

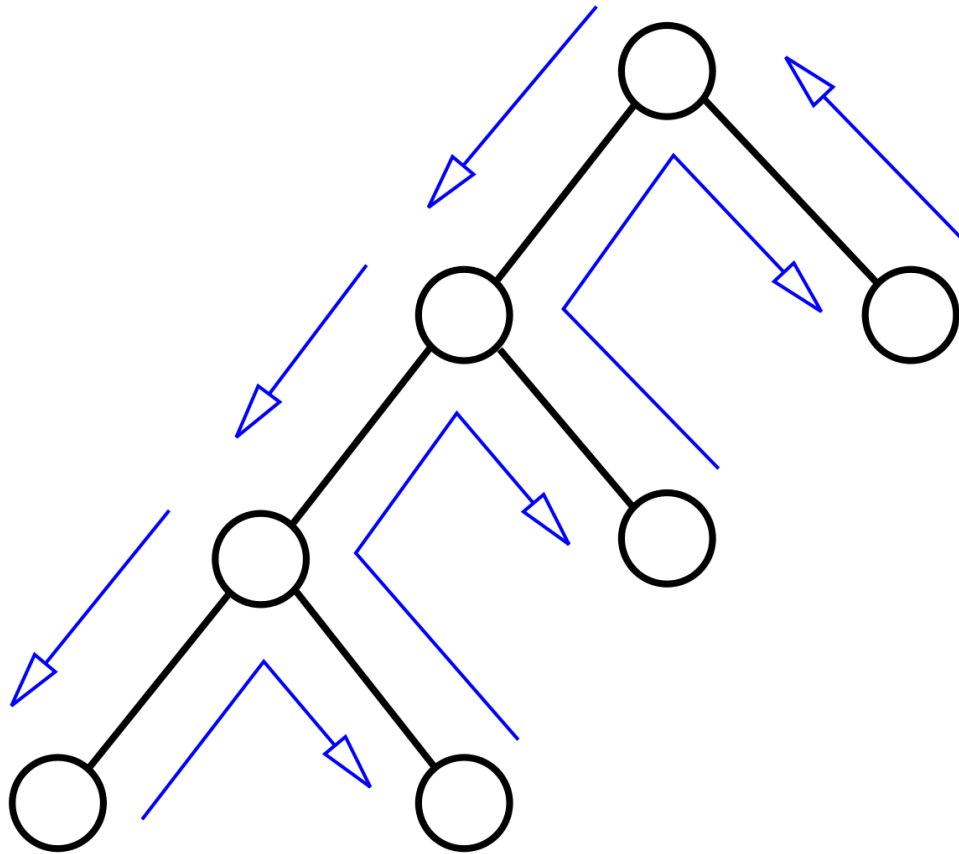


ALGORITHMS

Lecture 4

Dr.Sara Shehab

Backtrack



- **Backtracking** can be defined as a general algorithmic technique that considers searching every possible combination in order to solve a computational problem.

