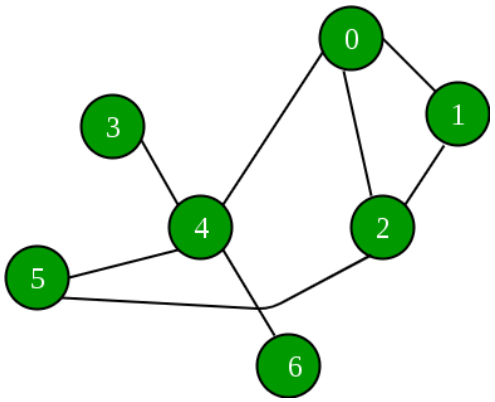
Graph Traversal

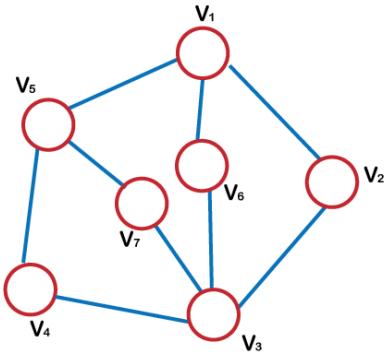
B2 Batch Questions:

Q. 11



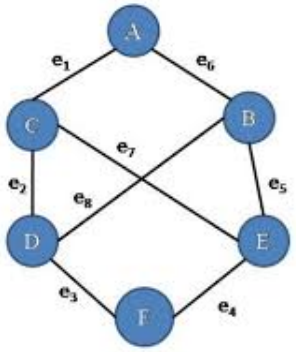
Roll numbers ending with 4 : starting vertex 0
Roll numbers ending with 3 ,2: starting vertex 1
Roll numbers ending with 0 : starting vertex 2
Roll numbers ending with 9,6: starting vertex 3
Roll numbers ending with 5 : starting vertex 4
Roll numbers ending with 1,8 : starting vertex 5
Roll numbers ending with 7 : starting vertex 6

Q. 12



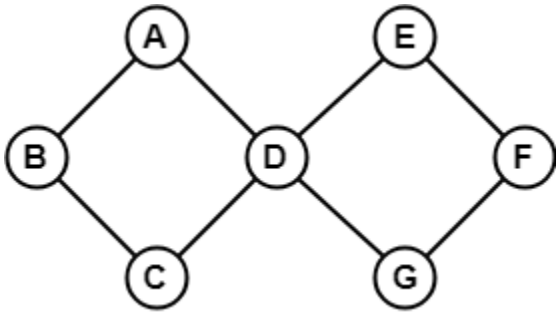
Roll numbers ending with 4 : starting vertex V1
Roll numbers ending with 3 ,2: starting vertex V2
Roll numbers ending with 0,7 : starting vertex V3
Roll numbers ending with 9,6: starting vertex V4
Roll numbers ending with 5 : starting vertex V5
Roll numbers ending with 1 : starting vertex V6
Roll numbers ending with 8 : starting vertex V8

Q. 13



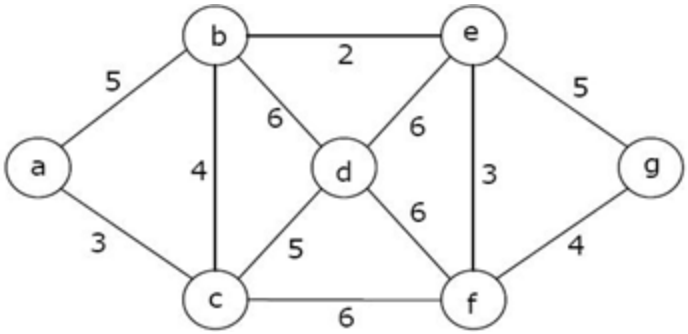
Roll numbers ending with 4 : starting vertex A
Roll numbers ending with 3 ,2: starting vertex B
Roll numbers ending with 0,7 : starting vertex C
Roll numbers ending with 9,6: starting vertex D
Roll numbers ending with 5 : starting vertex E
Roll numbers ending with 1,8 : starting vertex F

Q. 14



Roll numbers ending with 4 : starting vertex A
Roll numbers ending with 3 ,2: starting vertex B
Roll numbers ending with 0,7 : starting vertex C
Roll numbers ending with 9: starting vertex D
Roll numbers ending with 5 : starting vertex E
Roll numbers ending with 1,8 : starting vertex F
Roll numbers ending with 6 : starting vertex G

