# DSA – 1 to 6

## Session 1:

**1. Which of the following is the *first step* in problem solving?**

A. Finding a solution

B. Implementing a solution

C. Identifying the problem

D. Evaluating the outcome

**Ans: C**

**2. What is a well-defined problem?**

A. A problem with no solution

B. A problem with unclear goals

C. A problem with clear goals and solution path

D. A problem that involves innovation

**Ans: C**

**3. Which term refers to the ability to understand a problem and come up with effective solutions?**

A. Coding

B. Problem Solving

C. Debugging

D. Trial and Error

**Ans: B**

**4. What is the key difference between creativity and innovation?**

A. Creativity is about implementation; innovation is about ideas

B. Creativity is imagining; innovation is applying ideas in a useful way

C. Innovation doesn't require creativity

D. They are the same

**Ans: B**

**5. Which of the following is NOT a characteristic of effective problem solving?**

A. Emotional reasoning

B. Logical thinking

C. Analytical ability

D. Decision making

**Ans: A**

**6. Which tool involves visual representation of ideas branching from a central concept?**

A. Six Thinking Hats

B. Mind Mapping

C. Brainstorming

D. Flowchart

**Ans: B**

**7. Which of these is NOT a typical rule in a Brainstorming session?**

A. Criticize unusual ideas

B. Encourage wild ideas

C. Go for quantity over quality

D. Build on others' ideas

**Ans: A**

**8. Reverse Brainstorming is primarily used to:**

A. Block creativity

B. Find the root cause of a problem

C. Think about how to cause the problem

D. Map the process

**Ans: C**

**9. What is “Imagineering” a combination of?**

A. Imagination and Brainstorming

B. Imagination and Engineering

C. Imagination and Managing

D. Engineering and Mapping

**Ans: B**

**10. What is the purpose of using charts and diagrams in problem-solving?**

A. To replace decision making

B. To confuse the user

C. To present information clearly and analyze patterns

D. To skip brainstorming

**Ans: C**

**11. Which 'Thinking Hat' focuses on emotions and intuition?**

A. Red Hat

B. Black Hat

C. Blue Hat

D. White Hat

**Ans: A**

**12. Which hat in the Six Thinking Hats approach is associated with managing the thinking process?**

A. Yellow

B. Blue

C. Green

D. Red

**Ans: B**

**13. What does the White Hat represent?**

A. Emotions

B. Information and facts

C. Creativity

D. Negativity

**Ans: B**

**14. What does critical thinking involve?**

A. Blindly following instructions

B. Evaluating information to make reasoned judgments

C. Copying others' ideas

D. Avoiding decision making

**Ans: B**

**15. Which skill is NOT part of critical thinking?**

A. Analysis

B. Evaluation

C. Guesswork

D. Inference

**Ans: C**

**16. Which is NOT a common decision-making method?**

A. Consensus

B. Voting

C. Random guessing

D. Decision matrix

**Ans: C**

**17. What is the purpose of defining solution criteria in problem solving?**

A. To increase complexity

B. To make biased decisions

C. To ensure that solutions meet the desired outcome

D. To guess solutions

**Ans: C**

**18. Outcome-based thinking focuses on:**

A. Past performance

B. Intuition

C. Predicting and optimizing for best results

D. Avoiding analysis

**Ans: C**

**19. Which diagram is used to identify the root causes of a problem?**

A. Gantt Chart

B. Mind Map

C. Fishbone Diagram

D. Pie Chart

**Ans: C**

**20. Analyzing the situation in problem solving includes:**

A. Avoiding facts

B. Collecting irrelevant data

C. Understanding context, constraints, and factors

D. Guessing causes

**Ans: C**

**21. Information analysis helps in:**

A. Making uneducated guesses

B. Clarifying the problem and evaluating alternatives

C. Confusing the problem solver

D. Ignoring the data

**Ans: B**

**22. Effective problem-solving approaches include all EXCEPT:**

A. Trial and error

B. Breaking down into subproblems

C. Ignoring constraints

D. Pattern recognition

**Ans: C**

**23. Which of the following best supports collaboration and critical thinking?**

A. Six Thinking Hats

B. Guessing

C. Avoidance

D. Disorganized debate

**Ans: A**

**24. The Yellow Hat in Six Thinking Hats focuses on:**

A. Negatives

B. Emotions

C. Benefits and values

D. Creative alternatives

**Ans: C**

**25. Which creative thinking method focuses on visualizing connections and associations?**

A. Flowchart

B. SWOT analysis
C. Mind Mapping
D. Data Mining
**Ans: C**

**26. Which data structure is best suited for implementing Undo functionality in editors?**
A. Queue
B. Stack
C. Array
D. Graph
**Ans: B**