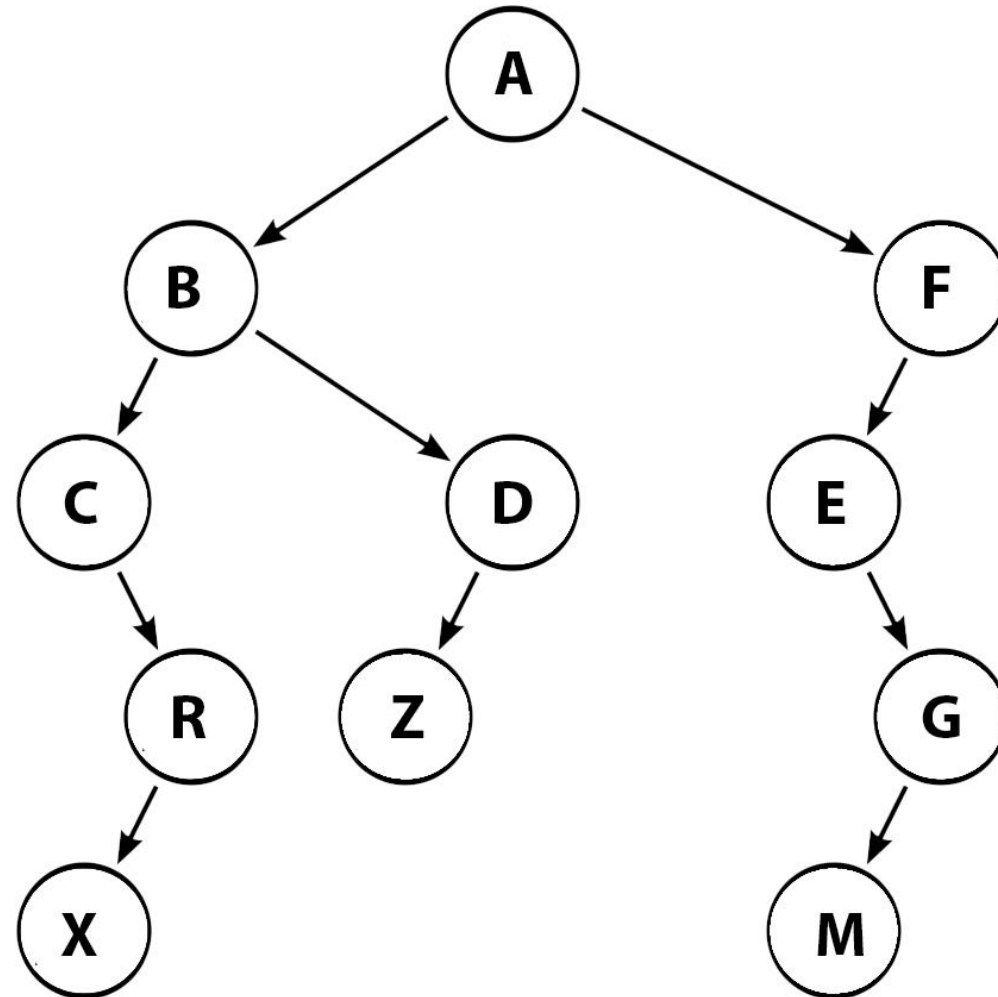


The algorithm of backtrack search can be build using three lists:-

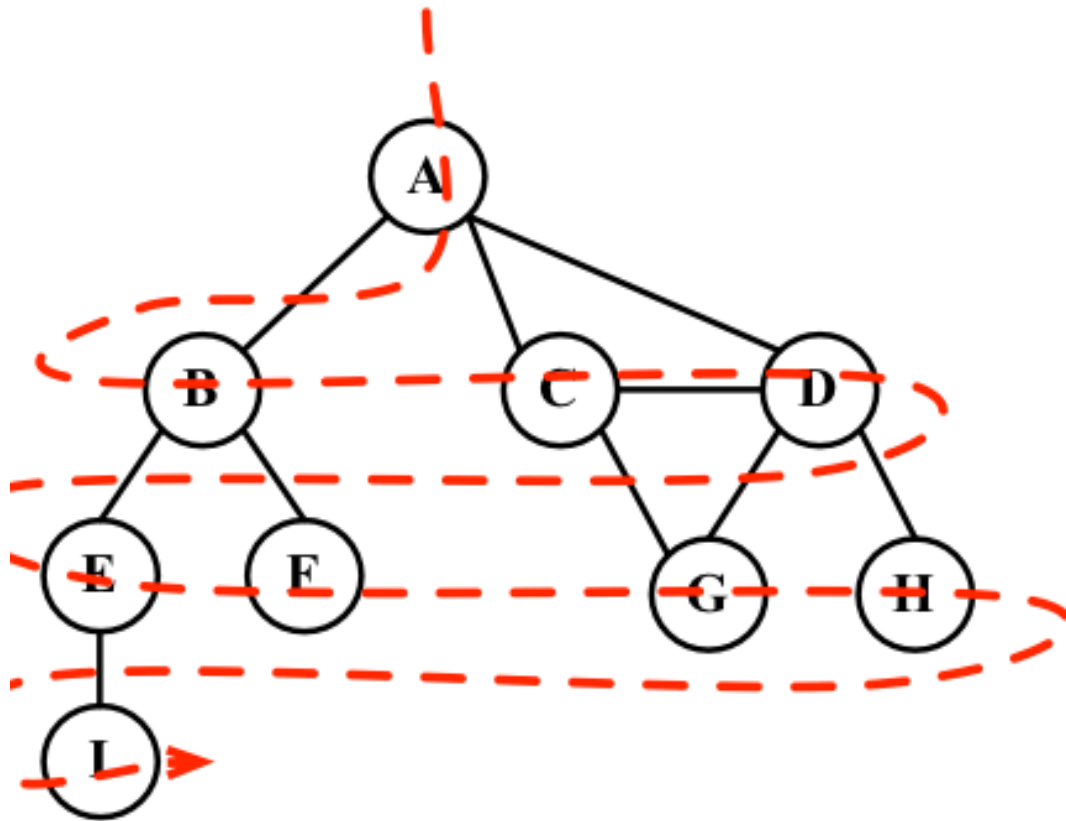
- 1- **SL**, for state list. lists the states in the current path being tried If a goal is found. SL contains the ordered list of states on the solution path.
- 2- **NSL**, for new state list. contains nodes awaiting evaluation i.e., nodes whose descendants have not yet been generated and searched.
- 3- **DE**, for dead ends lists states whose descendants have failed to contain a goal node. If these states are encountered again, they will be detected as elements of DE and



