Graphs in Data Structures & Algorithms Quiz

1. What is a graph in data structures?

- ○ A. A linear data structure
- ◉ B. A collection of nodes and edges
- ○ C. A type of array
- ○ D. A sorted list

2. Which of the following represents a directed graph?

- ○ A. Edges have no direction
- ○ B. Edges have a direction
- ○ C. All nodes are disconnected
- ○ D. No edges exist

3. What is the space complexity of an adjacency matrix for a graph with V vertices?

- ○ A. O(V)
- ○ B. O(V + E)
- ○ C. $O(V^2)$
- ○ D. O(E)

4. Which data structure is most space-efficient for sparse graphs?

- A. Adjacency matrix
- B. Adjacency list
- C. Edge list
- D. 2D array

5. What does DFS stand for in graph traversal?

- A. Depth-First Search
- B. Distance-First Search
- C. Dynamic-First Search
- D. Directed-First Search

6. Which algorithm finds the shortest path in an unweighted graph?

- A. Dijkstra’s
- B. BFS
- C. DFS
- D. Prim’s

7. What is the time complexity of BFS using an adjacency list?

- A. O(V)
- B. O(V + E)
- C. $O(V^2)$
- D. $O(E^2)$

8. Which algorithm is used to find the Minimum Spanning Tree?

- A. Kruskal’s
- B. Bellman-Ford
- C. Floyd-Warshall
- D. DFS

9. In a directed acyclic graph (DAG), what can topological sorting determine?

- A. Shortest path
- B. Order of vertices
- C. Maximum flow
- D. Connected components

10. What does Dijkstra’s algorithm assume about edge weights?

- A. They are negative
- B. They are non-negative
- C. They are zero
- D. They are random

11. Which algorithm detects negative weight cycles in a graph?

- A. Dijkstra’s
- B. Bellman-Ford
- C. Kruskal’s

- D. Prim’s

12. What is the time complexity of Kruskal’s algorithm with a Union-Find data structure?

- A. O(E log E)
- B. O(V^2)
- C. O(V + E)
- D. O(V log V)

13. Which graph representation is best for dense graphs?

- A. Adjacency list
- B. Adjacency matrix
- C. Edge list
- D. Linked list

14. What is a cycle in a graph?

- A. A path with no edges
- B. A path that starts and ends at the same vertex
- C. A disconnected component
- D. A tree structure

15. Which of the following is a tree?

- A. A cyclic graph
- B. A connected acyclic graph

- C. A disconnected graph
- D. A complete graph

16. What is the purpose of the Floyd-Warshall algorithm?

- A. Find a single shortest path
- B. Find all-pairs shortest paths
- C. Find a minimum spanning tree
- D. Detect cycles

17. What does the degree of a vertex represent in an undirected graph?

- A. Number of incoming edges
- B. Number of outgoing edges
- C. Total number of incident edges
- D. Number of vertices

18. Which algorithm uses a priority queue for efficiency?

- A. DFS
- B. BFS
- C. Dijkstra’s
- D. Bellman-Ford

19. What is a bipartite graph?

- A. A graph with cycles

- B. A graph with two sets of vertices and edges between them
- C. A fully connected graph
- D. A tree

20. Which traversal can detect cycles in a graph?

- A. BFS
- B. DFS
- C. Both BFS and DFS
- D. Neither BFS nor DFS

21. What is the time complexity of Prim's algorithm with a binary heap?

- A. $O(V^2)$
- B. $O((V + E) \log V)$
- C. $O(E \log E)$
- D. $O(V + E)$

22. What is the maximum number of edges in a simple undirected graph with V vertices?

- A. V
- B. V(V - 1)
- C. V(V - 1)/2
- D. V^2

23. Which algorithm finds the maximum flow in a network?

- A. Ford-Fulkerson
- B. Kruskal’s
- C. Prim’s
- D. Dijkstra’s

24. What is an articulation point in a graph?

- A. A vertex with no edges
- B. A vertex whose removal increases the number of components
- C. A vertex with maximum degree
- D. A vertex in a cycle

25. Which of these is NOT a property of a complete graph?

- A. Every pair of vertices is connected
- B. It is acyclic
- C. It has V(V - 1)/2 edges
- D. It is undirected

26. What does Kosaraju’s algorithm find?

- A. Shortest paths
- B. Strongly connected components
- C. Minimum spanning tree
- D. Maximum flow

27. In a weighted graph, what does an edge weight typically represent?

- A. Direction
- B. Cost or distance
- C. Number of vertices
- D. Degree of a vertex

28. Which algorithm can be used to detect bridges in a graph?

- A. DFS
- B. BFS
- C. Dijkstra’s
- D. Kruskal’s

29. What is the time complexity of Floyd-Warshall algorithm?

- A. $O(V^2)$
- B. $O(V^3)$
- C. $O(V + E)$
- D. $O(E \log V)$

30. Which of the following is an application of graphs?

- A. Sorting numbers
- B. Social network analysis
- C. Binary search

○ D. Stack operations

Answers

1. B | 2. B | 3. C | 4. B | 5. A | 6. B | 7. B | 8. A | 9. B | 10. B

11. B | 12. A | 13. B | 14. B | 15. B | 16. B | 17. C | 18. C | 19. B | 20. C

21. B | 22. C | 23. A | 24. B | 25. B | 26. B | 27. B | 28. A | 29. B | 30. B