**27. If you are trying to find the shortest path in a map, which algorithm will help most?**
A. Binary Search
B. Merge Sort
C. Dijkstra's Algorithm
D. Depth First Search
**Ans: C**

**28. Which of the following problems is solved using dynamic programming?**
A. Shortest Path in Weighted Graph
B. Fibonacci Series
C. Knapsack Problem
D. All of the above
**Ans: D**

**29. When the problem is to repeatedly access the minimum element, which data structure is ideal?**
A. Queue
B. Binary Search Tree
C. Min Heap
D. Linked List
**Ans: C**

**30. Which DSA concept helps you *divide the problem* into smaller subproblems and solve them recursively?**
A. Backtracking
B. Dynamic Programming
C. Divide and Conquer
D. Greedy Algorithm
**Ans: C**

**31. How can a creative solution to the "Least Recently Used" (LRU) cache be implemented?**

A. Using Array and Stack
B. Using HashMap and Doubly Linked List
C. Using Queue
D. Using Tree
**Ans: B**

**32. Which data structure would you use to simulate a 'Time Travel' feature in an app (going back/forward)?**
A. Two Stacks
B. Queue
C. Set
D. Tree
**Ans: A**

**33. Which of the following is an innovative way to reduce space in a recursive algorithm?**
A. Increase recursion depth
B. Use iterative approach with Stack
C. Use linked list
D. Avoid base cases
**Ans: B**

**34. Using DSA creatively, which structure helps in modeling relationships like in Facebook friends?**
A. Stack
B. Queue
C. Graph
D. Tree
**Ans: C**

**35. Which creative algorithmic technique is best for solving puzzles like Sudoku?**
A. Greedy
B. BFS
C. Backtracking
D. DFS
**Ans: C**

**36. Which sorting algorithm is most efficient when data is nearly sorted?**
A. Selection Sort
B. Insertion Sort
C. Merge Sort
D. Bubble Sort
**Ans: B**

**37. If a problem involves visiting all nodes and avoiding cycles, what should be used?**
A. DFS with visited array
B. BFS only
C. Stack without check
D. Binary Tree
**Ans: A**

**38. Critical thinking helps choose between which two approaches for overlapping subproblems?**
A. DFS vs BFS
B. Recursion vs Iteration
C. Memoization vs Tabulation
D. Sorting vs Searching
**Ans: C**

**39. For a problem requiring max profit with limited weight, which approach works best?**
A. Greedy
B. Brute Force
C. Backtracking
D. Dynamic Programming
**Ans: D**

**40. Which method is used to think critically in optimizing search within sorted data?**
A. Linear Search
B. Binary Search
C. Bubble Sort
D. DFS
**Ans: B**

**41. Which DSA helps in efficient decision-making in CPU task scheduling?**
A. Graph
B. Queue (Priority Queue)
C. Stack
D. Tree
**Ans: B**

**42. In a decision tree problem, which DSA is best to represent logical branching?**
A. Graph
B. Tree
C. Linked List
D. Stack
**Ans: B**