Q) Apply the **backtrack search algorithm** on the following graph, where the start state is (A) and the desired goal state is (G), show the successive values of SE, NSL, DE , and the **traversed path** .



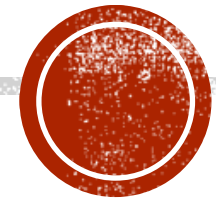
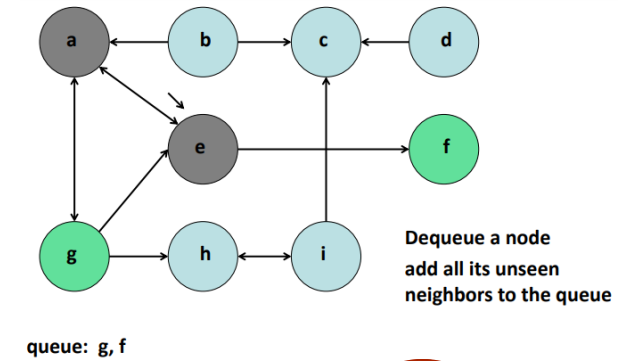
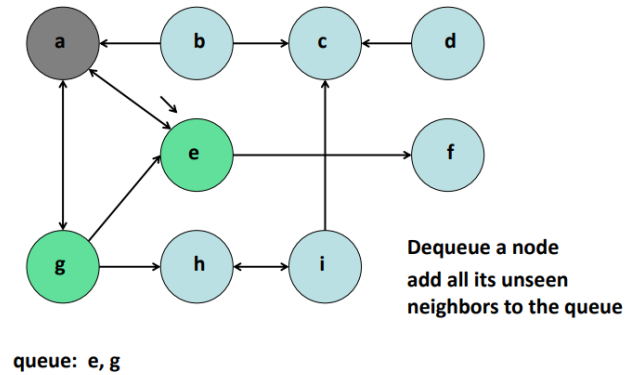
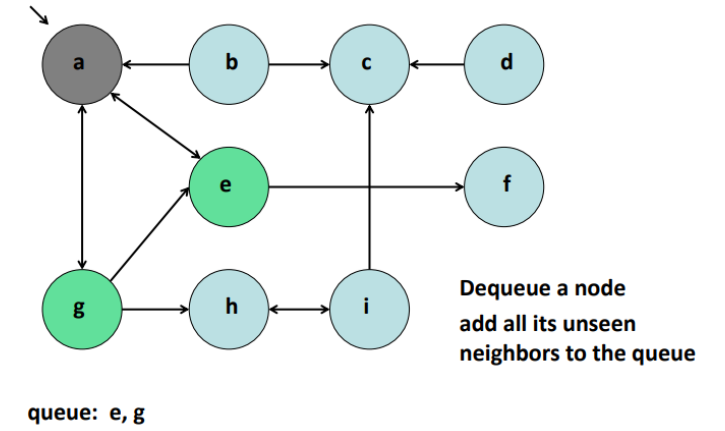
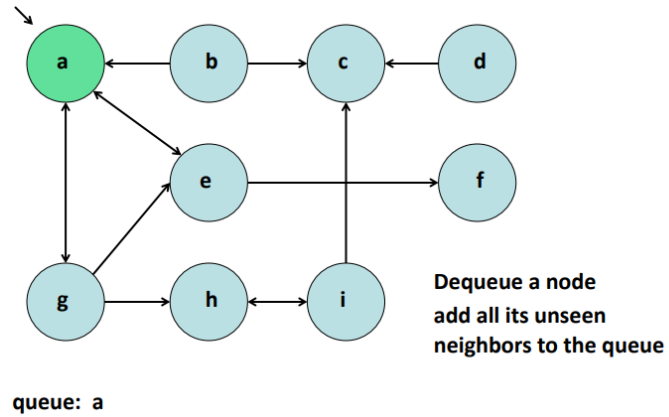
BREADTH-FIRST ALGORITHM