Q. 15

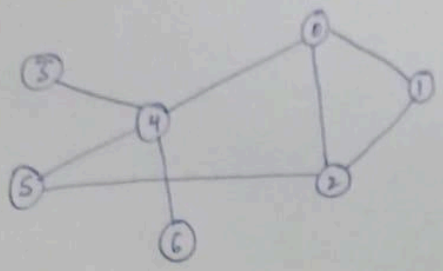


Roll numbers ending with 4 : starting vertex A
Roll numbers ending with 3: starting vertex B
Roll numbers ending with 0,7 : starting vertex C
Roll numbers ending with 9,6: starting vertex D
Roll numbers ending with 5 : starting vertex E
Roll numbers ending with 1,8 : starting vertex F
Roll numbers ending with 2 : starting vertex G

Answers

Roll : 1601012107

Q11)

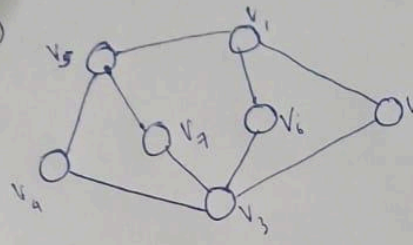


Start vertex 6:

BFS: 6, 4, 5, 3, 0, 2, 1

DFS: 6, 4, 3, 5, 2, 1, 0

Q12)

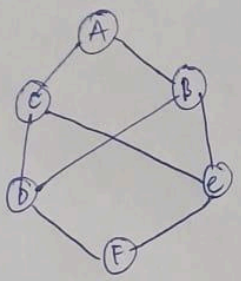


Start V 3:

BFS: $V_3, V_4, V_7, V_6, V_2, V_5, V_1$

DFS: $V_3, V_4, V_5, V_1, V_6, V_7, V_2$

Q13)

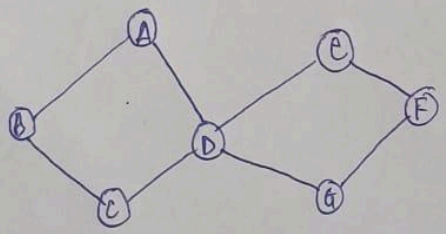


Start C:

BFS: C, A, E, D, B, F

DFS: C, A, B, e, F, D

Q14)

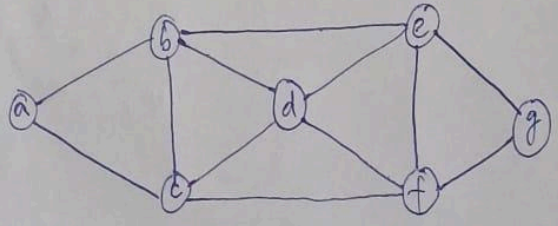


Start C:

BFS: C, B, D, A, E, G, F

DFS: C, B, A, D, G, e, F

Q15)

