

Course/ Batch: BTech/ SCSET
Course Code: CSET244
Semester: Even
Session: 2024-2025

Course Type: Core
Course Name: Design and Analysis of Algorithms

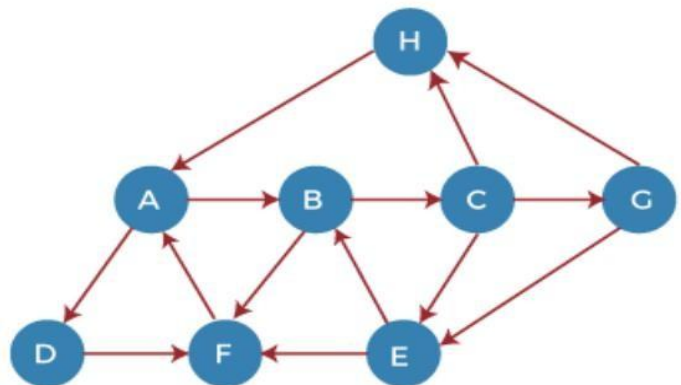
Tutorial Assignment: Week 9

Tutorial title: BFS and DFS

CO Mapping

Question no	CO1	CO2	CO3
Q1	✓	✓	✓
Q2	✓	✓	✓
Q3	✓	✓	✓
Q4	✓	✓	✓
Q5	✓	✓	

Q1. For the given directed graph, determine the BFS and DFS traversal sequences starting from node A.



Q 2 Anjali has enrolled for a part-time Masters programme where she has to complete 8 courses, numbered 1, 2, . . . , 8. Each course takes a full semester to complete. She can take as many or as few courses as she wants in each semester.

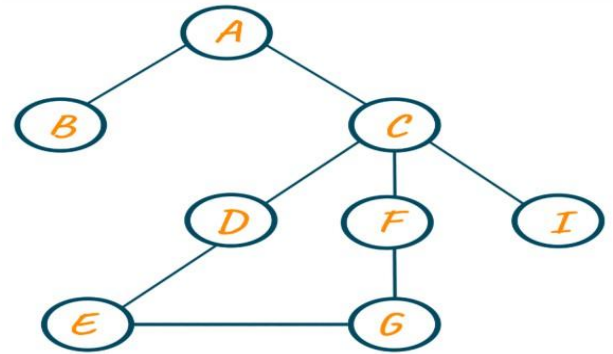
Some courses are prerequisites for other courses. If course A is a prerequisite for course B, she can take course B the semester after she finishes course A, or any time after that, but not before.

Given the following information about prerequisites, compute the minimum number of semesters she needs to complete these courses

- Prerequisites for course 1: course 2,4,5,7
- Prerequisites for course 2: course 3
- Prerequisites for course 3: course 5,6
- Prerequisites for course 4: course 8
- Prerequisites for course 5: course 8
- Prerequisites for course 6: course 7,8

- a) 3
- b) 4
- c) 5
- d) 6

Q 3. A computer network is represented as a given graph, where each Computer is a node, and a direct connection between two computers is an edge. The system administrator wants to check if there is a redundant connection (i.e., if a cycle exists in the network).



Q4. A city has 7 major intersections labelled A to G, connected by a complex network of roads. The city's traffic department is conducting a study to identify critical intersections that, if blocked due to construction, accidents, or natural disasters, could severely impact traffic flow. In addition, the city's emergency response team needs a plan to ensure uninterrupted access to all areas in case of road closures. Some intersections are also near hospitals, fire stations, and police headquarters, making their accessibility even more critical.

Your task is to identify all critical intersections whose removal would disconnect parts of the city. The road network is represented using the following adjacency matrix, where a 1 indicates a direct road connection between two intersections:

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

Q5. Let G be a directed graph and T a depth-first search (DFS) spanning tree in G that is rooted at a vertex v . Suppose T is also a breadth-first search (BFS) tree in G , rooted at v . Which of the following statements is/are true for every such graph G and tree T ?*

- A. There are no back-edges in G with respect to the tree T .
- B. There are no cross-edges in G with respect to the tree T .
- C. There are no forward-edges in G with respect to the tree T .
- D. The only edges in G are the edges in T .