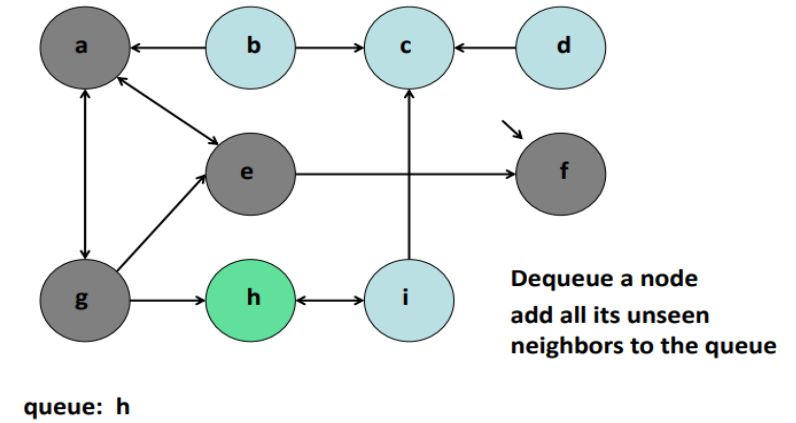
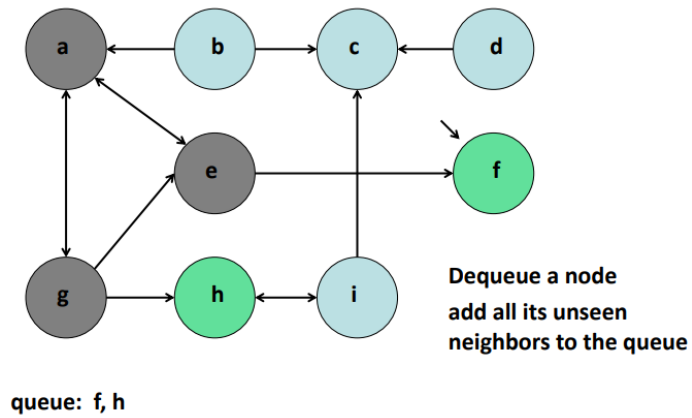
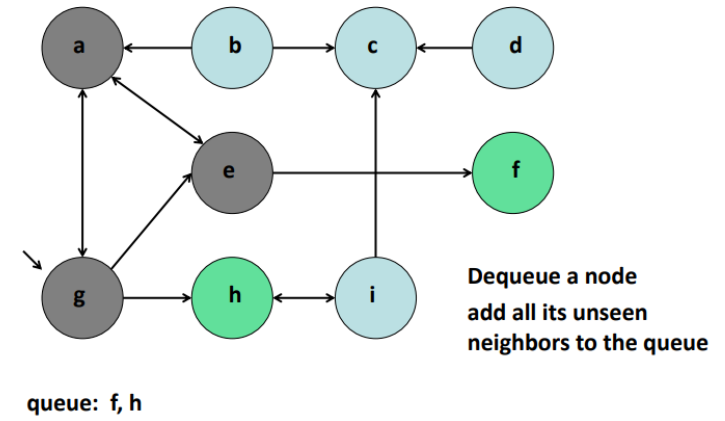
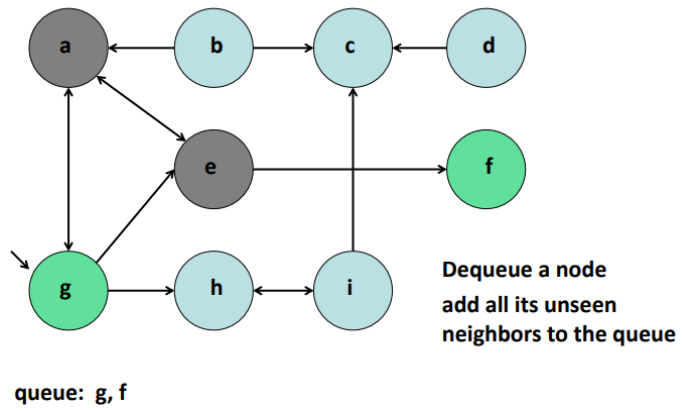


