United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Course Code: CSI 228 Section: E

Course Title: Algorithms Lab

Kruskal's Algorithm

Implement the **following** algorithm for finding the Minimum Spanning Tree in an *undirected weighted* graph.

```
MST-KRUSKAL(G, w)
1  A = ∅
2  for each vertex v ∈ G.V
3      MAKE-SET(v)
4  sort the edges of G.E into nondecreasing order by weight w
5  for each edge (u, v) ∈ G.E, taken in nondecreasing order by weight
6      if FIND-SET(u) ≠ FIND-SET(v)
7          A = A ∪ {(u, v)}
8          UNION(u, v)
9  return A
```

Instructions:

1. Your code **must** be such that I can copy paste the sample input in your code. Otherwise, 3 to 5 marks will be deducted.
2. You **must** use path compression heuristic and union-by-rank heuristic for disjoint set.
3. I shall evaluate your understanding of your code one-on-one. **You will only get marks when you can explain your code.**
4. If you copy from others, 10 marks will be deducted from your final total marks.

Sample Input	**Sample Output**

int V = 4, E = 5;
int edges[E][3] = {
{0, 1, 10},
{0, 2, 6},
{0, 3, 5},
{1, 3, 15},
{2, 3, 4}
};
	MST
	0 - 1
	3 - 2
	0 – 3
	Sum of edge weights 19

int V = 9, E = 14;
int edges[E][3] = {
{0, 1, 10},
{0, 2, 12},
{1, 2, 9},
{1, 3, 8},
{2, 4, 4},
{2, 5, 1},
{3, 4, 7},
{3, 6, 8},
{3, 7, 5},
{4, 5, 3},
{5, 7, 6},
{6, 7, 9},
{6, 8, 2},
{7, 8, 11}
};
	MST
	0-1
	2-5
	1-3
	4-5
	5-7
	3-6
	3-7
	6-8
	Sum of edge weights 43