

Lecture 12

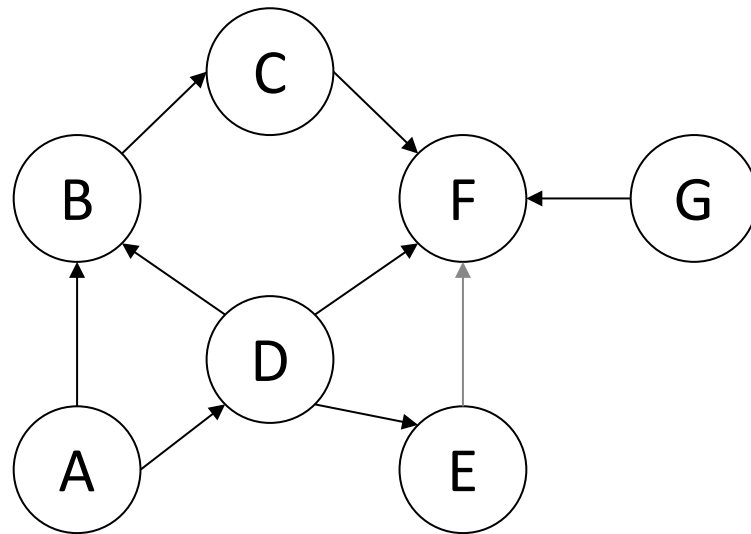
Graphs

Exercises ANS

Department of Computer Science
Hofstra University

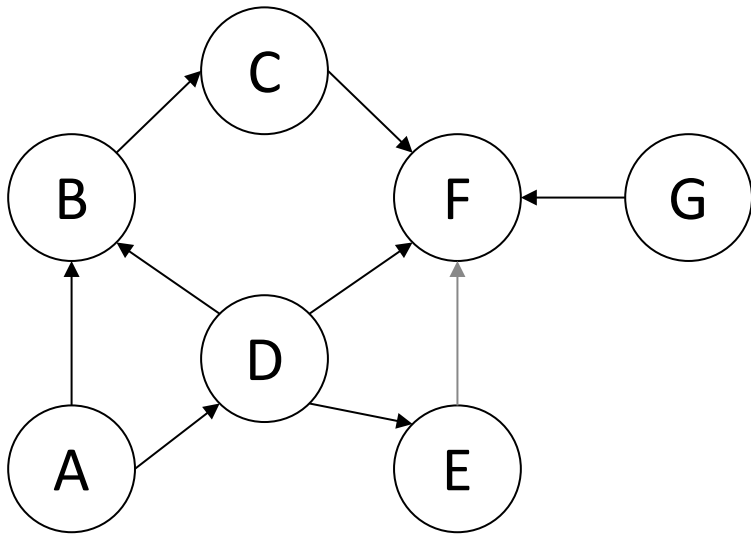
Q. Adjacency matrix and adjacency list

- Write out the adjacency matrix and adjacency list for the directed graph.

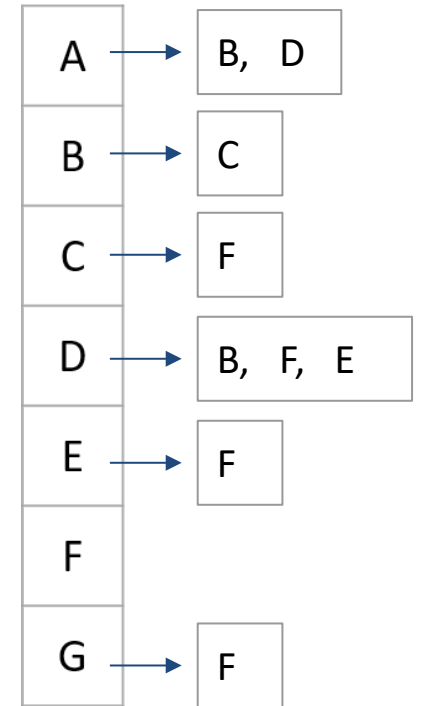


Q. Adjacency matrix and adjacency list ANS

- Write out the adjacency matrix and adjacency list for the directed graph.

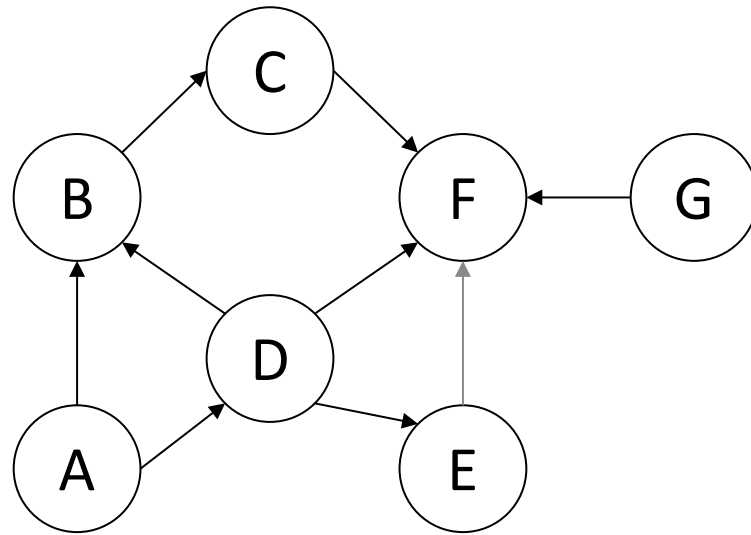


	A	B	C	D	E	F	G
A	0	1	0	1	0	0	0
B	0	0	1	0	0	0	0
C	0	0	0	0	0	1	0
D	0	1	0	0	1	1	0
E	0	0	0	0	0	1	0
F	0	0	0	0	0	0	0
G	0	0	0	0	0	1	0



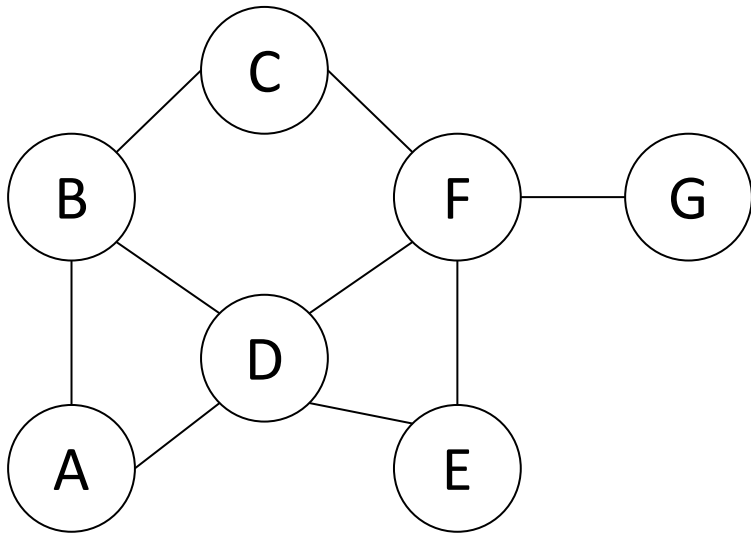
Q. Adjacency matrix and adjacency list

- Write out the adjacency matrix and adjacency list for the undirected graph.