**43. To apply "Outcome-Based Thinking", which sorting algorithm gives best average performance?**

A. Merge Sort
B. Insertion Sort
C. Quick Sort
D. Bubble Sort
**Ans: C**

**44. Decision Tree algorithm in ML uses which data structure internally?**

A. Graph
B. Tree
C. HashMap
D. Stack
**Ans: B**

**45. Which algorithm helps in deciding whether a graph has a cycle or not?**

A. DFS with visited and recursion stack
B. BFS with Queue
C. Binary Search
D. Quick Sort
**Ans: A**

**46. Which DSA is visually like a “mind map” showing hierarchical relations?**

A. Stack
B. Tree
C. Array
D. Queue
**Ans: B**

**47. Which algorithm helps in visualizing “connections” in a network?**

A. Quick Sort
B. Graph traversal
C. Binary Search
D. Insertion Sort
**Ans: B**

**48. Which data structure is ideal for drawing a flowchart-like structure?**

A. Tree
B. Queue
C. Hash Table
D. Linked List
**Ans: A**

**49. Charts like Gantt charts in scheduling relate most closely with:**

A. Queue

B. Heap

C. Linked List

D. Stack

**Ans: A**

**50. Which algorithm best supports "cause-effect" mapping like fishbone diagrams?**

A. DFS

B. Tree Traversal

C. Graph Cycle Detection

D. None of the above

**Ans: B**

**51. Which algorithm would you use to schedule jobs with deadlines and profits?**

A. Kruskal's Algorithm

B. Prim's Algorithm

C. Greedy Algorithm

D. Binary Tree

**Ans: C**

**52. If two people want to find a meeting point in a city map, which algorithm applies?**

A. DFS

B. Dijkstra from both ends (Bidirectional Search)

C. Sorting

D. Binary Search

**Ans: B**

**53. Which data structure is best suited for autocomplete suggestions?**

A. Trie

B. Array

C. Stack

D. Queue

**Ans: A**

**54. Which data structure helps reduce time complexity when checking for duplicates in large input?**

A. List

B. Tree

C. HashSet

D. Stack

**Ans: C**

**55. Which approach helps to solve problems optimally step-by-step with minimal decisions?**

A. Backtracking

B. Brute Force

C. Greedy

D. Memoization

**Ans: C**

**56. Which tool involves identifying supporting and resisting forces related to a decision?**

A. SWOT Analysis

B. Force Field Analysis

C. PESTLE Analysis

D. Gantt Chart

**Ans: B**

**57. Feasibility analysis is used to:**

A. Find employee salaries

B. Determine if a solution can be implemented practically

C. Hire the right people

D. Count resources

**Ans: B**

**58. Capability analysis evaluates:**

A. Financial loss

B. Technical or team ability to implement a solution

C. Time needed for lunch

D. Social media posts

**Ans: B**

**59. One major drawback of "Pros and Cons" lists is:**

A. They are difficult to make

B. They do not allow group input

C. They lack depth in measuring impact

D. They are statistical models

**Ans: C**

**60. In Force Field Analysis, what is the purpose of strengthening driving forces?**

A. Make the decision less effective

B. Encourage resistance

C. Support successful implementation

D. Hide alternatives

**Ans: C**

**61. Which decision-making model compares options based on weighted criteria?**

A. Pros and Cons

B. Cost-Benefit Analysis

C. Decision Matrix

D. Flow Chart

**Ans: C**

**62. What is the key purpose of evaluating multiple alternatives?**

A. Waste time

B. Ensure only cheapest option is chosen

C. Maximize effectiveness and minimize risks

D. Avoid group work

**Ans: C**

**63. When selecting among alternatives, the most important factor is usually:**

A. The most popular option

B. The one with fewer steps

C. The best alignment with objectives

D. The one requiring less documentation

**Ans: C**

**64. Qualitative analysis focuses on:**

A. Measurable values only

B. Non-numerical factors like opinions, experiences

C. Hardware costs

D. Input/output speed

**Ans: B**

**65. Which of the following is NOT a qualitative analysis technique?**

A. Expert interview

B. SWOT analysis

C. Sentiment analysis

D. Bubble Sort

**Ans: D**

**66. Why do we assign weights to objectives?**

A. To increase the confusion

B. To rank objectives by importance

C. To make fewer decisions

D. To decrease accountability

**Ans: B**

**67. Which of the following is a valid step before assigning weights to objectives?**

A. Decide outcomes

B. Finalize solution
C. Identify and define each objective clearly
D. Cancel the project
**Ans: C**

**68. Creating a satisfaction scale helps to:**
A. Compare alternatives consistently
B. Ignore lower-ranked options
C. Show dislike for solutions
D. Avoid critical thinking
**Ans: A**

**69. What is typically the highest value on a satisfaction scale?**
A. 0
B. 5
C. 10
D. 100
**Ans: D** *(Can vary, but 100 is common in weighted decision-making models)*

**70. If two solutions score similarly, the deciding factor should be:**
A. Random chance
B. Personal bias
C. Critical evaluation of long-term impacts
D. Stakeholder avoidance
**Ans: C**

**71. Which of the following is the FIRST step in implementing a decision?**
A. Review emails
B. Create an action plan
C. Delegate blame
D. Wait for approvals
**Ans: B**

**72. Breaking the solution into smaller action steps helps with:**
A. Confusing the team
B. Avoiding commitment
C. Managing implementation better
D. Wasting time
**Ans: C**

**73. Assigning roles and responsibilities ensures:**
A. No work is done
B. Everyone is confused
C. Accountability and task clarity

