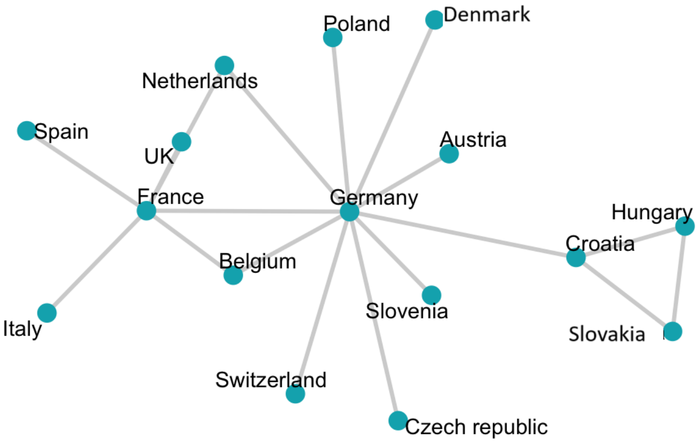
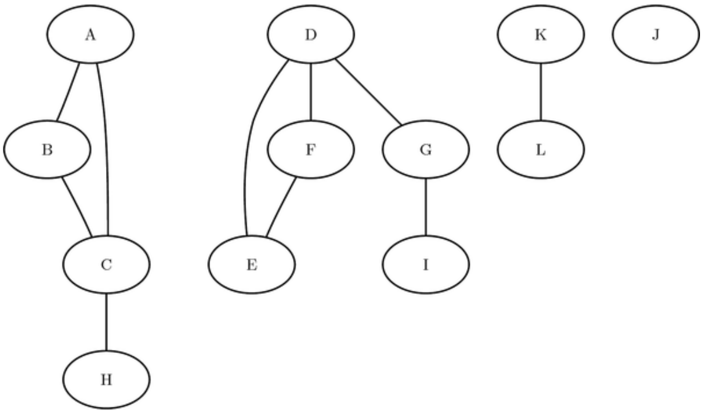
BT 3051 - Data structures and algorithms
Assignment - 4

1. In our recent lab session, we applied BFS and DFS algorithms for graph traversal. As an additional task, your assignment is to construct the traversal tree generated by both algorithms. A traversal tree captures the order in which nodes or vertices are visited during the traversal. Were you able to identify all the edges in the original graph as well as in the traversal tree? If not, please provide insights into any missing edges and their implications within the graph. Perform this on the graph as illustrated below.

   Starting node: Germany
   Traversing order: Alphabetical priority (A-Z)
   Your code should return traversal tree(both BFS,DFS) as an object of networkx and vizualize it.



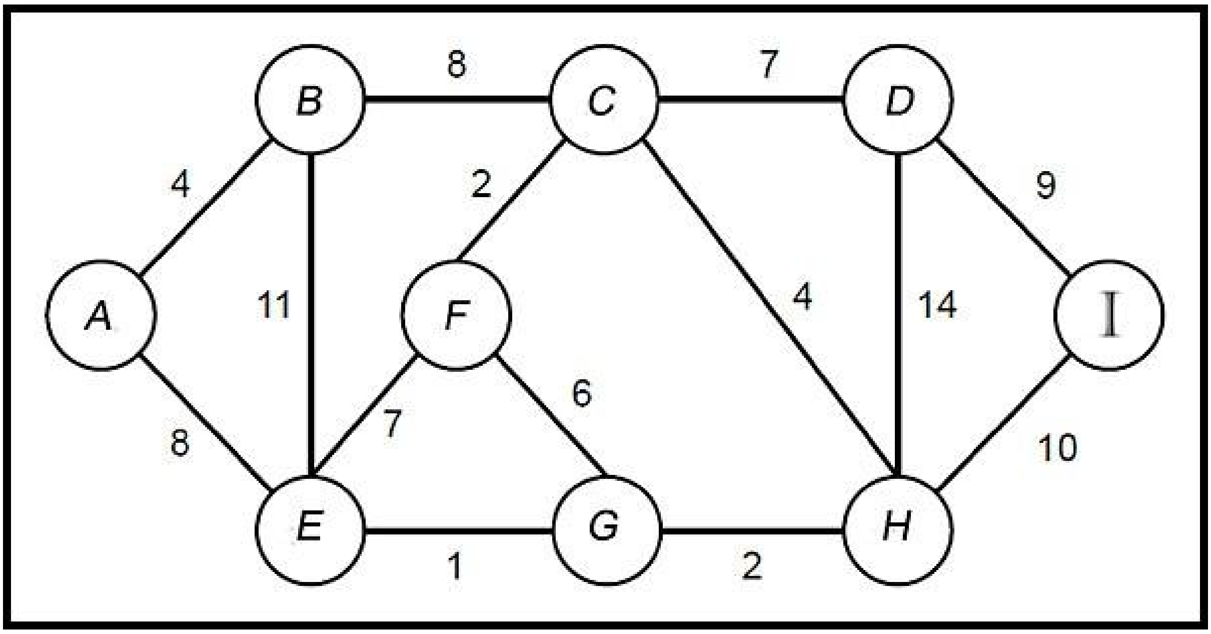
2. Connected components are subsets of a graph in which every node is reachable from every other node in that subset by following edges. These components often represent distinct groups or communities within a graph. Your task is to repurpose Depth-First Search (DFS) or Breadth-First Search (BFS) to determine the number of connected components in any given graph.
   Your code should print the number of connected components and return a dictionary with component id as key and list of nodes as values.



3. **Emergency Response Planning**

   You are responsible for planning emergency response routes for a city. The city is represented as a graph, with intersections as nodes and roads as edges. In the event of an emergency, you need to find the shortest path from a central emergency command center to various locations in the city to minimize response time. The city's road network is represented as an undirected weighted graph, where each road has a known travel time (weight) associated with it. Your task is to find the shortest paths from the central emergency command center **(Node F)** to all other intersections in the city.

   Your code should return a nested list of [Source, Target, Duration]. Ex [[F,C,2],....]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