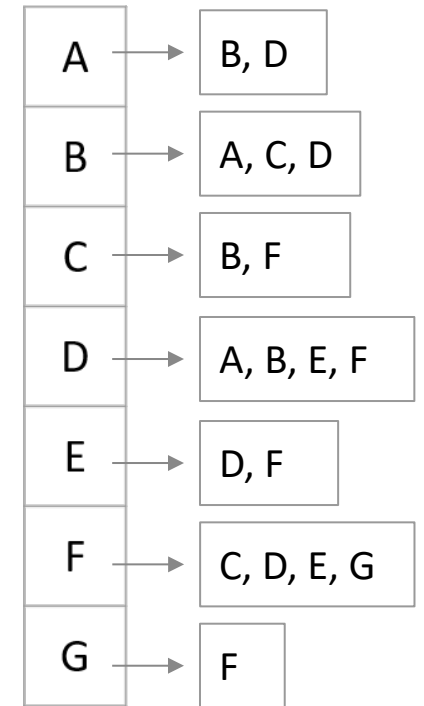


Q. Adjacency matrix and adjacency list ANS

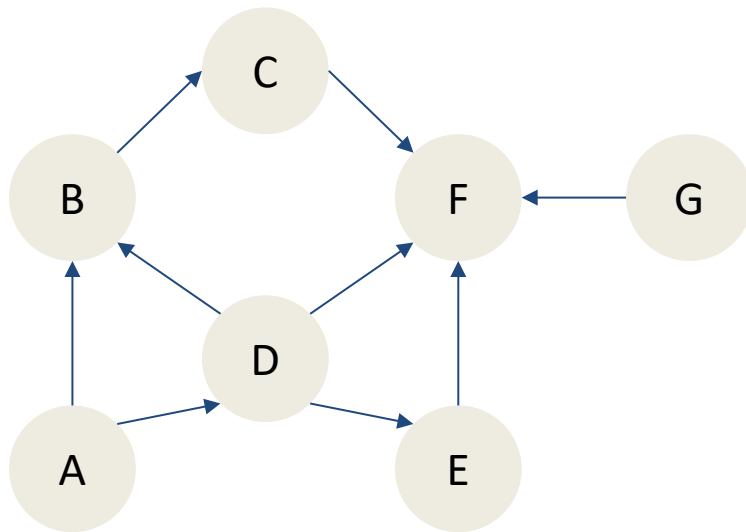
- Write out the adjacency matrix and adjacency list for the directed graph.



	A	B	C	D	E	F	G
A	0	1	0	1	0	0	0
B	1	0	1	1	0	0	0
C	0	1	0	0	0	1	0
D	1	1	0	0	1	1	0
E	0	0	0	1	0	1	0
F	0	0	1	1	1	0	1
G	0	0	0	0	0	1	0



Q: Graph Traversals (Pre-Order & Post-Order)



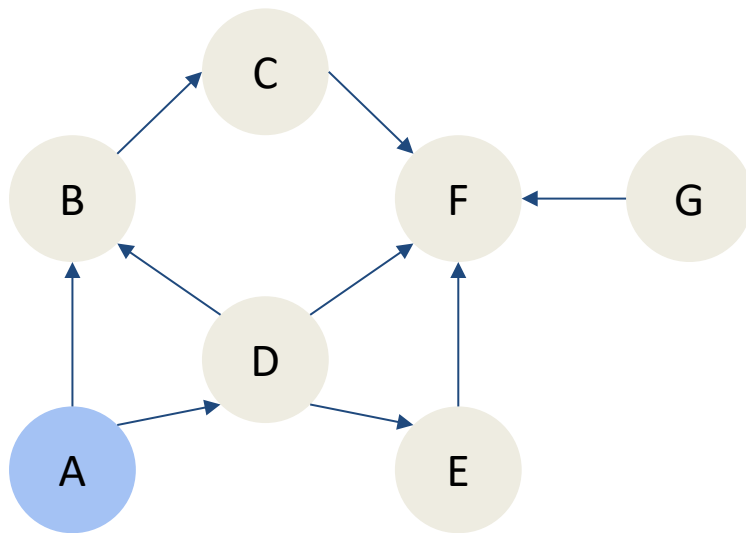
Stack:

Give the DFS pre-order and post-order traversals of this directed graph, **starting from node A**. When there are multiple possible orders of visiting the next node, select the next node in **alphabetical order**.

DFS Pre-Order:

DFS Post-Order:

You do NOT need to write out the stack or queue contents in the exam

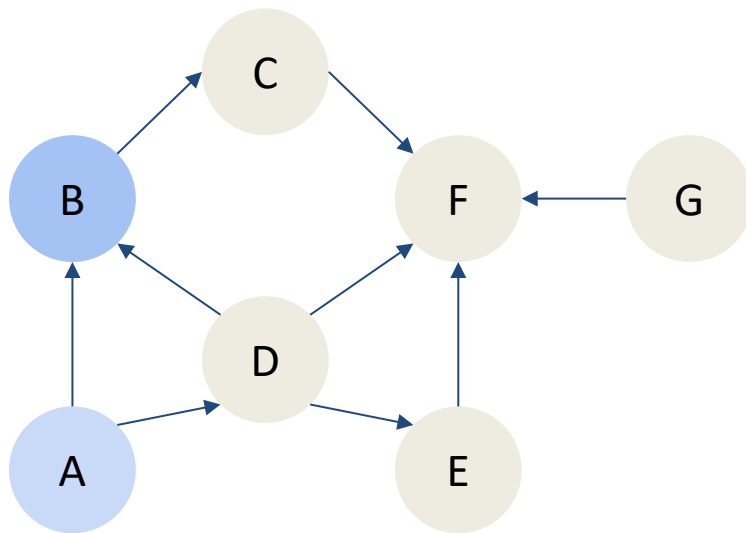


Stack: A

DFS Pre-Order:

A

DFS Post-Order:

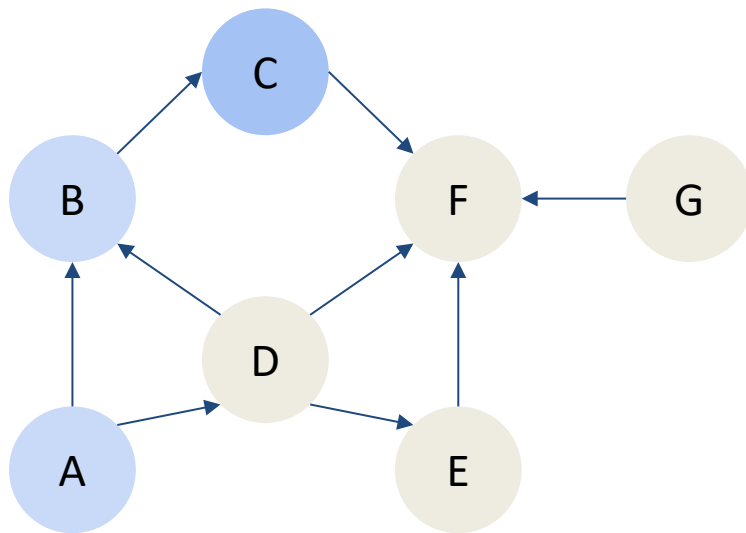


Stack: A, B

DFS Pre-Order:

A, B

DFS Post-Order:

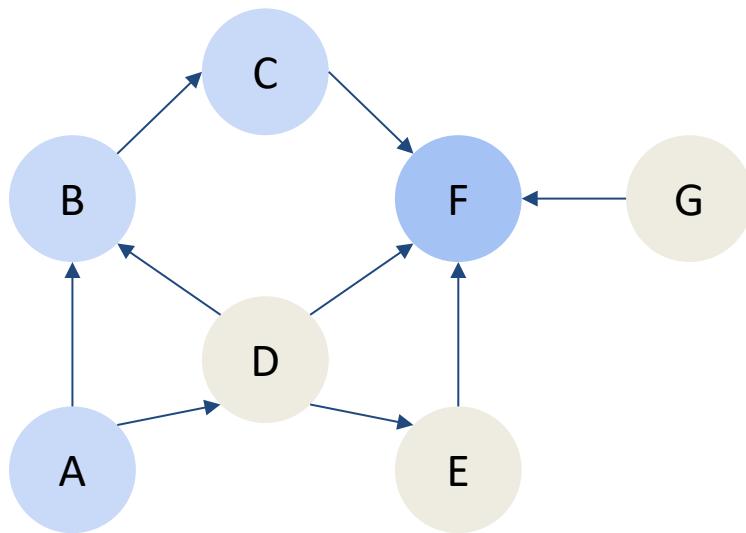


Stack: A, B, C

DFS Pre-Order:

A, B, C

DFS Post-Order:

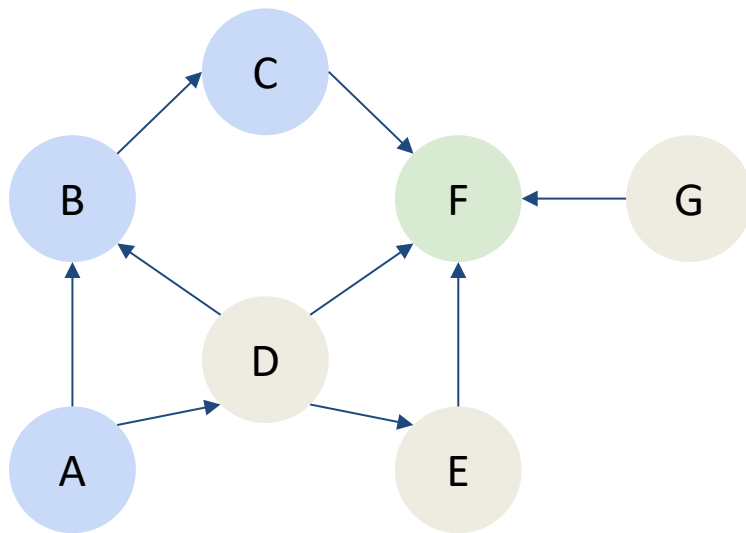


Stack: A, B, C, F

DFS Pre-Order:

A, B, C, F

DFS Post-Order:



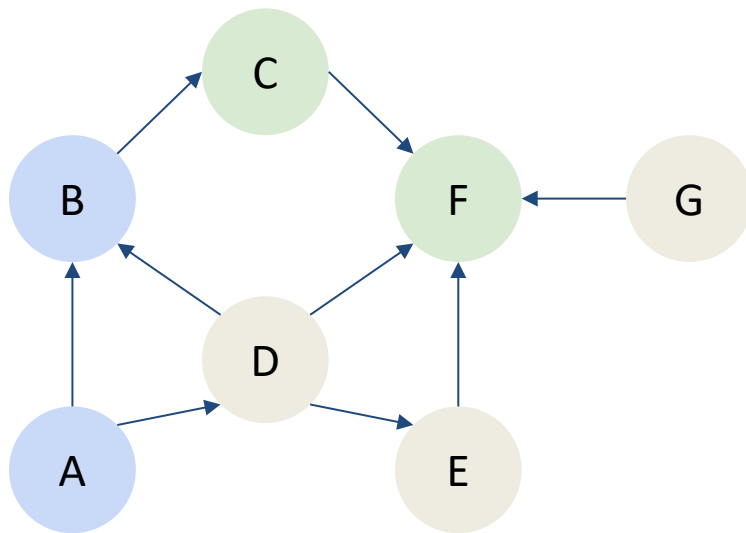
Stack: A, B, C

DFS Pre-Order:

A, B, C, F

DFS Post-Order:

F



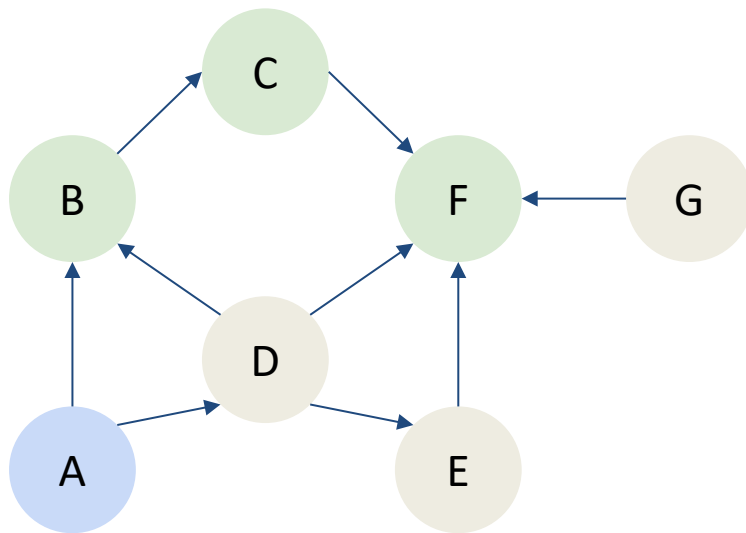
Stack: A, B

DFS Pre-Order:

A, B, C, F

DFS Post-Order:

F, C



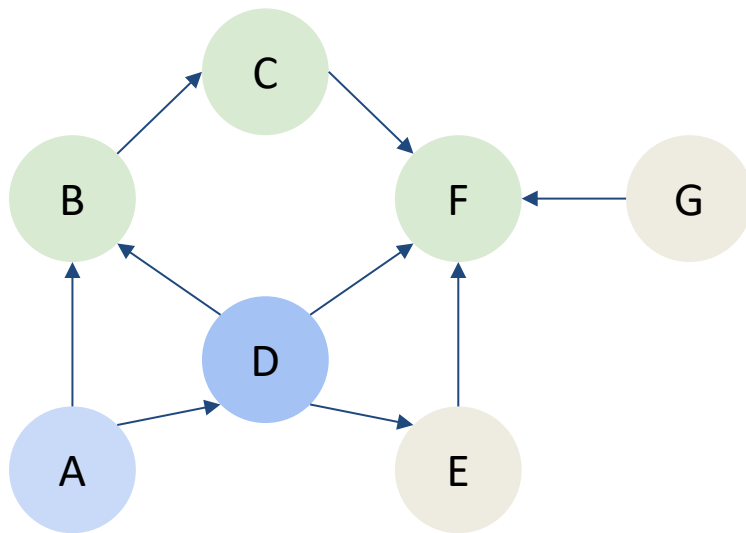
Stack: A

DFS Pre-Order:

A, B, C, F

DFS Post-Order:

F, C, B



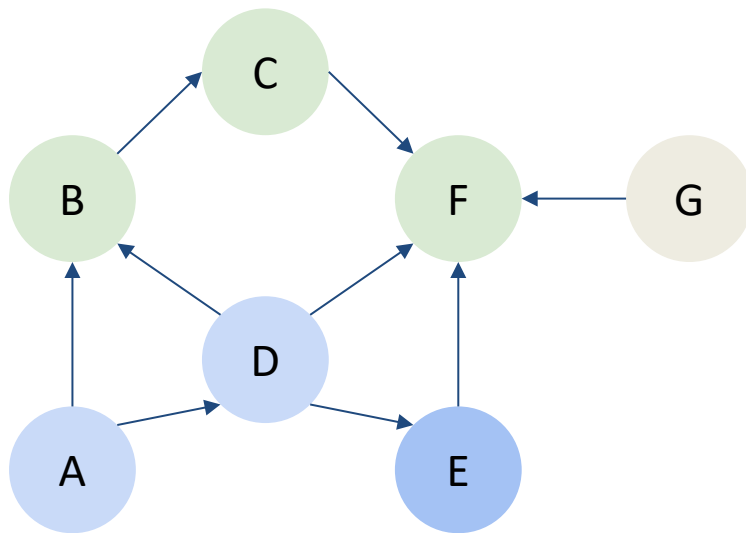
Stack: A, D

DFS Pre-Order:

A, B, C, F, D

DFS Post-Order:

F, C, B



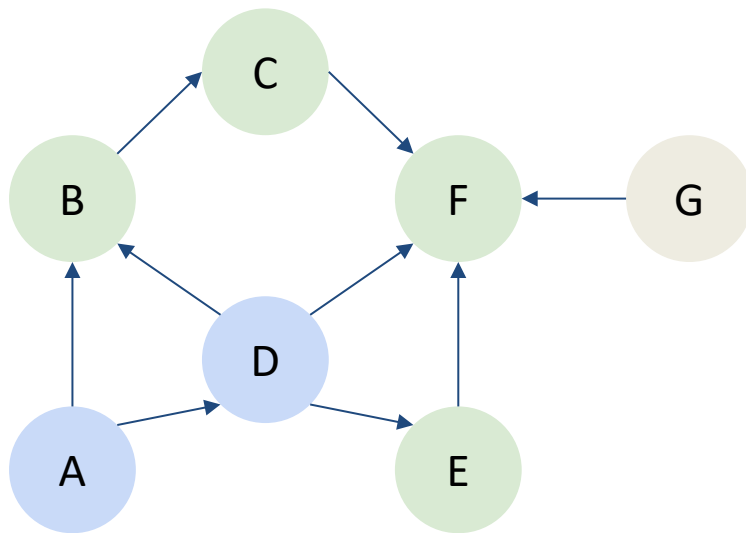
Stack: A, D, E

DFS Pre-Order:

A, B, C, F, D, E

DFS Post-Order:

F, C, B,



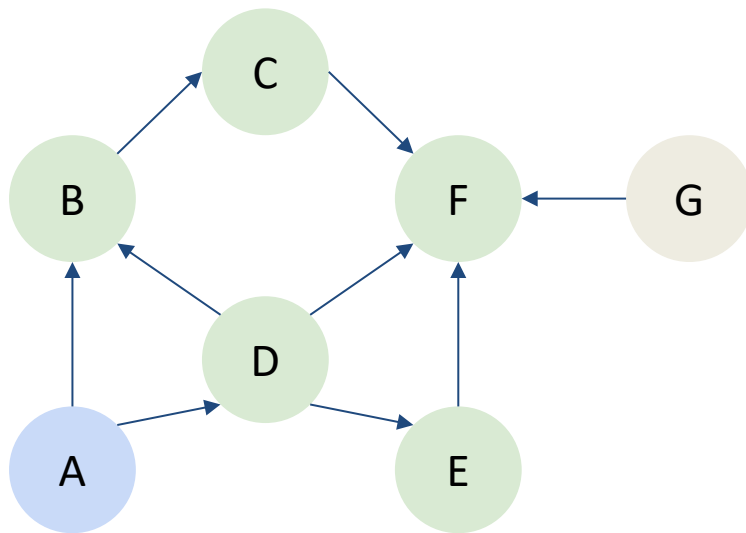
Stack: A, D

DFS Pre-Order:

A, B, C, F, D, E

DFS Post-Order:

F, C, B, E



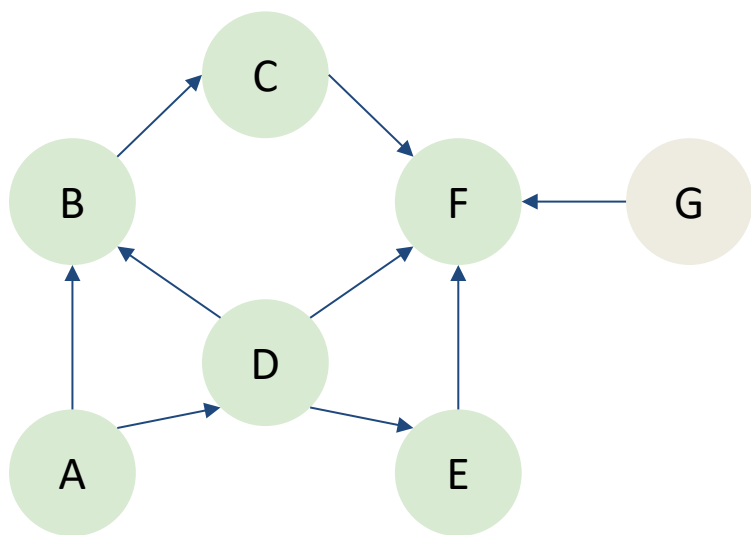
Stack: A,

DFS Pre-Order:

A, B, C, F, D, E

DFS Post-Order:

F, C, B, E, D



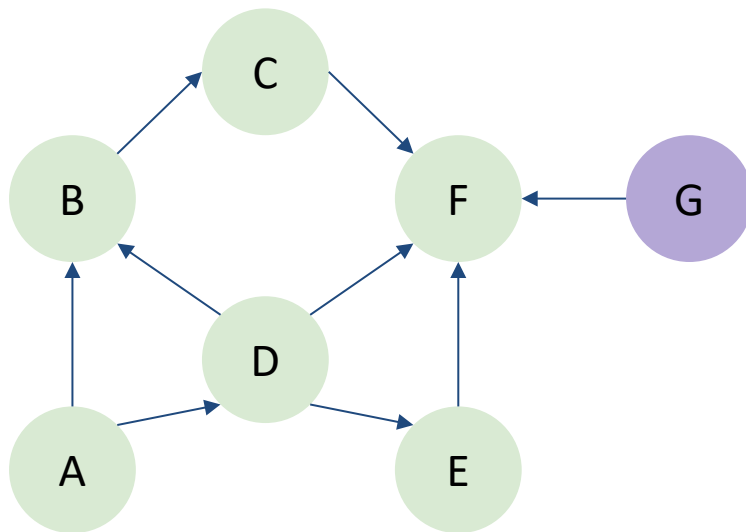
Stack:

DFS Pre-Order:

A, B, C, F, D, E

DFS Post-Order:

F, C, B, E, D, A



Stack:

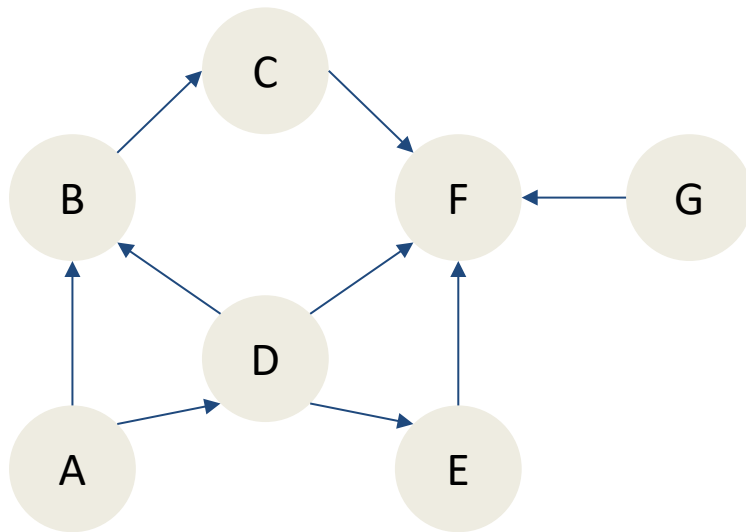
DFS Pre-Order:
A, B, C, F, D, E, G

DFS Post-Order:
F, C, B, E, D, A, G

Topological Sort (reverse of DFS
Post-Order):
G, A, D, E, B, C, F

* After visiting F, restart on unmarked
node G. G would be added to the stack
(and forming the last element in both
pre-order and post-order traversals)

Q: Graph Traversals (BFS)

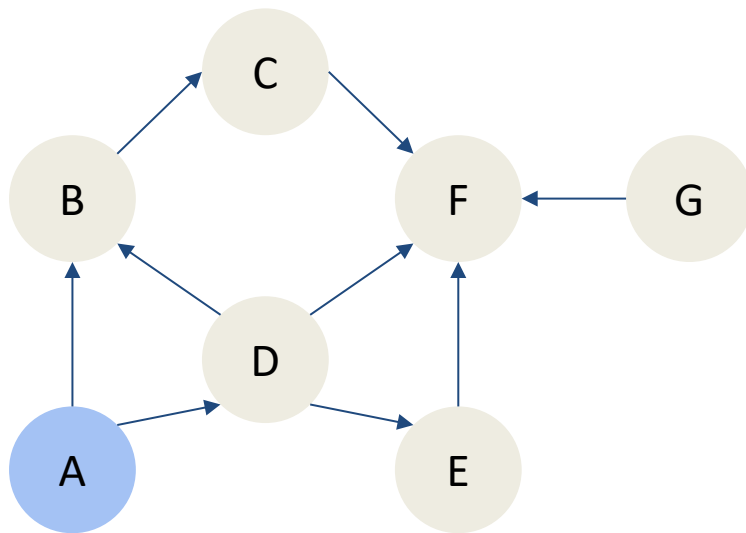


Queue: A

Give the BFS traversal of this directed graph, **starting from node A**. When there are multiple possible orders of visiting the next node, select the next node in **alphabetical order**.

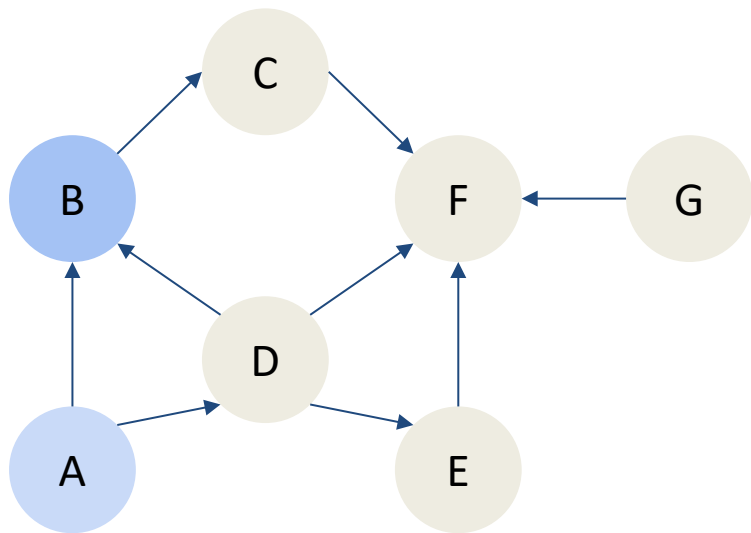
BFS:

You do NOT need to write out the stack or queue contents in the exam



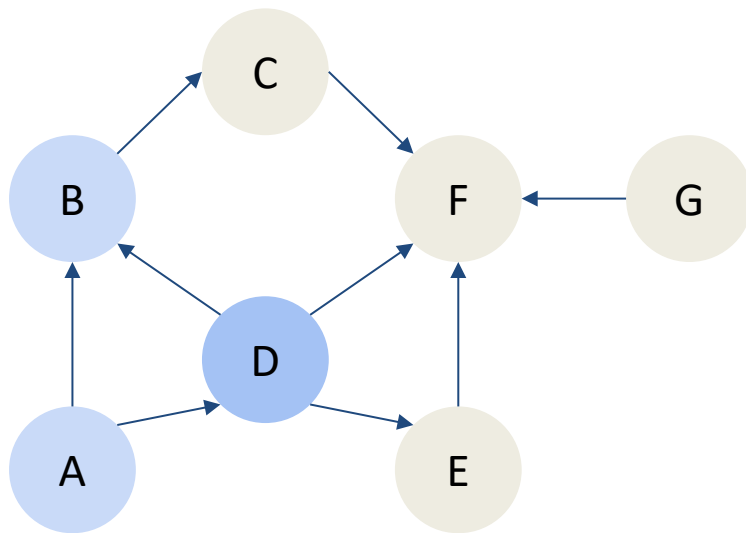
BFS:
A

Queue: B D



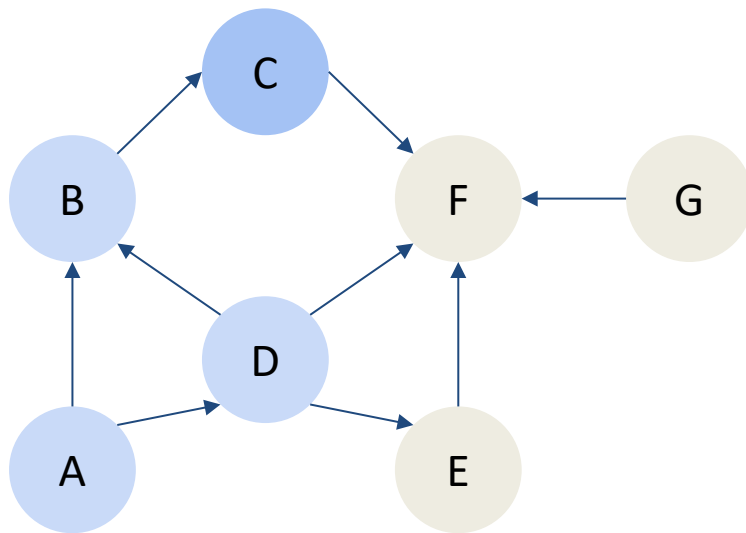
BFS:
A B

Queue: D C



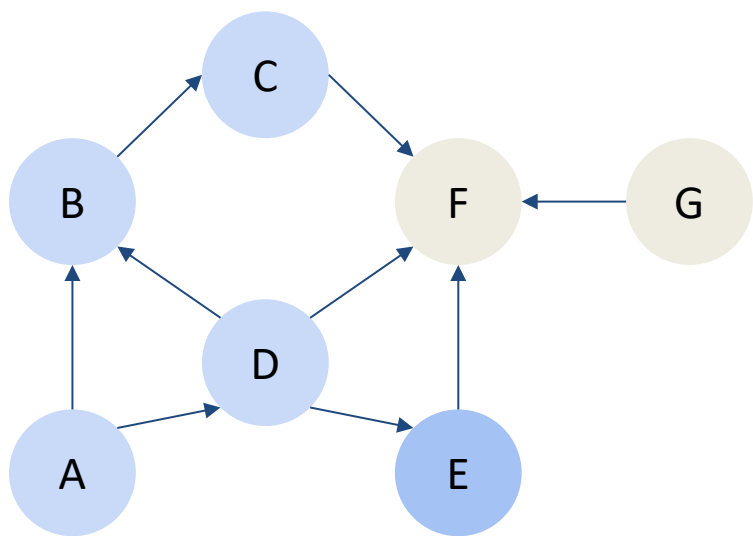
Queue: C E F

BFS:
A B D



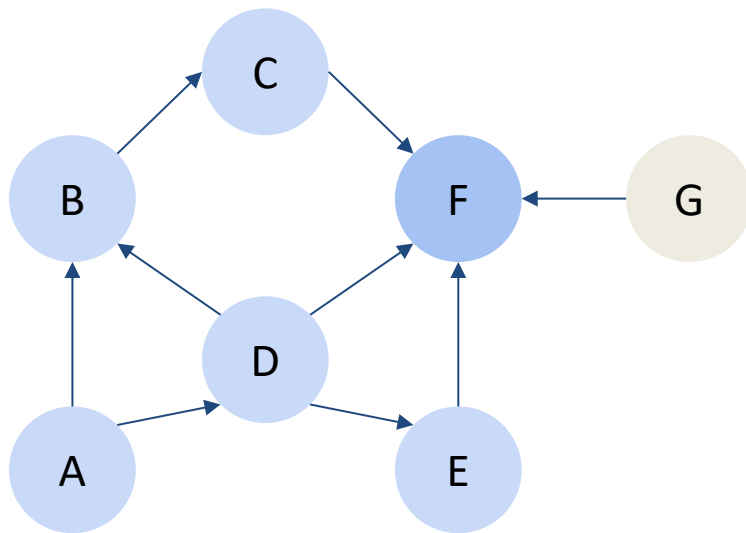
Queue: E F

BFS:
A B D C



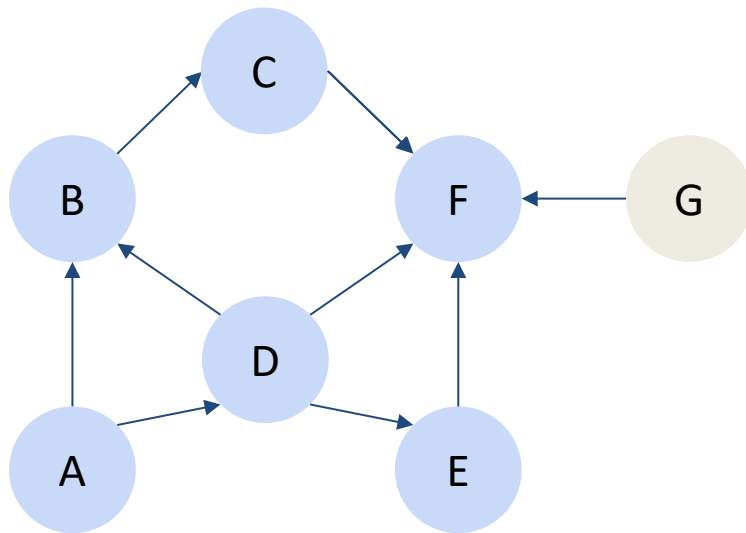
Queue: F

BFS:
A B D C E



BFS:
A B D C E F

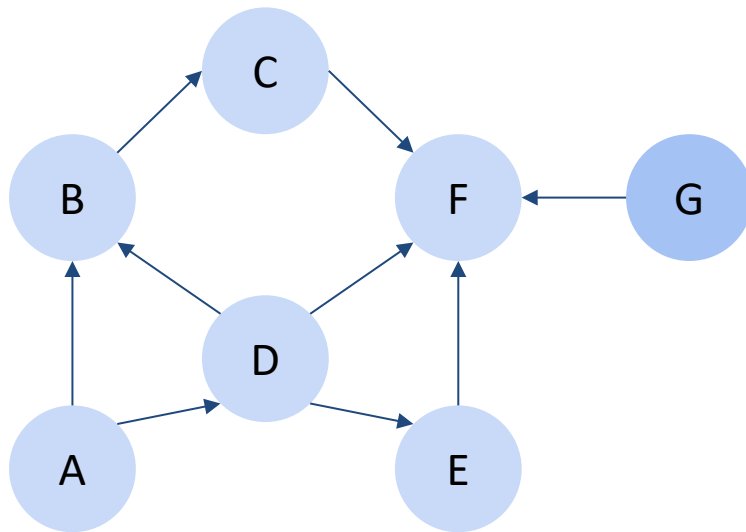