D. Redundancy in work

**Ans: C**

**74. What is meant by setting priorities in an action plan?**

A. Ignoring deadlines

B. Doing easiest work first

C. Scheduling tasks based on importance and impact

D. Asking everyone to start at the same time

**Ans: C**

**75. Which tool helps visualize task sequencing in implementation?**

A. Pie chart

B. Bar graph

C. Gantt chart

D. Histogram

**Ans: C**

**76. Why are milestones important in implementation?**

A. Add to documentation only

B. Waste time

C. Track progress and review success/failure

D. Avoid reporting

**Ans: C**

**77. What is the best time to conduct a follow-up check?**

A. Before action starts

B. After each milestone

C. After all work is done

D. Weekly, even if nothing is happening

**Ans: B**

**78. If a milestone is missed, what should be done first?**

A. Ignore it

B. Blame the team

C. Reassess causes and update the plan

D. Close the project

**Ans: C**

**79. Which of the following is NOT part of effective implementation?**

A. Planning ahead

B. Role assignment

C. Waiting for problems to resolve themselves

D. Monitoring progress

**Ans: C**

**80. What is a contingency plan?**
A. Primary action plan
B. Backup plan if things go wrong
C. Holiday schedule
D. Rework of the same task
**Ans: B**

**81. You have 3 project alternatives. You rank them using a decision matrix. One scores highest in cost-efficiency, the other in reliability. What should you do?**
A. Choose the cheapest
B. Choose highest total score based on weighted criteria
C. Choose the fastest one
D. Flip a coin
**Ans: B**

**82. Your team faces resistance in implementing a new tool. According to force field analysis, what should be done?**
A. Fire them
B. Increase driving forces or reduce resisting ones
C. Delay the project
D. Remove the tool
**Ans: B**

**83. In a problem-solving meeting, someone suggests a creative but risky solution. What should you evaluate first?**
A. Their rank
B. Personal opinion
C. Feasibility and risk impact
D. Cost of lunch
**Ans: C**

**84. While assigning weights to objectives, what does a weight of 10 represent?**
A. Low importance
B. Neutral
C. Highest priority
D. Random value
**Ans: C**

**85. You planned 5 steps for a solution. Step 3 failed. What is the best next action?**
A. Restart
B. Move to Step 4
C. Analyze the failure and adjust before proceeding

D. Quit the project

**Ans: C**

## Session 2:

**1. Which of the following is NOT a primary goal of algorithm design?**

A. Efficiency

B. Complexity

C. Correctness

D. Optimization

**Ans: B**

**2. An algorithm is considered *efficient* if:**

A. It produces the correct output

B. It uses minimal resources (time/space)

C. It contains more loops

D. It is written in Java

**Ans: B**

**3. Which term describes the step-by-step instructions to solve a problem?**

A. Flowchart

B. Pseudocode

C. Algorithm

D. Blueprint

**Ans: C**

**4. What is the *first step* in designing an algorithm?**

A. Implementation

B. Testing

C. Understanding the problem

D. Optimization

**Ans: C**

**5. Which of the following is NOT a feature of a good algorithm?**

A. Clear input/output

B. Infinite loop

C. Finite steps

D. Language-independent logic

**Ans: B**

**6. Which algorithmic technique divides the problem into sub-problems, solves them independently, and combines the result?**

A. Greedy

B. Divide and Conquer

C. Dynamic Programming
D. Brute Force
**Ans: B**

**7. Which algorithm design technique is most suitable when problems have overlapping subproblems and optimal substructure?**
A. Recursion
B. Divide and Conquer
C. Dynamic Programming
D. Greedy
**Ans: C**

**8. The Greedy method makes decisions based on:**
A. Past choices
B. All possible outcomes
C. Immediate benefit
D. Memory
**Ans: C**

**9. Which technique is most appropriate for exploring all possibilities in problems like Sudoku or N-Queens?**
A. Recursion
B. Brute Force
C. Backtracking
D. Greedy
**Ans: C**

**10. Which approach is used in Kruskal's algorithm for Minimum Spanning Tree?**
A. Divide and Conquer
B. Dynamic Programming
C. Greedy
D. Backtracking
**Ans: C**

**11. Which of these is an example of a problem solved by Divide and Conquer?**
A. Quick Sort
B. Dijkstra's Algorithm
C. Prim's Algorithm
D. BFS
**Ans: A**

**12. Which of these problems is solved using Dynamic Programming?**
A. Merge Sort
B. Fractional Knapsack

C. Longest Common Subsequence
D. Bubble Sort
**Ans: C**

**13. In Greedy algorithms, global optimum is achieved by:**
A. Trying all combinations
B. Choosing local optimum at each step
C. Backtracking
D. Repeating steps
**Ans: B**

**14. Which technique stores intermediate results to avoid recalculating them?**
A. Brute Force
B. Divide and Conquer
C. Memoization
D. Greedy
**Ans: C**

