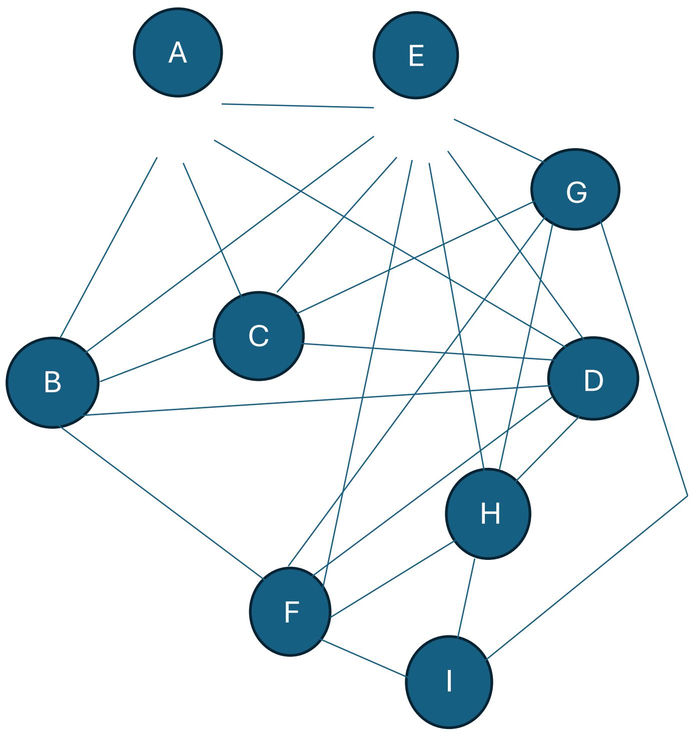
23CSE –111- DESIGN AND ANALYSIS OF ALGORTHIM

LAB-4
PRIMS’S AND KRUSKEL’S ALGORITHMS

PRIMS’S ALGORITHM:

GRAPH DIAGRAM:



Weight of the graph:

i.	A–B = 4	A–C = 8	A–D = 6	A–E = 7
ii.	B–C = 5	B–D = 3	B–F = 9	B–E = 6
iii.	C–D = 4	C–E = 2	C–G = 10	
iv.	D–E = 5	D–F = 7	D–H = 6	
v.	E–F = 4	E–G = 8	E–H = 9	
vi.	F–G = 3	F–H = 5	F–I = 6	
vii.	G–H = 4	G–I = 7		
viii.	H–I = 2			

