CS1102 Data Structures Assignment-3

Instructions

1. Deadline to submit assignment is 09:00 PM, 05-12-2021.
2. Upload single PDF file having solutions of theory and programming part (submission through TCs-Ion assignment link).

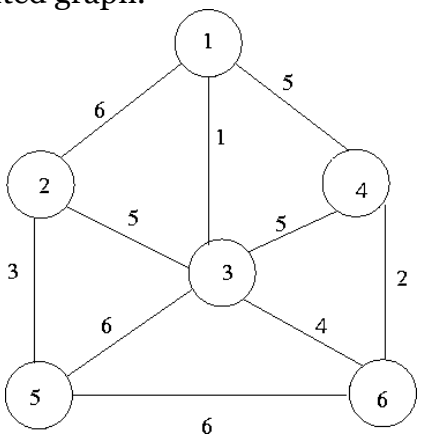
Programming Part

Instructions

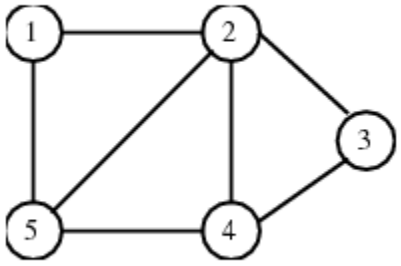
1. you must write the code in JAVA and mention the time and space complexity of your program.

Q1. Write a Program in JAVA to Check if an Un-Directed Graph is a Tree or Not Using DFS

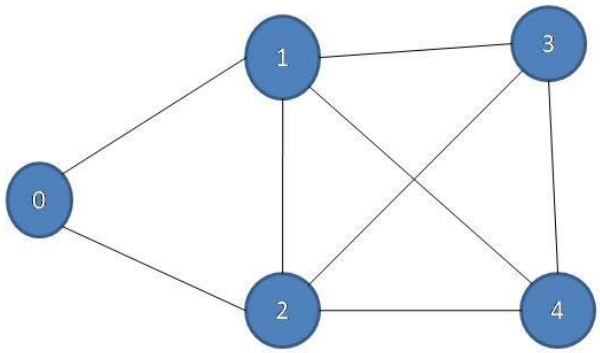
Q2. Write a Program in JAVA for finding out minimum spanning tree using Prim's algorithm for the given weighted graph.



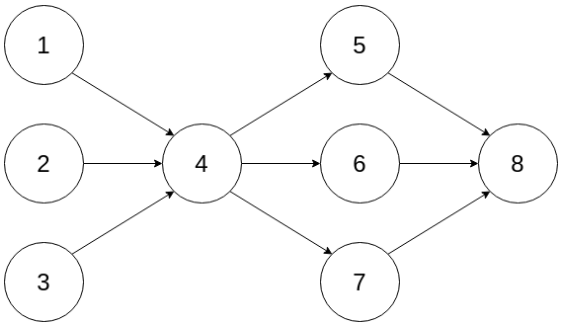
Q3. Java Program to count and print cycles in a Graph using Graph traversal techniques.



Q4. Write a program in java to find and Hamilton path in the given graph.



Q5. Write a program in JAVA to find longest path in the given Directed acyclic graph (DAG)



Theory Part

Q1. Draw a picture of the directed graph specified below:

G = (V, E)

V(G) = {1, 2, 3, 4, 5, 6}

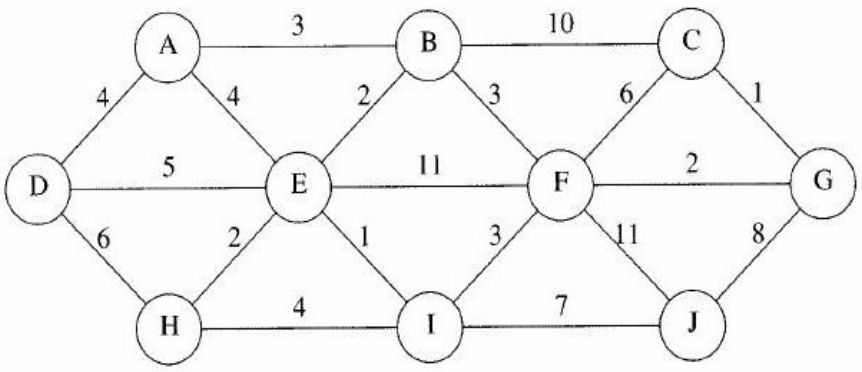
E(G) = {(1,2), (2, 3), (3, 4), (5,1), (5, 6), (2, 6), (1, 6), (4, 6), (2, 4)}