**15. Which technique stores intermediate results to avoid recalculating them?**
A. Brute Force
B. Divide and Conquer
C. Memoization
D. Greedy
**Ans: C**

**16. What kind of algorithm is used in Binary Search?**
A. Greedy
B. Divide and Conquer
C. Brute Force
D. Dynamic Programming
**Ans: B**

**17. Which of the following expresses the *upper bound* of an algorithm's runtime?**
A. Ω (Omega)
B. Θ (Theta)
C. O (Big O)
D. π (Pi)
**Ans: C**

**18. Which notation represents the best-case complexity?**
A. Θ
B. O
C. Ω

D. α

**Ans: C**

**19. Which notation represents the best-case complexity?**

A. Θ

B. O

C. Ω

D. α

**Ans: C**

**20. If an algorithm runs in linear time, its complexity is:**

A. $O(n^2)$

B. O(log n)

C. O(n)

D. O(1)

**Ans: C**

**21. An algorithm with time complexity $O(n^2)$ is considered:**

A. Constant time

B. Linear time

C. Quadratic time

D. Logarithmic time

**Ans: C**

**22. Which of the following determines the efficiency of an algorithm?**

A. Number of instructions

B. Time and Space Complexity

C. Language of implementation

D. Use of comments

**Ans: B**

**23. In asymptotic analysis, we assume input size:**

A. To be very small

B. Does not matter

C. Approaches infinity

D. Fixed at 1

**Ans: C**

**24. Space complexity includes:**

A. Time to execute instructions

B. Memory needed for input only

C. Memory for input, auxiliary, and function calls

D. Size of database

**Ans: C**

**25. Which algorithm has O(n log n) time complexity in average case?**

A. Bubble Sort

B. Insertion Sort

C. Merge Sort

D. Linear Search

**Ans: C**

**26. Time complexity of Binary Search is:**

A. O(n)

B. $O(n^2)$

C. O(log n)

D. O(1)

**Ans: C**

**27. You are designing a search algorithm for millions of sorted records. Which method is best?**

A. Linear Search

B. Bubble Sort

C. Binary Search

D. Insertion Sort

**Ans: C**

**28. You are designing a search algorithm for millions of sorted records. Which method is best?**

A. Linear Search

B. Bubble Sort

C. Binary Search

D. Insertion Sort

**Ans: C**

**29. Which data structure helps optimize searching with hashing?**

A. Array

B. Hash Table

C. Queue

D. Stack

**Ans: B**

**30. What is the time complexity of accessing an element in an array by index?**

A. O(1)

B. O(n)

C. O(log n)

D. O(n log n)

**Ans: A**

**31. A recursive solution without memoization may cause:**

A. Stack overflow

B. Memory leak

C. Speed increase

D. Constant time execution

**Ans: A**

**32. Why is algorithm analysis important?**

A. Helps write longer code

B. Makes code complex

C. Determines performance on large inputs

D. Is optional for programmers

**Ans: C**

## Session 3:

**1. Which of the following algorithms uses Divide and Conquer?**

A. Bubble Sort

B. Quick Sort

C. Dijkstra's Algorithm

D. Linear Search

**Ans: B**

**2. In Merge Sort, the time complexity is:**

A. O(n)

B. O(n log n)

C. $O(n^2)$

D. O(log n)

**Ans: B**

**3. Divide and Conquer approach divides a problem into:**

A. Independent subproblems

B. Dependent subproblems

C. Random problems

D. Unsolvable parts

**Ans: A**

**4. Which of the following does NOT follow Divide and Conquer?**

A. Merge Sort

B. Binary Search

C. Linear Search

D. Quick Sort

**Ans: C**

**5. Greedy algorithms make decisions based on:**

A. Future consequences

B. Immediate benefit

C. Dynamic memory

D. Recursion depth

**Ans: B**

**6. Greedy algorithms are guaranteed to give optimal results only when the problem has:**

A. Overlapping subproblems

B. Greedy-choice property & optimal substructure

C. Cycles

D. Recursive calls

**Ans: B**

**7. Which algorithm uses a greedy approach?**

A. Floyd-Warshall

B. Huffman Encoding

C. Bellman-Ford

D. Knapsack (0/1)

**Ans: B**

**8. In Fractional Knapsack, Greedy algorithm works because:**

A. Items are indivisible

B. The items are picked randomly

C. Items can be divided, and optimal choice works at each step

D. It uses backtracking

**Ans: C**

**9. Which problem is NOT best solved using greedy technique?**

A. Minimum Spanning Tree

B. 0/1 Knapsack

C. Activity Selection

D. Dijkstra's Algorithm

**Ans: B**

**10. Dynamic Programming works best for problems with:**

A. Independent subproblems

B. Greedy properties

C. Overlapping subproblems and optimal substructure

D. Random input

**Ans: C**

**11. Which of the following is solved using dynamic programming?**

A. Insertion Sort

B. Longest Common Subsequence
C. Binary Search
D. Prim's Algorithm
**Ans: B**

**12. Fibonacci number calculation using Dynamic Programming avoids:**
A. Recursion
B. Repeated calculations
C. Greedy choices
D. Stack Overflow
**Ans: B**

