Assignment 6

Deadline:-17/November/2020 11:55 PM IST

1 Theory

1. Explain how the coding question #2 can be solved by computing an MST of the input graph.   2

2. A Minimum Bottleneck Spanning Tree of an undirected graph $G(V, E)$ is a spanning tree whose maximum weight edge is minimized. Explain how an MST is always a minimum bottleneck spanning tree, but the converse may not be true.   4

3. Let $G(V, E)$ be a directed graph. A cliq is defined to be the maximal set of vertices $V' \subset V$ such that every vertex in V' can reach the rest of the vertices in V' using some directed path. Show how DFS can be used to verify whether a graph has cliqs are not.   4

4. Given an adjacency-list representation of a directed graph, how long does it take to compute the out-degree of every vertex? How long does it take to compute the in-degrees?   2

5. The square of a directed graph $G(V, E)$ is the graph $G'(V, E')$ such that $(u, v) \in E' \iff G$ contains a directed path with at most two edges between u and v.

   Describe an efficient algorithm to compute G' from G for the adjacency-matrix representation of G.
   Analyze the running time of your algorithm.   4