Data Structure and Algorithms

Paper code –PCC-CS-301

3rd Semester CSE

1. *What is Abstract Data type? What are the operations of ADT? Give an example.
2. What are sparse matrices? How is it represented in memory? What are the types of sparse matrices?
3. *Let the size of the elements stored in an 8 x 3 matrix be 4 bytes each. If the base address of the matrix is 3500, then find the address of A [5, 2] for both row major & column major cases.
4. **What is stack? Why it is called LIFO? What is top of the stack? What are the conditions for stack underflow & stack overflow? Why stack is called ADT?
5. **What is queue? Why queue is called FIFO?
6. **Disadvantage of Linear Queue. How it is solved.
7. ***Write short notes on Priority Queue.
8. Difference: Linear and Non-Linear DS.
9. Define an algorithm. What are the properties of an algorithm?
10. What are the applications of stacks, Queue?
11. *Difference between array & linked list.
12. What is recursion tree? Write down the recursive definition for generation of the Fibonacci sequence.
13. **Write the difference between recursion & iteration. State the advantages and disadvantages of both the types.
14. **What is recursion? Explain with an example. Explain: - "Recursion is worse than Iteration".
15. What is self –referential structure? Explain with an example.
16. **Can we do a Binary search on a linked list? Give reason to your answer.
17. If you implement stack or queue using linked list, then what is the full conditions?
18. Why heap tree is represented with array?
19. The height of a binary tree is the maximum number of edges in any root to leaf path. What is the maximum number of nodes in a binary tree of height h?
20. *Write the recursive definition of Tower of Hanoi.
21. *What is threaded binary tree? Write the memory representations of threaded binary tree.
22. Write short notes on the following:
    AVL Tree.
    B+ Tree.
    B* Tree.
    BST.
    Threaded Binary Tree.
    Expression Tree
23. What is the difference between Linear & Binary Search? *What is the prerequisite for binary search? What are the advantages of binary search over linear search?
24. *"Binary search technique can't be implemented using linked list" .Justify.
25. **What is heap? Define max and min heap. Explain with an example how to construct a heap (show both types).
26. *Define Big-O, Ω, Θ notation.
27. What is a complete graph? Show that the sum of degree of all the vertices in a graph is always even.
28. **Complexity:
    - Linked List operations
    - Sorting all

- Searching all

29. ***Explain with suitable example the collision resolution scheme using linear probing with open addressing.
30. **Linked List:
    - Insert after/before/position (SLL)
    - Delete any (SLL)
    - Reverse(SLL)
31. Queue and stack basic algorithm with full and empty conditions.
32. **heap sort basic , quick sort technique, merge technique (Theory).
33. **Insertion Sort.

*******Problem type questions all need to practice. Like Tree formation of BST, AVL, B-TREE. BFS, Heap, DFS, Minimum cost spanning tree, Array address calculations, infix to postfix, infix to prefix, Hash function mapping.**