Obtain the following for the above graph:

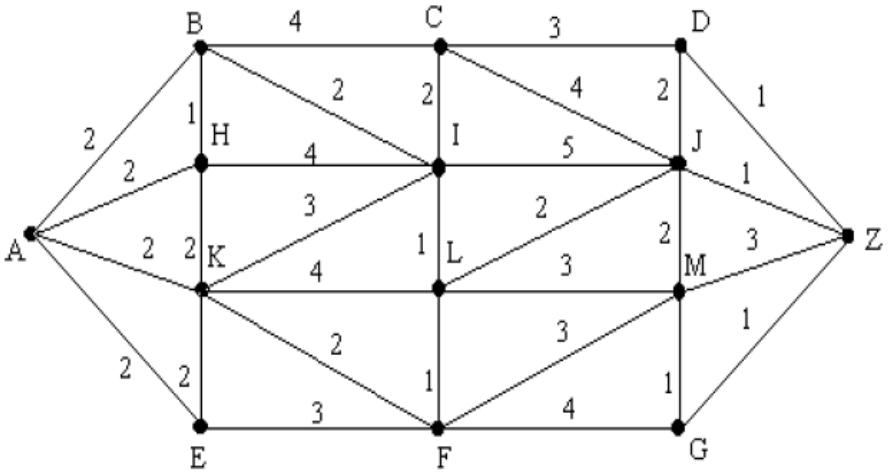
(i) Adjacency matrix.

(ii) Reachability matrix. (Path Matrix)

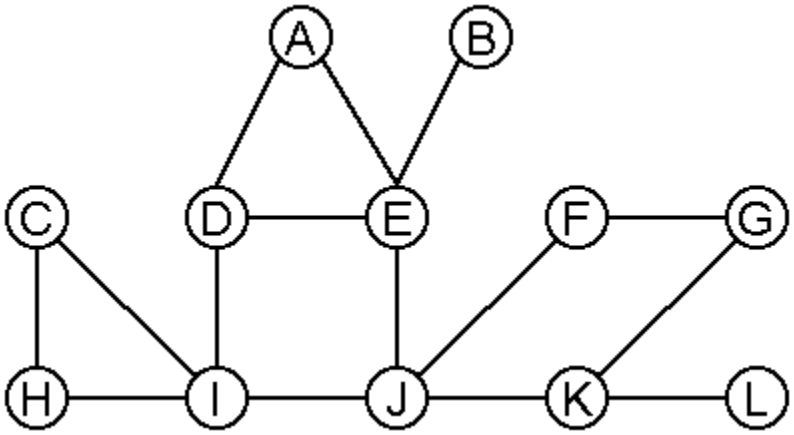
Q2. What is the difference between Prim's algorithm and Kruskal's algorithm for finding the minimum-spanning tree of a graph? Execute both Prim's and Kruskal's algorithms on the following graph



Q3. Use Dijkstra's algorithm to find the shortest path from (A & C) to all nodes.



Q4. Show the result of running BFS and DFS on a directed graph given below using vertex **A** as source. Show the status of the data structure used at each stage



Q5. Draw the 11 item hash table resulting from hashing the keys:
12, 44, 13, 88, 23, 94, 11, 39, 20, 16 and 5
Using the hash function h(i) = (2i+5) mod 11.

Q6. What do you understand by term file organization? Briefly summarize the different file organizations that are widely used today. Explain the significance of multi-level indexing with an appropriate example? What are inverted files? Why they are needed?