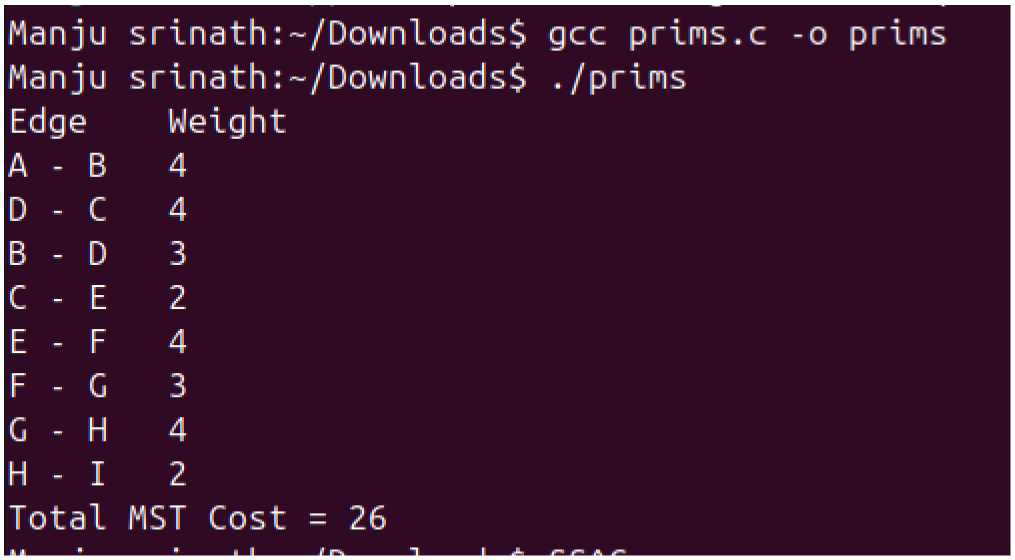
CODE:

```
#include <stdio.h>
```

```
#include <limits.h>
#define V 9
int minKey(int key[], int mstSet[]) {
  int min = INT_MAX, min_index;
  for (int v = 0; v < V; v++) {
    if (!mstSet[v] && key[v] < min) {
      min = key[v];
      min_index = v;
    }
  }
  return min_index;
}
void printMST(int parent[], int graph[V][V]) {
  int cost = 0;
  printf("Edge \tWeight\n");
  for (int i = 1; i < V; i++) {
    printf("%c - %c \t%d\n", parent[i] + 'A', i + 'A',
        graph[i][parent[i]]);
    cost += graph[i][parent[i]];
  }
  printf("Total MST Cost = %d\n", cost);
}
void primMST(int graph[V][V]) {
  int parent[V];
  int key[V];
  int mstSet[V];
  for (int i = 0; i < V; i++) {
    key[i] = INT_MAX;
    mstSet[i] = 0;
  }
  key[0] = 0;
  parent[0] = -1;
  for (int count = 0; count < V - 1; count++) {
    int u = minKey(key, mstSet);
    mstSet[u] = 1;
    for (int v = 0; v < V; v++) {
      if (graph[u][v] && !mstSet[v] && graph[u][v] < key[v]) {
        parent[v] = u;
```

```
                key[v] = graph[u][v];
            }
        }
    }
    printMST(parent, graph);
}
int main() {
    int graph[V][V] = {
        {0,4,8,6,7,0,0,0,0},
        {4,0,5,3,6,9,0,0,0},
        {8,5,0,4,2,0,10,0,0},
        {6,3,4,0,5,7,0,6,0},
        {7,6,2,5,0,4,8,9,0},
        {0,9,0,7,4,0,3,5,6},
        {0,0,10,0,8,3,0,4,7},
        {0,0,0,6,9,5,4,0,2},
        {0,0,0,0,0,6,7,2,0}
    };
    primMST(graph);
    return 0;
}
```

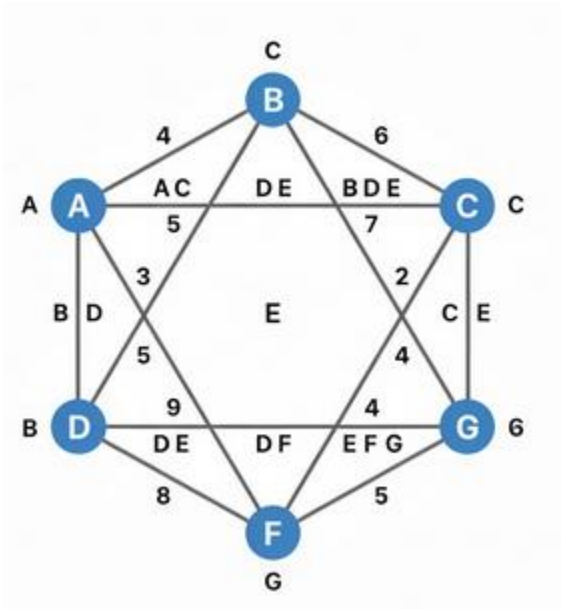
OUTPUT:



```
Manju srinath:~/Downloads$ gcc prims.c -o prims
Manju srinath:~/Downloads$ ./prims
Edge    Weight
A - B   4
D - C   4
B - D   3
C - E   2
E - F   4
F - G   3
G - H   4
H - I   2
Total MST Cost = 26
```

KRUSKAL’S ALGORITHM:

<u>GRAPH DIAGRAM:</u>



<u>Weight of the graph:</u>

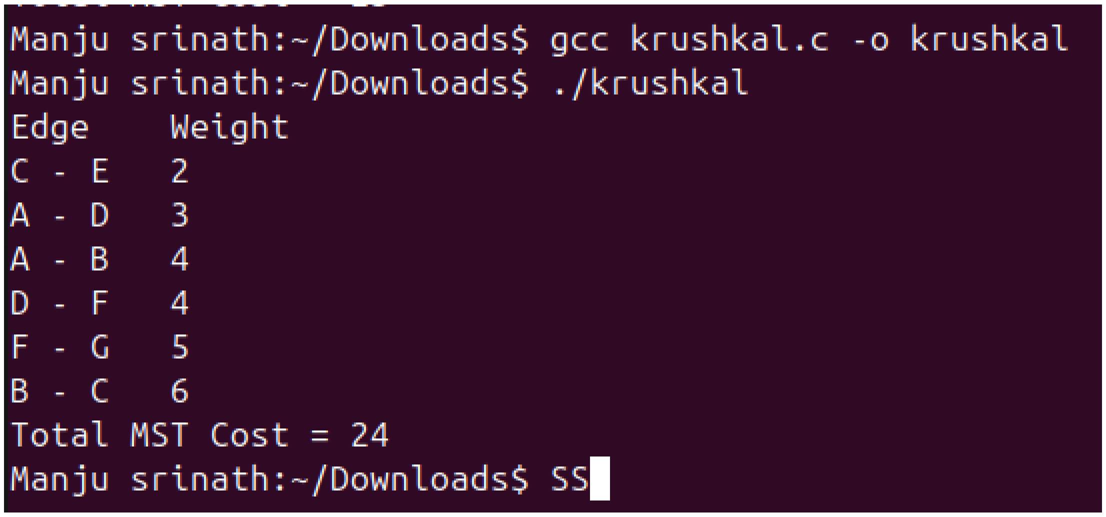
I. A - B = 7 , A - D = 5
II. B - C = 8 , B - D = 9 , B - E = 7
III. C - E = 5
IV. D - E = 15 , D - F = 6
V. E - F = 8 , E - G = 9
VI. F - G = 11

CODE:

```
  #include <stdio.h> #include <stdlib.h>

#define V 7

#define E 11

struct Edge { int src, dest, weight; };

struct Subset { int parent; int rank; };

int find(struct Subset subsets[], int i) { if (subsets[i].parent != i) subsets[i].parent =
find(subsets, subsets[i].parent); return subsets[i].parent; }

void Union(struct Subset subsets[], int x, int y) { int xroot = find(subsets, x); int yroot =
find(subsets, y);

if (subsets[xroot].rank < subsets[yroot].rank)
   subsets[xroot].parent = yroot;
else if (subsets[xroot].rank > subsets[yroot].rank)
   subsets[yroot].parent = xroot;
else {
   subsets[yroot].parent = xroot;
   subsets[xroot].rank++;
}
}

int compare(const void *a, const void *b) { return ((struct Edge *)a)->weight - ((struct Edge
*)b)->weight; }

void KruskalMST(struct Edge edges[]) { struct Edge result[V]; int e = 0, i = 0;

qsort(edges, E, sizeof(edges[0]), compare);

struct Subset subsets[V];
for (int v = 0; v < V; v++) {
   subsets[v].parent = v;
   subsets[v].rank = 0;
}

while (e < V - 1 && i < E) {
   struct Edge next = edges[i++];
   int x = find(subsets, next.src);
   int y = find(subsets, next.dest);

   if (x != y) {
      result[e++] = next;
      Union(subsets, x, y);
   }
}

int total = 0;
printf("Edge \tWeight\n");
for (i = 0; i < e; i++) {
   printf("%c - %c \t%d\n",
         result[i].src + 'A',
         result[i].dest + 'A',
         result[i].weight);
   total += result[i].weight;
}
printf("Total MST Cost = %d\n", total);


}
```

```
int main() { struct Edge edges[E] = { {0,1,4},

 {0,3,3},

 {1,2,6},

 {1,3,5},

 {1,4,7},

 {2,4,2},

 {3,4,9},

 {3,5,4},

 {4,5,6},

 {4,6,8},

 {5,6,5}

 };

KruskalMST(edges);
return 0;
 }
```

OUTPUT:



```
Manju srinath:~/Downloads$ gcc krushkal.c -o krushkal
Manju srinath:~/Downloads$ ./krushkal
Edge    Weight
C - E   2
A - D   3
A - B   4
D - F   4
F - G   5
B - C   6
Total MST Cost = 24
Manju srinath:~/Downloads$ SS
```