**13. Memoization stores results in:**
A. CPU cache
B. A table or array
C. Compiler
D. Disk
**Ans: B**

**14. Which type of recursion does bottom-up dynamic programming avoid?**
A. Tail recursion
B. Multiple recursion
C. Forward recursion
D. Backward recursion
**Ans: B**

**15. Brute force algorithms solve problems by:**
A. Trying optimal combinations only
B. Exploring all possible solutions
C. Avoiding iteration
D. Using memory efficiently
**Ans: B**

**16. Which of the following is an example of brute force approach?**
A. Merge Sort
B. Traveling Salesman Problem (using all permutations)
C. Huffman Coding
D. Prim's Algorithm
**Ans: B**

**17. Disadvantage of brute force algorithms:**
A. Always incorrect
B. Very complex logic
C. High time complexity

D. Uses greedy logic

**Ans: C**

**18. Brute force search in string matching has time complexity:**

A. O(1)

B. O(n)

C. O(n*m)

D. O(log n)

**Ans: C**

**19. Backtracking is a form of:**

A. Brute force optimization

B. Divide and conquer

C. Memoization

D. Random search

**Ans: A**

**20. N-Queens problem can be solved using:**

A. Greedy

B. Brute Force

C. Backtracking

D. Dynamic Programming

**Ans: C**

**21. Which condition is checked in backtracking to reduce unnecessary calls?**

A. Safety/feasibility condition

B. Sorting condition

C. Recursion level

D. Random pruning

**Ans: A**

**22. Backtracking avoids exploring:**

A. Safe paths

B. Correct branches

C. Unpromising paths

D. Optimized solutions

**Ans: C**

**23. Branch and Bound is commonly used to solve:**

A. Fibonacci

B. TSP

C. Sorting

D. Searching

**Ans: B**

**24. Which of the following problems can use Branch and Bound?**

A. Graph coloring

B. 0/1 Knapsack

C. Merge Sort

D. Linear Search

**Ans: B**

**25. How does branch and bound differ from backtracking?**

A. Uses no bounding

B. Uses a bounding function to prune branches

C. Always explores all paths

D. Less efficient

**Ans: B**

**26. Which is a common strategy used in Branch and Bound to explore nodes?**

A. BFS

B. DFS

C. A* heuristic

D. Both A and C

**Ans: D**

**27. Stochastic algorithms involve:**

A. Exact results

B. Deterministic steps

C. Randomness and probability

D. Sorting only

**Ans: C**

**28. Example of stochastic algorithm:**

A. Merge Sort

B. Genetic Algorithm

C. Prim's Algorithm

D. DFS

**Ans: B**

**29. Simulated Annealing is a type of:**

A. Dynamic Programming

B. Greedy Algorithm

C. Stochastic Algorithm

D. Backtracking Algorithm

**Ans: C**

**30. Monte Carlo methods are used when:**

A. Deterministic solutions are fast

B. Problem has small input size
C. There is a need for randomness to approximate solutions
D. We want exact answers
**Ans: C**

**31. Stochastic algorithms are most useful in:**
A. Real-time sorting
B. Data transfer
C. Optimization where exact methods fail
D. Simple arithmetic
**Ans: C**

**32.Which technique is generally best for optimization problems with overlapping subproblems?**
A. Greedy
B. Brute Force
C. Dynamic Programming
D. Randomized
**Ans: C**

**33. Which technique is preferred for shortest path in unweighted graphs?**
A. DFS
B. BFS
C. Greedy
D. Brute force
**Ans: B**

**34. For solving optimization problems where the solution space is large and exact solution is hard, you should consider:**
A. Backtracking
B. Stochastic Algorithms
C. Greedy only
D. Brute force
**Ans: B**

**35. Which technique is ideal for problems where finding *any* solution is enough, not necessarily optimal?**
A. Backtracking
B. Brute Force
C. Greedy
D. Dynamic Programming
**Ans: C**

