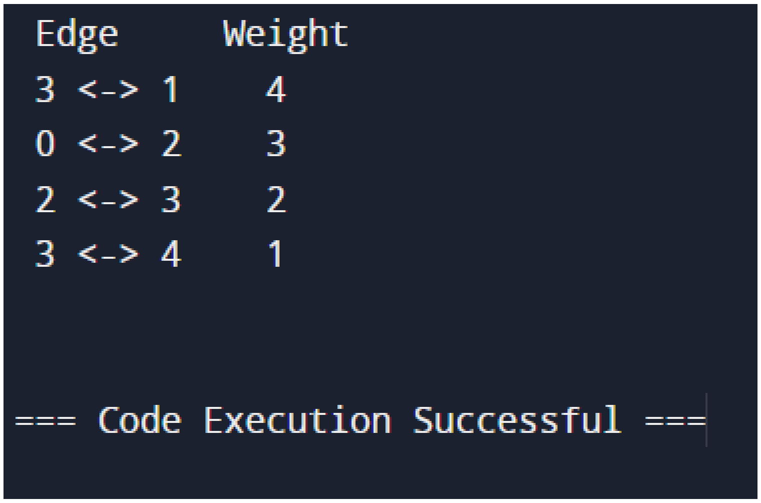
```
#include <stdio.h>
#include <limits.h>
#define vertices 5  /*Define the number of vertices in the graph*/
/* create minimum_key() method for finding the vertex that has minimum key-value and that is
not added in MST yet */
int minimum_key(int k[], int mst[])
{
   int minimum  = INT_MAX, min,i;

   /*iterate over all vertices to find the vertex with minimum key-value*/
   for (i = 0; i < vertices; i++)
      if (mst[i] == 0 && k[i] < minimum )
         minimum = k[i], min = i;
   return min;
}
/* create prim() method for constructing and printing the MST.
The g[vertices][vertices] is an adjacency matrix that defines the graph for MST.*/
void prim(int g[vertices][vertices])
{
   /* create array of size equal to total number of vertices for storing the MST*/
   int parent[vertices];
   /* create k[vertices] array for selecting an edge having minimum weight*/
   int k[vertices];
   int mst[vertices];
   int i, count,edge,v; /*Here 'v' is the vertex*/
   for (i = 0; i < vertices; i++)
   {
      k[i] = INT_MAX;
      mst[i] = 0;
   }
   k[0] = 0; /*It select as first vertex*/
   parent[0] = -1;   /* set first value of parent[] array to -1 to make it root of MST*/
   for (count = 0; count < vertices-1; count++)
   {
      /*select the vertex having minimum key and that is not added in the MST yet from the set
of vertices*/
      edge = minimum_key(k, mst);
      mst[edge] = 1;
```

```
        for (v = 0; v < vertices; v++)
        {
            if (g[edge][v] && mst[v] == 0 && g[edge][v] <  k[v])
            {
                parent[v]  = edge, k[v] = g[edge][v];
            }
        }
     }
     /*Print the constructed Minimum spanning tree*/
     printf("\n Edge \t  Weight\n");
     for (i = 1; i < vertices; i++)
     printf(" %d <-> %d    %d \n", parent[i], i, g[i][parent[i]]);

}
int main()
{
    int g[vertices][vertices] = {{0, 0, 3, 0, 0},
                                {0, 0, 10, 4, 0},
                                {3, 10, 0, 2, 6},
                                {0, 4, 2, 0, 1},
                                {0, 0, 6, 1, 0},
                                };
    prim(g);
    return 0;
}
```

Output:



```
 Edge     Weight
 3 <-> 1    4
 0 <-> 2    3
 2 <-> 3    2
 3 <-> 4    1


=== Code Execution Successful ===
```