## Assignment 4-(Part 1)-on Disjoint Sets and MST

In this assignment, you will implement the Kruskal's algorithm for finding the minimum spanning tree from a given 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

- You must take input from a .txt file. The first line represents the node number and edge number. Rest of the lines represent each edge info. [leftnode rightnode weight]
- For sort operation, you can directly use the sort() function from algorithm (**C++ stl**) library.
- For your MAKE-SET, FIND-SET, UNION operations, modify the disjoint set codes as discussed in the class to include **union by rank and path compression** (
- In the output, print all the edges of this MST and also print the sum of the edge weights of this MST

| Sample Input | Sample Output |
| --- | --- |
| 9 14 | MST Edges: |
| 1 2 4 | 8 7 |
| 1 8 8 | 3 9 |
| 2811 | 6 7 |
| 2 3 8 | 1 2 |
| 8 9 7 | 3 6 |
| 8 7 1 | 3 4 |
| 3 9 2 | 1 8 |
| 3 4 7 | 4 5 |
| 3 6 4 | Minimum weight of MST = 37 |
| 4 5 9 | |
| 5610 | |
| 4614 | |
| 6 7 2 | |
| 9 7 6 | |

**Total Marks: 10**

[Miss at your own risk]
[Zero tolerance for plagiarism]