INDIAN STATISTICAL INSTITUTE

M. Tech (CS) - I Year, 2018-2019 (Semester - II)

Design and Analysis of Algorithms

Assignment-2: Programming Assignment

Total marks: 200

Submission: The assignment is being uploaded on 22.03.2019 and has to be made ready by 07.04.2019. The submission procedure will be informed shortly.

Note: Implementations need to be in C/C++.

(Q1) Implement depth first search traversal of a directed and undirected graph. [30]

(Q2) For a directed graph G, implement an algorithm to find the strongly connected components in G. [30]

(Q3) For a directed graph G, implement an algorithm to find

- the *articulation points* in G, if they exist; [30]
- the *bridges* in G, if they exist; [30]

(Q4) Let G be a directed acyclic graph. Implement *topological sort* in G. [20]

(Q5) Let G be a directed/undirected graph. Implement

- Dijkstra's shortest path algorithm in G where G does not have negative weight edges; [30]
- Kruskal's minimum spanning tree algorithm by using the *Union Find* data structure. [30]