Perfect 👍

Below is **ALL 40 QUESTIONS**, written in a **clean exam-style format** with:

- ✅ **Question**
- 🔹 **All Options**
- ✔️ **Correct Answer**
- 🧠 **Clear, short explanation** (easy to remember in exam)

📘 DATA STRUCTURES – MCQs WITH EXPLANATIONS

Question 1

Which sorting algorithm gives best performance when the array is already or almost sorted?

Options:

A. Quick Sort

B. Heap Sort

C. Merge Sort

D. Insertion Sort ✅

Explanation:

Insertion Sort performs very few shifts when the array is nearly sorted.

Best case time complexity = **O(n)**.

Question 2

What is the best-case time complexity of Bubble Sort?

Options:

A. $O(n^2)$

B. O(n log n)

C. O(n) ✅

D. $O(n (\log n)^2)$

Explanation:

With optimization, Bubble Sort stops after one pass if no swaps occur.

Question 3

If swap operation is very costly, which sorting algorithm is preferred?

Options:

A. Heap Sort

B. Selection Sort ✅

C. Insertion Sort

D. Merge Sort

Explanation:

Selection Sort performs **minimum swaps (n−1)**.

Question 4

Which algorithm design technique is used in Quick Sort?

Options:

A. Greedy Method

B. Backtracking

C. Dynamic Programming

D. Divide and Conquer ✅

Explanation:

Quick Sort divides the problem using a pivot and solves subproblems recursively.

Question 5

Selection Sort algorithm design technique is an example of:

Options:

A. Greedy Method ✅

B. Divide and Conquer

C. Dynamic Programming

D. Backtracking

Explanation:

It greedily selects the smallest element at every step.

Question 6

Evaluate the postfix expression: `539*74-/+62*-`

Options:

A. 16

B. 2 ✅

C. -7

D. 3

Explanation:

Postfix expressions are evaluated using a **stack** by applying operators after operands.

Question 7

Time complexity of push and pop operations in stack using linked list?

Options:

A. O(1) insertion, O(n) deletion

B. O(1) insertion, O(1) deletion ✅

C. O(n) insertion, O(1) deletion

D. O(n) insertion, O(n) deletion

Explanation:

Insertion and deletion occur at the head → constant time.

Question 8

Two stacks are implemented in one array. Which condition indicates stack full?

Options:

A. Only I is true ✅

B. Only II is true

C. Both I and II

D. Both false

Explanation:

Stack is full when `top1 = top2 - 1`.

Question 9

Which data structure is used to check balanced parentheses?

Options:

A. Queue

B. List

C. Tree

D. Stack ✅

Explanation:

Stack follows LIFO, perfect for matching brackets.

Question 10

Which is a disadvantage of arrays?

Options:

A. Efficient storage

B. Random access

C. Insertion and deletion are difficult ✅

D. Contiguous memory allocation

Explanation:

Elements must be shifted during insertion/deletion.

Question 11

Which are applications of Queue?

Options:

A. Printer spooling

B. Router buffering

C. Expression evaluation

D. All of the above

E. Both A and B ✅

Explanation:

Queue is used where **FIFO** order is required.

Question 12

Which statement is true about linked-list implementation of queue?

Options:

A. Insert front, delete end

B. Insert end, delete front

C. Used in LRU and Quick Sort

D. All of the above ✅

Explanation:

Queue operations depend on insertion and deletion ends.

Question 13

What does the given function print?

Options:

A. 0 to n−1

B. n−1 to 0

C. First n Fibonacci numbers ✅

D. Fibonacci in reverse

Explanation:

The queue logic generates Fibonacci numbers.

Question 14

Which ADT allows insertion and deletion at both ends?

Options:

A. Double Ended Queue

B. Deck

C. Deque

D. Only A

E. Both A and C ✅

Explanation:

Deque = Double Ended Queue.

Question 15

Queue full condition for circular queue (array)?

Options:

A. rear == SIZE

B. rear == SIZE−1

C. (rear+1)%size == front ✅

D. None

Explanation:

Modulo arithmetic handles circular nature.

Question 16

Which statements are true about Complete Binary Tree?

Options:

A. Only I

B. Only II

C. Both I and II ✅

D. None

Explanation:

Complete binary tree fills levels left to right.