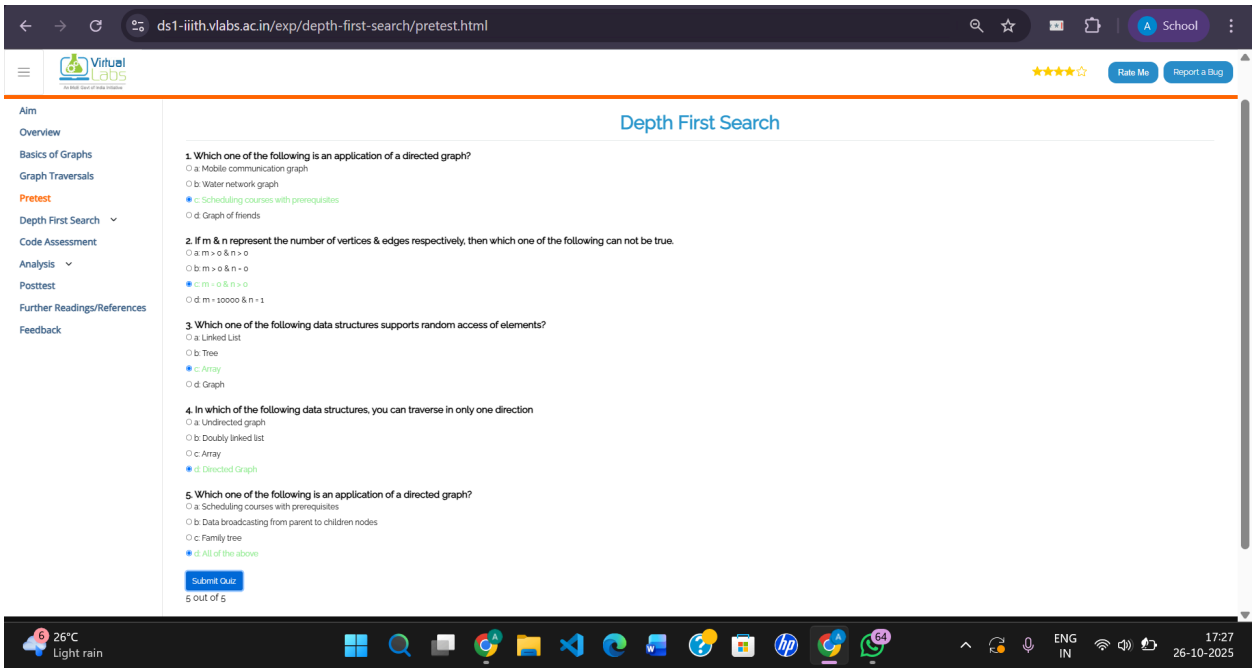


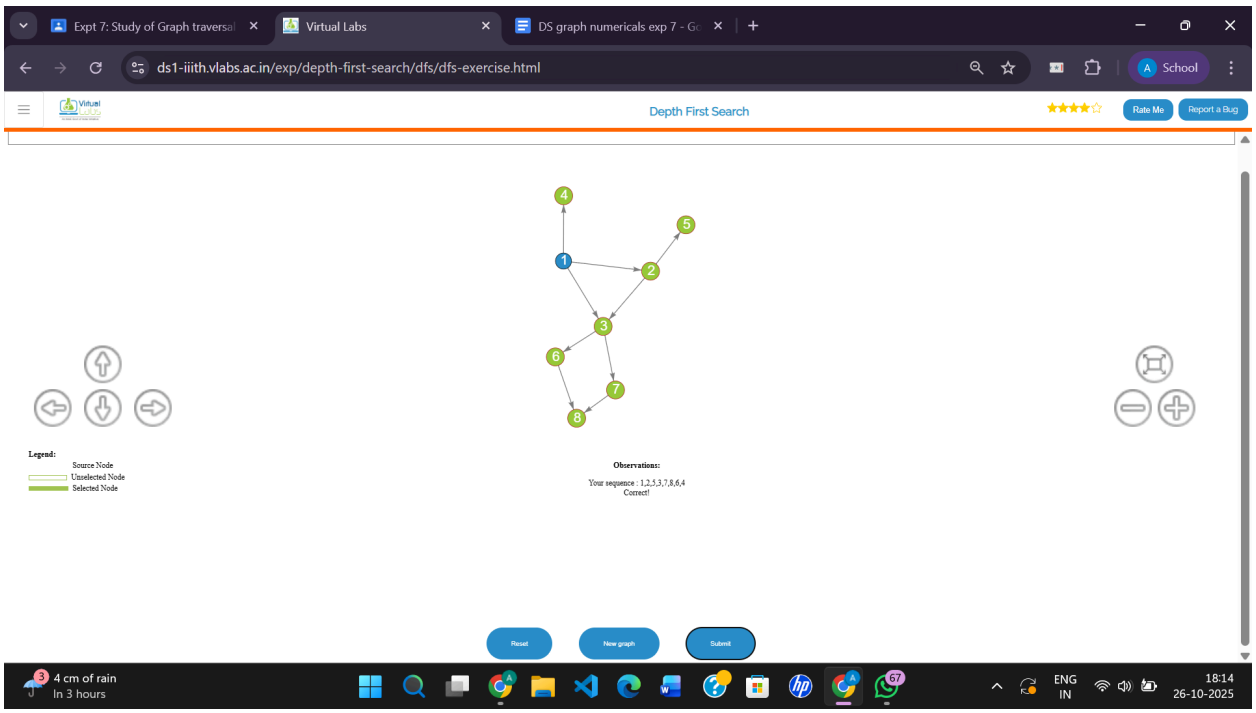
Start C:

BFS: c, a, b, d, e, f, g

DFS: c, a, b, d, e, f, g

Virtual Lab 1





Depth First Search

1. Which one of the following data structures is used in DFS?

- a: Heap
- b: Dequeue
- c: Linked List
- d: Stack

2. What is backtracking in DFS?

- a: Going to the parent node if all the children nodes have been visited
- b: Going to the parent node when a children node has been visited
- c: Going to the sibling node when all the children nodes have been visited
- d: Going to the sibling node when a children node has been visited

Submit Quiz

2 out of 2

Depth First Search

1. If there are 10 edges in a graph, in the worst case how many edges can be traversed?
- a: 0
- b: 1
- c: 5
- d: 10

2. Which one of the following is correct?
- a: DFS uses queue & BFS can be done using stack & recursion.
- b: In DFS, all the neighbors are traversed before other nodes.
- c: DFS is a vertex-based algorithm while BFS is an edge-based algorithm.
- d: BFS is an optimal algorithm while DFS is not optimal.

Submit Quiz

2 out of 2

Depth First Search

1. Which one of the following steps is incorrect when performing DFS?
- a: STEP 1: Start by putting any one of the graph's vertices on top of a stack (acts as source node of DFS).
- b: STEP 2: Take the top item of the stack and set its visited as 1.
- c: STEP 3: Create a list of that vertex's adjacent nodes. Add the ones whose visited is 1 to the top of the stack.
- d: STEP 4: Keep repeating steps 2 and 3 until the stack is empty.

2. What is the time complexity of DFS? V is the number of vertices & E is the number of edges
- a: O(V^2)
- b: O(V+E)
- c: O(E^2)
- d: O(VlogV)

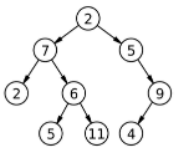
3. Pick the incorrect option
- a: BFS consumes more memory & DFS consumes less memory
- b: DFS goes deeper & deeper until the node has no children
- c: BFS involves traversing neighbors before other nodes
- d: DFS uses queue

4. Which one of the following are applications of DFS?
- a: Topological Sorting
- b: Minimum Spanning Tree
- c: Finding connected components
- d: All of the above

5. DFS can only be applied on Trees & not on Graphs.
- a: True
- b: False

6. Pick the incorrect option
- a: DFS uses exhaustive traversal along one path before exploring other options
- b: DFS can be used to find the shortest path between two nodes
- c: DFS uses stack or recursion
- d: DFS can be used in topological sorting

7.



When we apply DFS on the above graph, which one of the following order of traversal is not possible?
- a: 2,7,2,6,5,11,5,9,4
- b: 2,7,5,2,6,9,5,11,4
- c: 2,7,6,5,11,2,5,9,4
- d: 2,5,9,4,7,2,6,5,11

Submit Quiz

7 out of 7

Virtual Lab 2

Choose difficulty: ☑ Beginner

1. Which of the following policies does a queue follow?

◉ a: FIFO - First In, First Out Explanation

○ b: LIFO - Last In, First Out Explanation

○ c: FILO - First In, Last Out Explanation

○ d: Random order Explanation

2. Which of the following describes a standard graph traversal algorithm?

○ a: Visiting all the edges of the graph Explanation

◉ b: Visiting all the vertices of the graph Explanation

○ c: Detecting all the cycles in the graph Explanation

○ d: None of the above Explanation

3. Consider the following undirected graph:
Vertices, V = [1, 2, 3, 4, 5, 6]
Edges, E = [[1, 2], [1, 3], [2, 4], [2, 5], [3, 5], [3, 6]]
Where each array within E signifies an edge between the two mentioned vertices
Which of the following data structures is represented by the above graph?

