

Course/ Batch: BTech/ SCSET

Course Code: CSET244

Semester: Even

Session: 2024-2025

Course Type: Core

Course Name: Design and Analysis of Algorithms

Tutorial Assignment: Week 9

Tutorial title: BFS DFS

Q1. BFS Order:

$A \rightarrow B \rightarrow D \rightarrow C \rightarrow F \rightarrow E \rightarrow G \rightarrow H$

DFS Order:

$A \rightarrow B \rightarrow C \rightarrow G \rightarrow H \rightarrow E \rightarrow F \rightarrow D$

Q2. Prepare the graph and perform topological sorting. The answer will be 5 semester

Q3. To check if there is a redundant connection, i.e., a cycle exists in the network, we can use DFS.

Algorithm Steps

1. Start DFS from any unvisited node (e.g., A).
2. Mark the node as visited and check its adjacent nodes.
3. If an adjacent node is already visited and not the parent, a cycle exists.
4. Continue DFS traversal for all connected components.

DFS Traversal (Starting from Node A) Visit A

→ Mark as visited.

Move to B → Mark B as visited.

Backtrack to A, move to C → Mark C as visited.

Move to D → Mark D as visited. Move to E →

Mark E as visited.

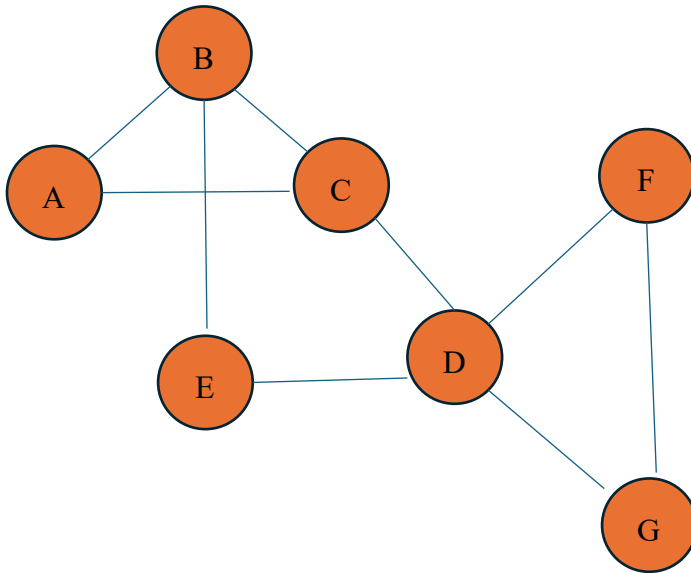
Move to G → Mark G as visited.

Move to F → Mark F as visited.

Move to C (already visited and not the parent of F)

Cycle detected ($C \rightarrow D \rightarrow E \rightarrow G \rightarrow F \rightarrow C$)

Q4. The graph will be



Perform DFS and find the back edges.

The critical point is the articulation point i.e D

Q5. If a spanning tree T of a directed graph G serves as both a DFS and BFS tree rooted at v , it implies that all nodes are reachable from v without any additional edges. Consequently, G contains only the edges present in T , making statements A, B, and C true as there are no back-edges, cross-edges, or forward-edges outside T .

Answer: D. The only edges in G are the edges in T .