Question 17

Application of Graph Data Structure?

Options:

A. Circuit simulation

B. Path optimization

C. Scientific computation

D. All of the above ✅

Explanation:

Graphs model real-world relationships.

Question 18

Binary tree where each non-leaf has two children is called:

Options:

A. Strictly Binary Tree ✅

B. Complete Binary Tree

C. Full Binary Tree

D. Skewed Tree

Explanation:

Every internal node has exactly two children.

Question 19

Inorder traversal of a BST gives:

Options:

A. Random order

B. Reverse order

C. Sorted order ✅

D. Level order

Explanation:

BST property + inorder = sorted sequence.

Question 20

Sum of degrees of undirected graph with 7 edges?

Options:

A. 7

B. 5

C. 10

D. 14 ✅

Explanation:

Sum of degrees = **2 × edges**.

Question 21

Number of zeros in adjacency matrix (given graph)?

Options:

A. 10 ✅

B. 6

C. 16

D. 0

Explanation:

Zeros represent absence of edges.

Question 22

Number of undirected graphs with n vertices?

Options:

A. n(n−1)/2

B. 2^n

C. n!

D. 2^(n(n−1)/2) ✅

Explanation:

Each edge can be present or absent.

Question 23

Correct statement about flowchart and pseudocode?

Options:

A. Flowchart is text

B. Pseudocode is diagram

C. Flowchart is diagram, pseudocode is textual ✅

D. Same thing

Question 24

Advantage of linked list over array?

Options:

A. Easy insertion/deletion ✅

B. Fixed size

C. Extra memory

D. Random access

Question 25

Correct hash function statements?

Options:

A. Only I

B. II and III

C. I and III ✅

D. Only II

Question 26

Correct about Bellman-Ford?

Options:

A. Only I

B. I and II

C. Only II ✅

D. None

Explanation:

Detects negative cycle **reachable from source**.

Question 27

Merge Sort works because:

Options:

A. Both inefficient

B. Both efficient ✅

C. Only sorting efficient

D. Only merging efficient

Question 28

Pointers modified to insert at front of singly linked list?

Options:

A. 1

B. 2 ✅

C. 3

D. 4

Question 29

Dijkstra's Algorithm cannot be applied on:

Options:

A. Directed weighted graph

B. Negative weight graph ✅

C. Unweighted graph

D. Undirected graph

Question 30

Worst-case traversal of doubly linked list?

Options:

A. O(1)

B. O(log n)

C. O(n) ✅

D. O(n log n)

Question 31

Worst-case comparisons in singly linked list search?

Options:

A. log n

B. n ✅

C. n/2

D. None

Question 32

Advantage of circular linked list?

Options:

A. Traverse from any node

B. Used in Fibonacci Heap

C. Only A ✅

D. Both A and B

Question 33

Time complexity to search in linked list of length n?

Options:

A. O(log n)

B. O(n) ✅

C. O(1)

D. $O(n^2)$

Question 34

Is it possible to insert before a node in singly linked list?

Options:

A. Not possible

B. Traverse twice

C. Yes, by pointer manipulation ✅

D. Both B and C

Question 35

Suitable data structure for priority queue?

Options:

A. Graph

B. Heap

C. Linked List

D. Both B and C ✅

Question 36

Correct code to count nodes in circular linked list?

Options:

A. do–while till head ✅

B. while NULL

C. while head

D. do–while NULL

Question 37

Applications of linked list?

Options:

A. Navigation

B. Stack/Queue

C. Hash tables

D. All of the above ✅

Question 38

Asymptotic notation for lower bound?

Options:

A. Big-O

B. Big-Omega (Ω) ✅

C. Big-Theta

D. None

Question 39

Prim’s algorithm is a:

Options:

A. Divide & Conquer

B. Greedy algorithm ✅

C. Dynamic Programming

D. Approximation

Question 40

AVL tree rotation after inserting 70?

Options:

A. Right then Left rotation ✅

B. Left then Right

C. Two Left

D. Two Right

✅ END

If you want next:

- 📄 **PDF with clean formatting**
- 🧠 **Ultra-short revision sheet**
- 🎯 **Only tricky MCQs**
- 📚 **Topic-wise DS notes**

Just tell me 👍