## Session 4:

**1. What does time complexity of an algorithm represent?**

A. The amount of memory used

B. Number of inputs

C. The number of basic operations as a function of input size

D. Length of the code

**Ans: C**

**2.What is the time complexity of a linear search in the worst case?**

A. O(1)

B. O(n)

C. O(log n)

D. O(n log n)

**Ans: B**

**3. What is the best-case time complexity of Binary Search?**

A. O(n)

B. O(log n)

C. O(1)

D. $O(n^2)$

**Ans: C**

**4. Which notation represents an upper bound on the time complexity?**

A. O (Big O)

B. Θ (Theta)

C. Ω (Omega)

D. π (Pi)

**Ans: A**

**5. If an algorithm has time complexity $O(n^2)$, what will happen to the time if the input doubles?**

A. Doubles

B. Quadruples

C. Remains the same

D. Halves

**Ans: B**

**6. Which of the following affects space complexity?**

A. Input size

B. Temporary variables

C. Function call stack

D. All of the above

**Ans: D**

**7. What is the space complexity of an algorithm that uses only a fixed number of variables?**

A. O(n)

B. O(1)

C. O(log n)

D. $O(n^2)$

**Ans: B**

**8. In recursive algorithms, space complexity increases due to:**

A. Loops

B. Stack frames

C. Sorting

D. Arrays

**Ans: B**

**9. Which of the following has a better space complexity?**

A. Iterative solution

B. Recursive solution

C. Greedy solution

D. Brute force

**Ans: A**

**10. What is the space complexity of Merge Sort?**

A. O(1)

B. O(log n)

C. O(n)

D. $O(n^2)$

**Ans: C**

**11. Time complexity of Insertion Sort in best case:**

A. $O(n^2)$

B. O(n)

C. O(log n)

D. O(n log n)

**Ans: B**

**12. Time complexity of Quick Sort in worst case:**

A. $O(n^2)$

B. O(n log n)

C. O(log n)

D. O(n)

**Ans: A**

**13. Which sorting algorithm always has O(n log n) time complexity?**

A. Bubble Sort

B. Merge Sort

C. Insertion Sort

D. Quick Sort

**Ans: B**

**14. Which has better average-case time complexity?**

A. Bubble Sort

B. Selection Sort

C. Merge Sort

D. Linear Search

**Ans: C**

**15. What is the time complexity of traversing a linked list of n elements?**

A. O(log n)

B. O(1)

C. O(n)

D. $O(n^2)$

**Ans: C**

**16. Which design strategy is used in Merge Sort?**

A. Greedy

B. Brute Force

C. Divide and Conquer

D. Dynamic Programming

**Ans: C**

**17. The 0/1 Knapsack problem is optimally solved using:**

A. Greedy

B. Divide and Conquer

C. Brute Force

D. Dynamic Programming

**Ans: D**

**18. In Prim's algorithm for MST, the design approach is:**

A. Greedy

B. Dynamic Programming

C. Divide and Conquer

D. Brute Force

**Ans: A**

**19. Which design technique is used in solving Fibonacci using bottom-up DP?**

A. Divide and Conquer

B. Greedy
C. Dynamic Programming
D. Recursion
**Ans: C**

**20. Which algorithm uses backtracking for solution generation?**
A. Dijkstra
B. N-Queens Problem
C. Merge Sort
D. Kruskal's Algorithm
**Ans: B**

**21. Which data structure is used for function call management in recursion?**
A. Queue
B. Stack
C. Tree
D. Array
**Ans: B**

**22. Which data structure is best for implementing BFS?**
A. Stack
B. Queue
C. Array
D. Graph
**Ans: B**

**23. Which data structure supports Last-In-First-Out (LIFO)?**
A. Queue
B. Tree
C. Stack
D. Heap
**Ans: C**

**24. Which data structure is best suited for implementing priority queues?**
A. Stack
B. Array
C. Hash Map
D. Heap
**Ans: D**

**25. Which data structure provides average-case O(1) time for insert, delete and search?**
A. Hash Table
B. Array
C. Linked List

