Design & Analysis of Algorithms

UNIT-4

Part-A: Multiple Choice Questions (20 × 1 = 20 Marks)

Choose the correct answer.

1. A Greedy Algorithm makes decisions based on:

a) Future possibilities
b) Local optimum choice
c) Random selection
d) Recursion only

2. The Greedy method aims to obtain:

a) Local optimal solution at each step
b) Global solution directly
c) Recursive solution only
d) Dynamic programming table

3. Which of the following is an application of the Greedy Method?

a) Job Sequencing with Deadlines
b) Merge Sort
c) Binary Search
d) N-Queens

4. In Job Sequencing with Deadlines, the objective is to maximize:

a) Number of jobs only
b) Profit
c) Memory usage
d) Deadlines

5. Which algorithm is commonly used to find a Minimum Cost Spanning Tree?

a) Quick Sort
b) Kruskal's Algorithm
c) Binary Search
d) Floyd-Warshall

6. Kruskal’s Algorithm selects edges based on:

a) Maximum weight
b) Random order
c) Minimum weight
d) Vertex degree

7. Prim's Algorithm is used to find:

a) Shortest Path
b) Minimum Cost Spanning Tree
c) Hamiltonian Cycle
d) Graph Coloring

8. Dijkstra's Algorithm solves:

a) All-Pairs Shortest Path
b) Single Source Shortest Path
c) Minimum Spanning Tree
d) Graph Coloring

9. Dijkstra's Algorithm works correctly when edge weights are:

a) Negative
b) Positive or Zero
c) Complex numbers
d) Infinite

10. The Fractional Knapsack Problem is solved efficiently using:

a) Dynamic Programming
b) Greedy Method
c) Backtracking
d) Branch and Bound

11. A Binary Tree node can have at most:

a) One child
b) Two children
c) Three children
d) Four children

12. Which traversal visits Root, Left, Right?

a) Inorder
b) Postorder
c) Preorder
d) Level Order

13. Which traversal visits Left, Root, Right?

a) Inorder
b) Preorder
c) Postorder
d) DFS

14. Which traversal visits Left, Right, Root?

a) Preorder
b) Inorder
c) Postorder
d) BFS

15. Breadth First Search (BFS) uses:

a) Stack
b) Queue
c) Heap
d) Array

16. Depth First Search (DFS) uses:

a) Queue
b) Heap
c) Stack
d) Priority Queue

17. A Connected Component exists in:

a) Directed graph only
b) Undirected graph
c) Tree only
d) Heap only

18. A graph is connected if:

a) Every vertex is reachable from every other vertex
b) It has no edges
c) It contains cycles
d) It is directed

19. A Biconnected Component is a maximal subgraph that:

a) Contains only one vertex
b) Remains connected after removal of any one vertex

c) Contains no edges
d) Has equal weights

20. An articulation point is a vertex whose removal:

a) Increases connectivity
b) Disconnects the graph
c) Reduces edge weights
d) Creates cycles

Part-B: Fill in the Blanks (20 × 1 = 20 Marks)

1. The Greedy method makes the _____ choice at each step.

2. Job Sequencing with Deadlines aims to maximize total _____.

3. A job must be completed before its _____.

4. Kruskal's Algorithm is used to find a Minimum Cost _____ Tree.

5. Prim's and Kruskal's algorithms are used for _____.

6. Dijkstra's Algorithm finds the shortest path from a _____ source.

7. Dijkstra's Algorithm does not work correctly with _____ edge weights.

8. The Fractional Knapsack Problem can be solved using the _____ strategy.

9. A spanning tree of a graph with n vertices contains _____ edges.

10. The total weight of a Minimum Spanning Tree is _____ among all spanning trees.

11. In a binary tree, each node has at most _____ children.

12. Inorder traversal follows _____, Root, Right.

13. Preorder traversal follows Root, _____, Right.

14. Postorder traversal follows Left, Right, _____.

15. BFS stands for Breadth First _____.

16. DFS stands for Depth First _____.

17. BFS uses a _____ data structure.

18. DFS uses a _____ data structure.

19. A graph with only one connected component is called a _____ graph.

20. A vertex whose removal disconnects a graph is called an _____ point.

ANSWERS

Part-A: MCQs

1. b
2. a
3. a
4. b
5. b
6. c
7. b
8. b
9. b
10. b
11. b
12. c
13. a
14. c
15. b
16. c
17. b
18. a
19. b
20. b

Part-B: Fill in the Blanks

1. Best (or Locally Optimal)
2. Profit
3. Deadline
4. Spanning
5. Minimum Spanning Trees
6. Single
7. Negative
8. Greedy
9. $n - 1$
10. Minimum
11. Two
12. Left

13. Left
14. Root
15. Search
16. Search
17. Queue
18. Stack
19. Connected
20. Articulation