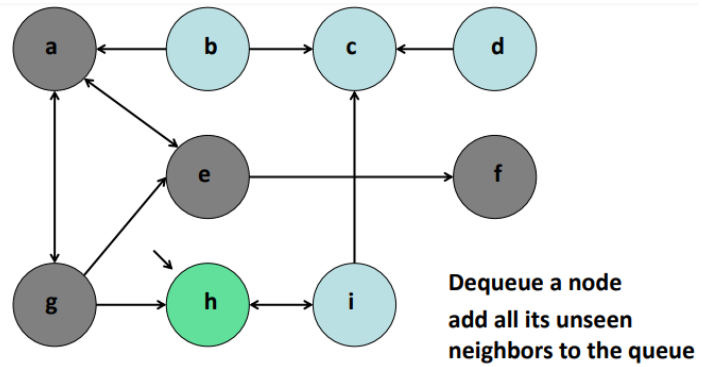
- **Breadth-first search** is a graph traversal algorithm that starts traversing the graph from the root node and explores all the neighbouring nodes. Then, it selects the nearest node and explores all the unexplored nodes.



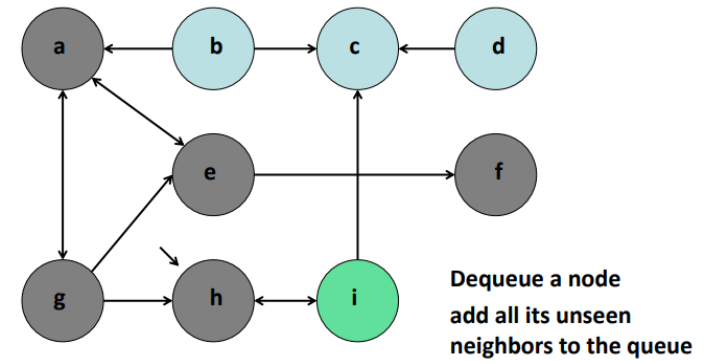
STEPS OF BREADTH -FIRST ALGORITHM



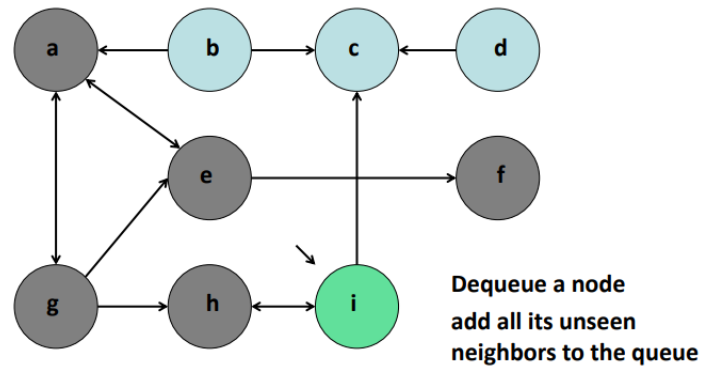




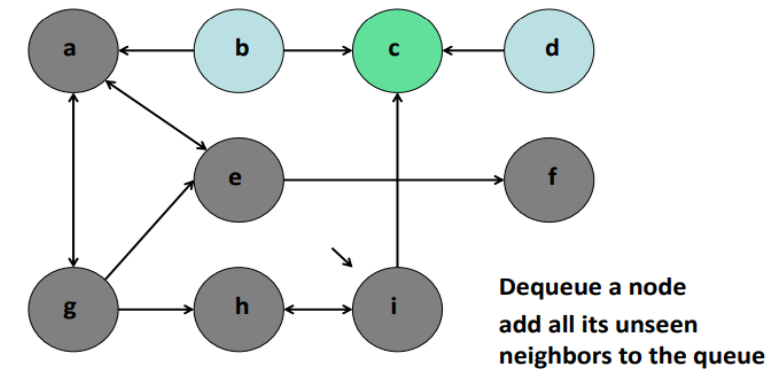
queue: h



queue: i

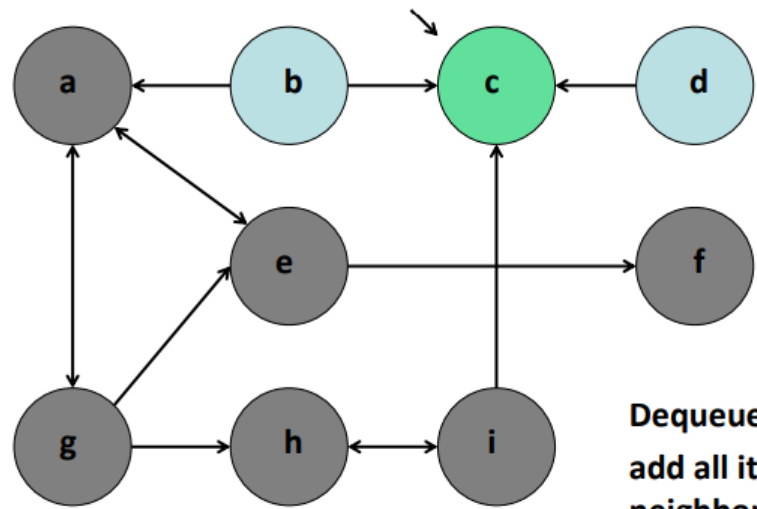


queue: i



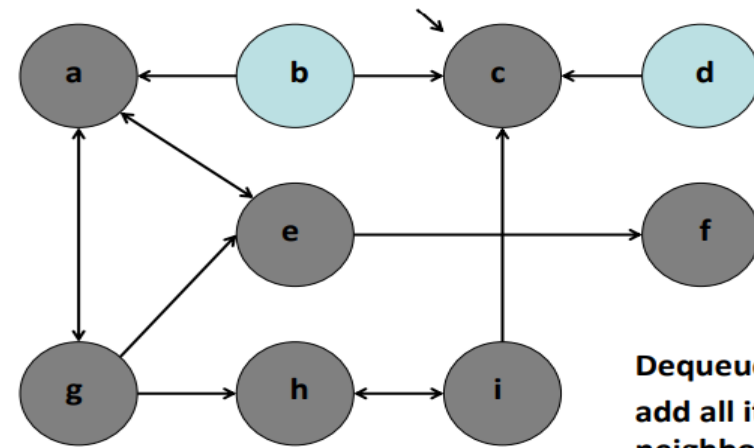