D. Queue

**Ans: A**

**26. Which data structure is used in backtracking?**

A. Queue

B. Stack

C. Tree

D. Heap

**Ans: B**

**27. Which data structure is used for undo operations?**

A. Tree

B. Stack

C. Queue

D. Graph

**Ans: B**

**28. Graphs are used to represent:**

A. Networks

B. Trees

C. Arrays

D. All of the above

**Ans: A**

**29. Which data structure is used to implement DFS?**

A. Queue

B. Stack

C. Tree

D. Hash Table

**Ans: B**

**30. Which structure is used to find the shortest path in weighted graphs?**

A. Stack

B. Dijkstra's algorithm with Priority Queue

C. BFS only

D. Brute force traversal

**Ans: B**

## Session 5 & 6:

**1. An algorithm must have the following properties except:**

A. Finiteness

B. Ambiguity

C. Input

D. Definiteness

**Ans: B**

**2. Which of the following is an algorithm construct?**

A. Sequence

B. Selection

C. Iteration

D. All of the above

**Ans: D**

**3. What is an Abstract Data Type (ADT)?**

A. A concrete implementation

B. An interface for data structures

C. A type of compiler

D. An algorithm

**Ans: B**

**4. An ADT defines:**

A. How data is stored

B. What operations are supported

C. Implementation logic

D. Compiler rules

**Ans: B**

**5. Which of the following is NOT a feature of object-oriented design?**

A. Encapsulation

B. Inheritance

C. Polymorphism

D. Compilation

**Ans: D**

**6. Which of the following best represents an ADT?**

A. Stack

B. Algorithm

C. Recursion

D. Header file

**Ans: A**

**7. Which of the following is true for arrays in C/C++?**

A. Index starts at 1

B. Memory allocation is dynamic by default

C. Index starts at 0

D. It is a linked list

**Ans: C**

**8. Time complexity for accessing an array element is:**

A. O(n)

B. O(1)

C. O(log n)

D. $O(n^2)$

**Ans: B**

**9. What is the drawback of arrays?**

A. Fixed size

B. Easy to access

C. Uses pointers

D. Slow access time

**Ans: A**

**10. Which operation is expensive in an array?**

A. Access

B. Update

C. Insertion at the beginning

D. Traversal

**Ans: C**

**11. Stacks follow which order?**

A. FIFO

B. LIFO

C. Random

D. FILO

**Ans: B**

**12. Which operation is used to insert in a stack?**

A. Enqueue

B. Push

C. Add

D. Append

**Ans: B**

**13. Which operation removes the top element in a stack?**

A. Pop

B. Delete

C. Remove

D. Top

**Ans: A**

**14. What is the time complexity of push and pop?**

A. O(n)

B. O(n log n)
C. O(1)
D. O(log n)
**Ans: C**

**15. Queues follow which order?**
A. LIFO
B. FILO
C. FIFO
D. Random
**Ans: C**

**16. Which operation is used to insert in a queue?**
A. Pop
B. Enqueue
C. Push
D. Add
**Ans: B**

**17. What does Dequeue mean in queue context?**
A. Insert at end
B. Remove from front
C. Peek
D. Reset the queue
**Ans: B**

**18. Queues are used in:**
A. Recursion
B. CPU scheduling
C. Expression evaluation
D. Backtracking
**Ans: B**

**19. Circular Queue overcomes the drawback of:**
A. Stack overflow
B. Queue overflow due to unused space
C. Recursion
D. Memory leak
**Ans: B**

**20. In a circular queue, rear == front condition means:**
A. Queue is empty
B. Queue is full
C. Queue has one element

D. Invalid state

**Ans: B**

**21. What is the initial value of front and rear in a circular queue?**

A. -1

B. 0

C. 1

D. NULL

**Ans: A**

**22. In a priority queue:**

A. Elements are processed in FIFO

B. Elements are processed based on priority

C. Elements are sorted

D. All elements are treated equally

**Ans: B**

**23. Which data structure is most suitable for priority queues?**

A. Stack

B. Linked List

C. Heap

D. Array

**Ans: C**

**24. Which application uses priority queues?**

A. Recursion

B. BFS traversal

C. Dijkstra's algorithm

D. Tree Traversal

**Ans: C**

**25. Deque stands for:**

A. Data Queue

B. Double Queue

C. Double Ended Queue

D. Directed Queue

**Ans: C**

**26. In a deque, insertion and deletion are allowed at:**

A. Front only

B. Rear only

C. Both ends

D. Middle

**Ans: C**

**27. Deque can be used to implement:**

A. Stack

B. Queue

C. Both stack and queue

D. None

**Ans: C**

**28. Which of the following deque types allows insertion at one end and deletion at both?**

A. Input-restricted deque

B. Output-restricted deque

C. Linear queue

D. Priority queue

**Ans: A**

**29. Which data structure is best for undo operations?**

A. Queue

B. Stack

C. Array

D. Tree

**Ans: B**

**30. Which structure is commonly used in breadth-first search?**

A. Stack

B. Queue

C. Deque

D. Heap

**Ans: B**