○ a: Tree Explanation

◉ b: Cyclic graph Explanation

○ c: Disconnected Graph Explanation

○ d: Complete Graph Explanation

4. Consider the following undirected graph:
Vertices, V = [a, b, c , d, e, f]
Edges, E = [[a, b], [a c], [b, d], [b, e], [c, e], [c, f]]
Where each array within E signifies an edge between the two mentioned vertices.
If we were to store this graph's vertices in a queue in the order top to bottom(parent to child) and left to right(edges that appear first in th

○ a: 2 Explanation

○ b: 3 Explanation

◉ c: 4 Explanation

○ d: 5 Explanation

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Score: 4 out of 4

ds1-iiith.vlabs.ac.in/exp/breadth-first-search/bfs/bfs_exercise.html

Virtual Labs

Breadth First Search

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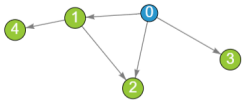

Legend:
Source Node
Unselected Node
Selected Node

Observations

Your sequence : 0 , 1 , 2 , 3 , 4
Correct!

Reset | New graph | Submit

Breadth First Search

Choose difficulty: Beginner Intermediate

1. Which of the following are applications of BFS?

- a: To find the Minimum Spanning Tree (MST) Explanation
- b: To find the shortest distance to a node from the root Explanation
- c: Cycle detection in undirected graphs Explanation
- d: All of the above Explanation

2. Imagine a 4X4 grid (assume 1 indexing) where the hero stands in the cell (2,3) and the villain is in the cell (3,1). Assuming t right to the immediately adjacent cells and cannot move out of the grid, how many steps will it take for the hero to reach th

- a: 1 Explanation
- b: 2 Explanation
- c: 3 Explanation
- d: 4 Explanation

Submit Quiz

Score: 2 out of 2

1. Consider the following graph:
Vertices, V = [a, b, c , d, e, f]
Edges, E = [[a, b], [a c], [b, d], [b, e], [c, e], [c, f]]
Where each array within E signifies an edge between the two mentioned vertices.
How many iterations of the queue would it take for the algorithm to traverse this graph completely?

- ○ a: 3 Explanation
- ○ b: 5 Explanation
- ◉ c: 6 Explanation
- ○ d: 7 Explanation

2. When will the space complexity of BFS be greater than DFS? Note that maximum height in the option or final non-repeating vertex.

- ◉ a: If the maximum height is less than the maximum number of nodes in a single level Explanation
- ○ b: If the maximum height is greater than the maximum number of nodes in a single level Explanation
- ○ c: BFS and DFS have same the space complexity Explanation
- ○ d: Space complexity of DFS is always greater than that of BFS Explanation

Submit Quiz

Score: 2 out of 2

Breadth First Search

Choose difficulty: ☑ Intermediate ☑ Advanced

1. Which of the following is a use of the extra 'visited' array (the array used to keep track of which nodes have been visited/traversed) in BFS?

- ◉ a: To avoid getting stuck in a cycle Explanation
- ○ b: To decide which node to traverse next Explanation
- ○ c: To preemptively end the algorithm when all nodes are marked as visited thus saving time Explanation
- ○ d: None of the above Explanation

2. What would happen if we used a stack instead of a queue in BFS?

- ○ a: The algorithm would simply traverse the graph in the reverse order, i.e, from bottom to top (leaves to root) Explanation
- ◉ b: The algorithm would become equivalent to DFS Explanation
- ○ c: The algorithm would not work properly, i.e, it will not traverse the graph properly and/or completely Explanation
- ○ d: No change in the algorithm, i.e, it remains unaffected Explanation

3. Why is the time complexity of BFS O(|V| + |E|)?

- ○ a: Because it considers all vertices and edges in the worst case Explanation
- ◉ b: Because it considers all vertices and edges in all cases Explanation
- ○ c: This is not the correct time complexity of BFS Explanation
- ○ d: None of the above Explanation

4. Consider the following graph:
Vertices, V = [a, b, c , d, e, f]
Edges, E = [[a, b], [a c], [b, d], [b, e], [c, e], [c, f]]
Where each array within E signifies an edge between the two mentioned vertices and a is the root.
Which of the following represents the correct sequence of the queue used in BFS to traverse the above graph?

- ○ a: [] → [a] → [b, c] → [b, e, f] → [b, e] → [b] → [d] → [] Explanation
- ○ b: [] → [a] → [a, b, c] → [a, b, c, d, e] → [a, b, c, d, e, f] Explanation
- ○ c: [] → [a] → [b, c] → [c, d] → [d, e, f] → [e, f] → [f] → [] Explanation
- ◉ d: [] → [a] → [b, c] → [c, d, e] → [d, e, f] → [e, f] → [f] → [] Explanation

Submit Quiz

Score: 4 out of 4