Queue:



Queue: G

BFS:
A B D C E F

Q: Graph Traversals (BFS) ANS

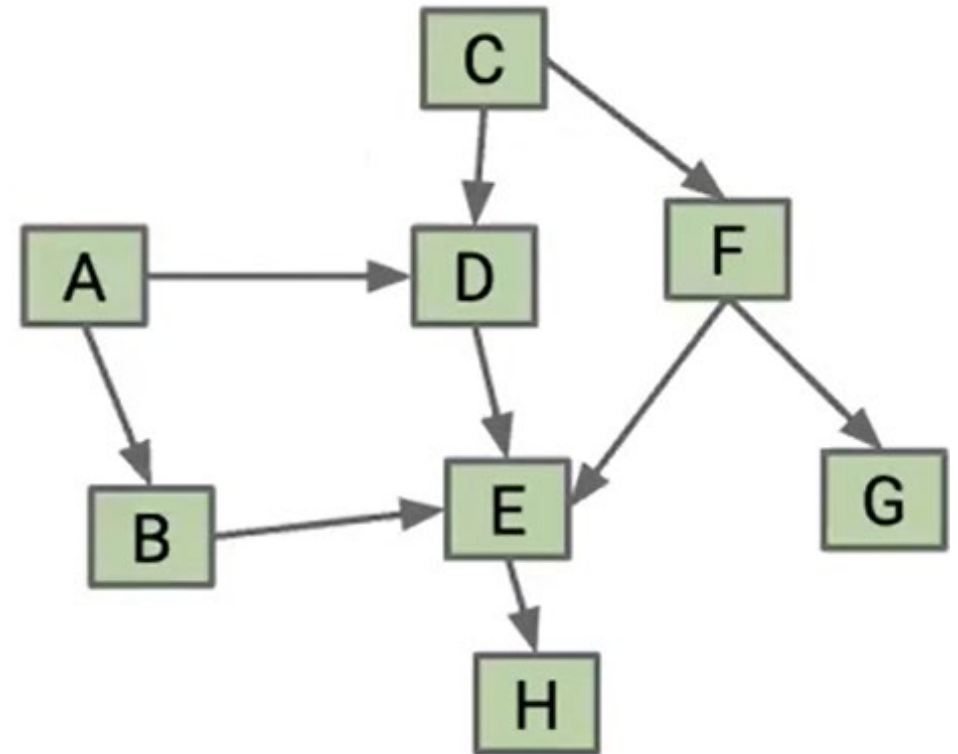


BFS:
A B D C E F G

Queue:

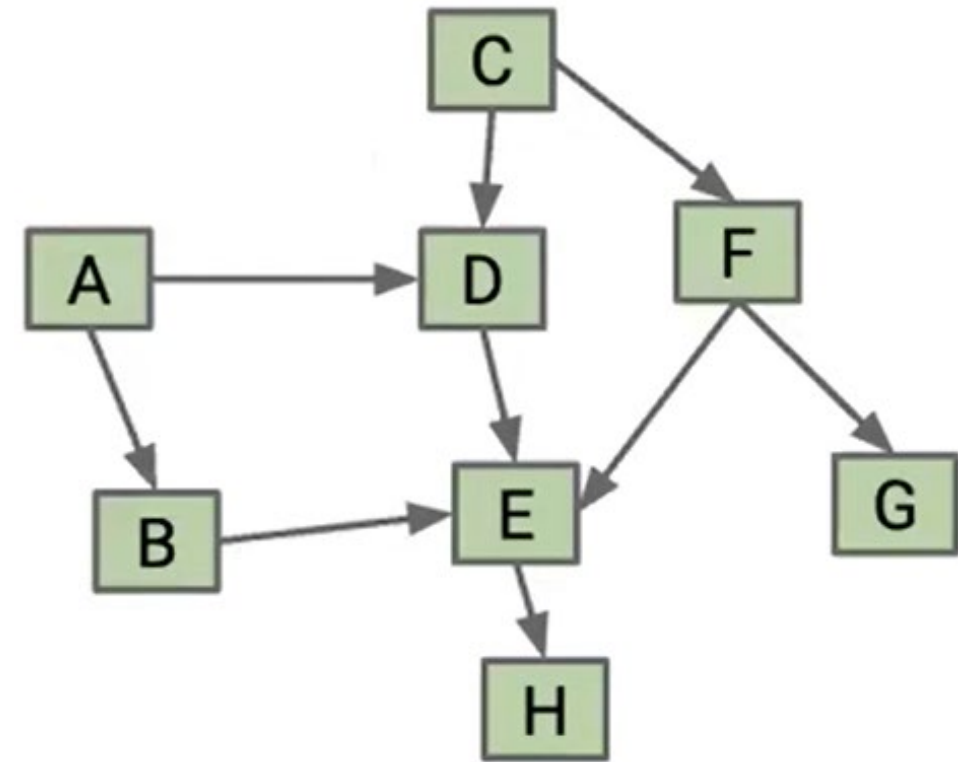
Q. Graph Traversal (Directed Graph)

Give the BFS, DFS pre-order and post-order traversals, topological sort of this directed graph, **starting from either A or C**. When there are multiple possible orders of visiting the next node, select the next node in **alphabetical order**.