queue: c





Dequeue a node
add all its unseen
neighbors to the queue

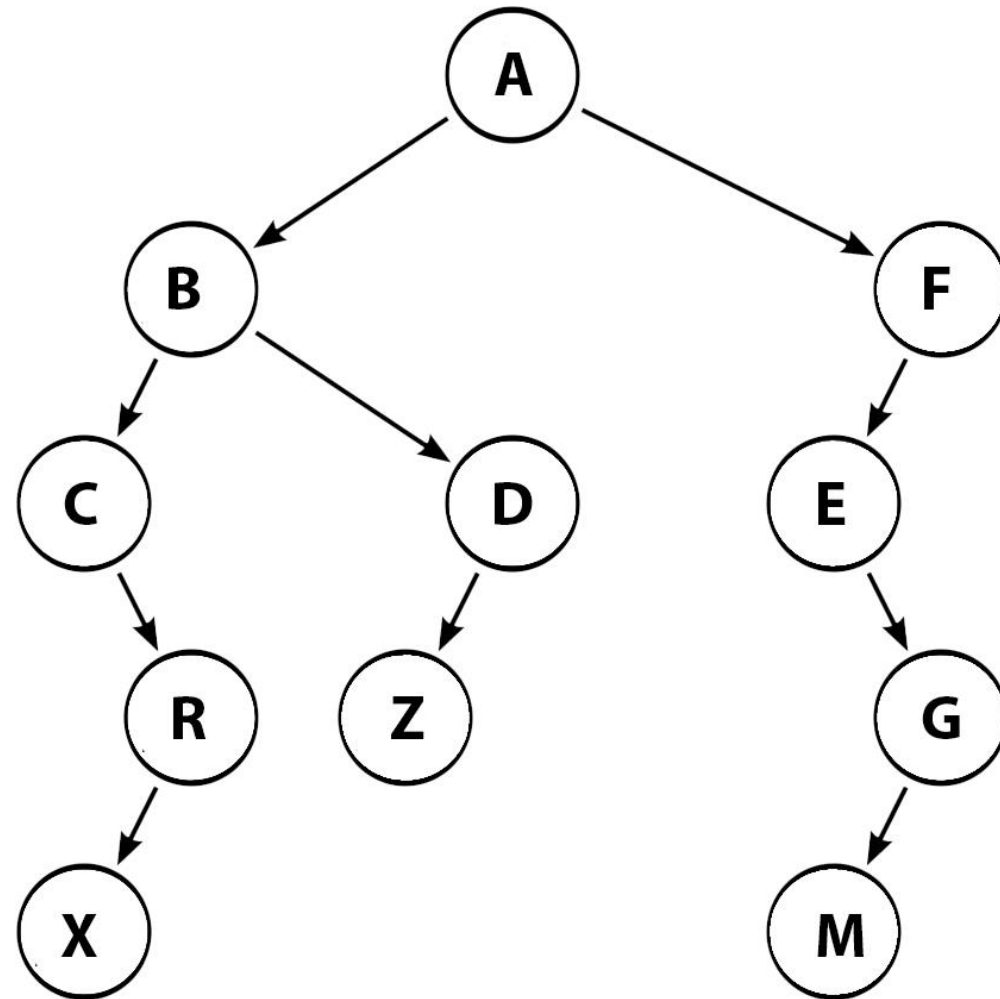
queue: c



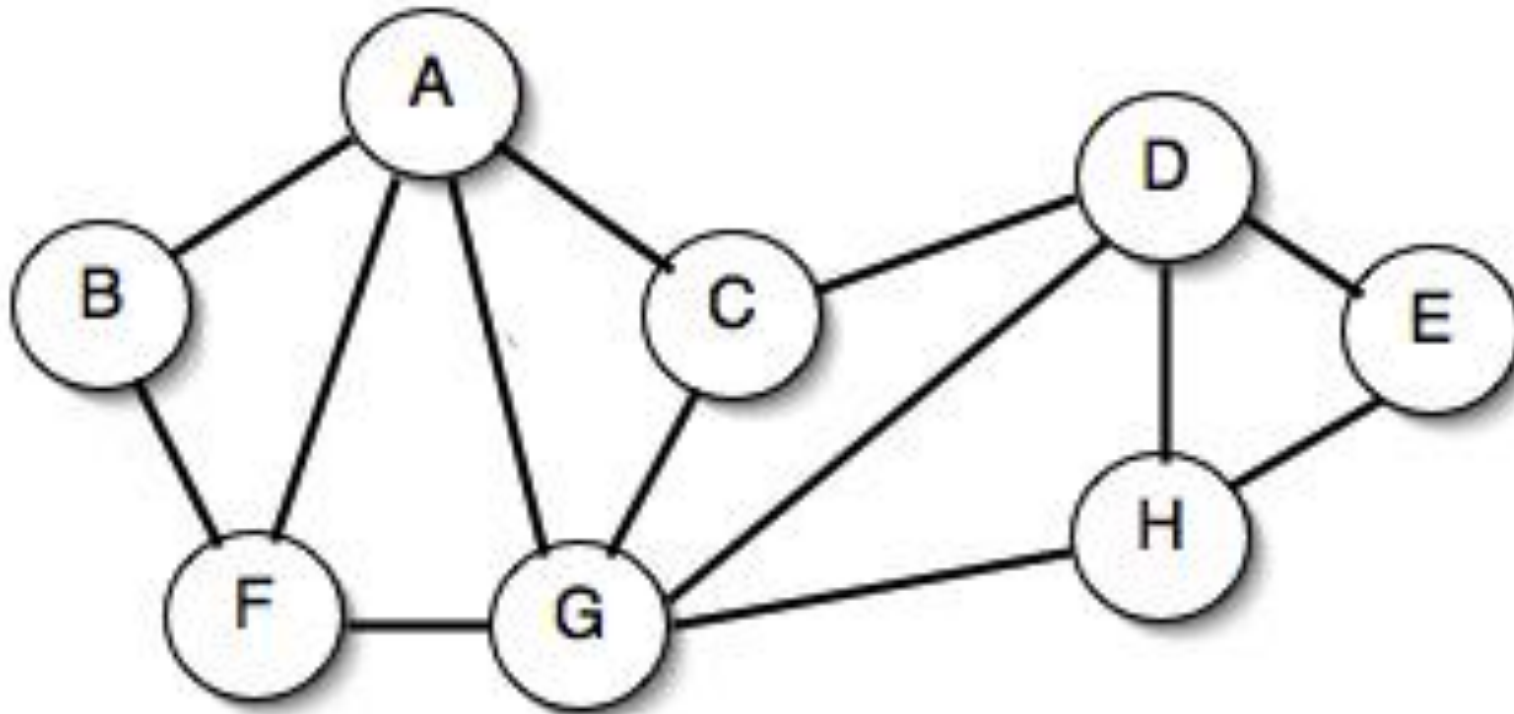
Dequeue a node
add all its unseen
neighbors to the queue

queue: c

Q) Apply the **breadth first search algorithm** on the following graph, where the start state is (A) and the desired goal state is (G), show the successive values of open and closed ,and the traversed path



Q) Show how you Apply the **breadth first search algorithm** on the following graph, where the start state is (A) to generate its BFS spanning tree. Show details and draw the BFS spanning tree .



Q) Apply the **breadth first search algorithm** on the result of the previous question, where the start state is (A) and the desired goal state is (E), show the successive values of open and closed ,and the **traversed path**

Q) Apply the **backtrack search algorithm** on the following graph, where the start state is (A) and the desired goal state is (E), show the successive values of SE, NSL, DE , and the **traversed path** .