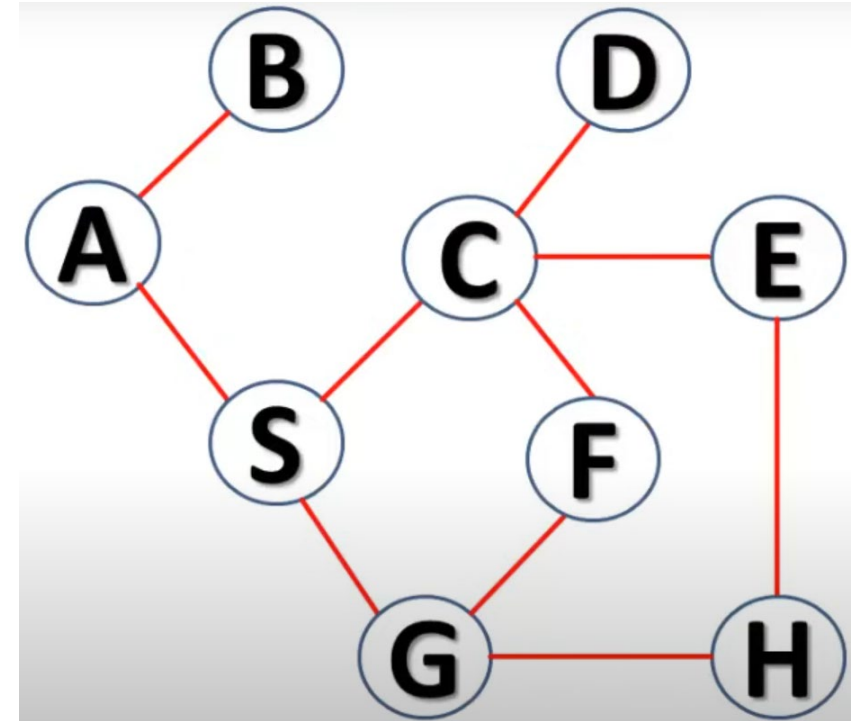
Q. Graph Traversal (Directed Graph) ANS

- Starting from node A:
 - Pre-order traversal: (A, B, E, H, D, C, F, G)
 - Post-order traversal: (H, E, B, D, A, G, F, C)
 - Topological Sort: (C, F, G, A, D, B, E, H)
 - BFS: (A, B, D, E, H, C, F, G)
- Starting from node C, '
 - Pre-order traversal: (C, D, E, H, F, G, A, B)
 - Post-order traversal: (H, E, B, D, A, G, F, C)
 - Topological Sort: (C, F, G, A, D, B, E, H)
 - BFS: (C, D, F, E, G, H, A, B)



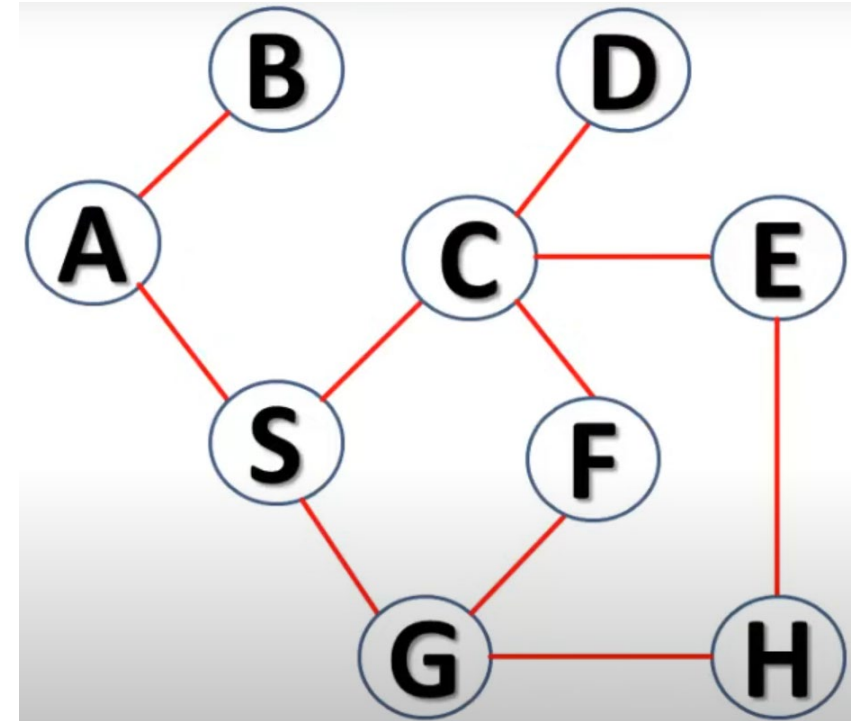
Q. Graph Traversal (Undirected Graph)

Give the BFS, DFS pre-order and post-order traversals of this undirected graph, **starting from either A**. When there are multiple possible orders of visiting the next node, select the next node in **alphabetical order**.



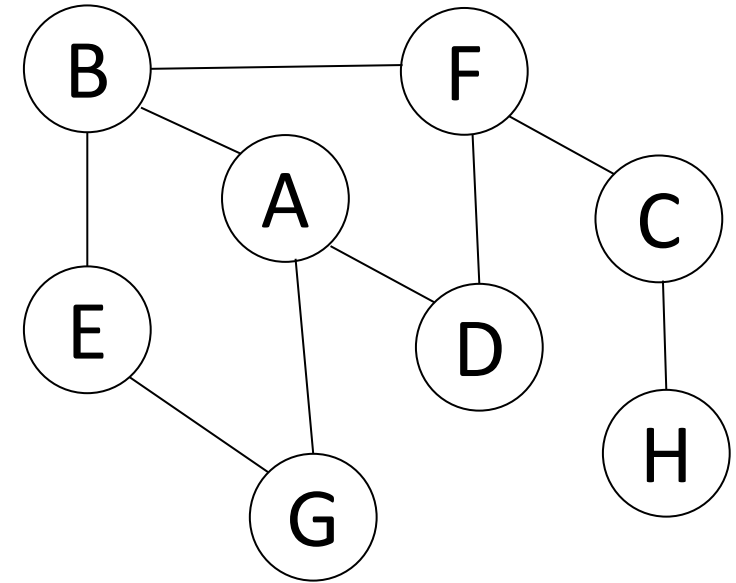
Q. Graph Traversal (Undirected Graph) ANS

- Starting from node A:
 - Pre-order traversal: A B S C D E H G F
 - Post-order traversal: B D F G H E C S A
 - BFS: A B S C G D E F H
 - (Topological Sort: N/A, since it is only for DAG)
- Depth First Search Algorithm, Go GATE IIT
 - <https://www.youtube.com/watch?v=iaBEKo5sM7w>



Q. Graph Traversal (Undirected Graph)

Give the BFS, DFS pre-order and post-order traversals of this undirected graph, **starting from A**. When there are multiple possible orders of visiting the next node, select the next node in **alphabetical order**.



Q. Graph Traversal (Undirected Graph)

- Starting from node A:
 - Pre-order traversal: A B E G F C H D
 - Post-order traversal: G E B H C F D A
 - BFS: A B D G E F C H
 - (Topological Sort: N/A, since it is only for DAG)
- Graph Traversals – Breadth First and Depth First
 - <https://www.youtube.com/watch?v=bIA8HEEUxZI>

