B.Sc. (Data Science) II Sem.

Data Structures and Algorithms

Important Topics

Unit-I:

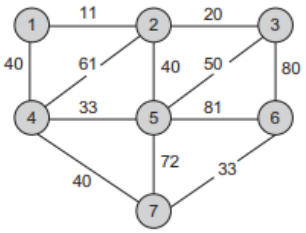
1. Define Data Structure. What are the types of Data Structures?
2. What is Algorithm and Pseudocode?
3. Define Stack. Explain Stack operations with an example.
4. Write a Python program for Stack using array.
5. Explain Arithmetic Expression evaluation with an example.
6. Define Recursion with an example.

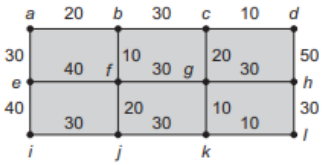
Unit-II:

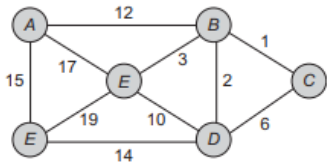
7. Compare Recursion vs Iteration
8. Define Queue. Explain Queue operations with an example.
9. Write a Python program for Queue using array.
10. Compare Double-Ended Queue vs Circular Queue.
11. Define Linked List. Explain its types.
12. Explain various Linked List operations.

Unit-III:

13. Explain various terms of Tree.
14. Define Binary Tree. Explain pre-order, in-order and post-order of Tree traversal.
15. Explain various terms of Graph
16. Graph Traversal – (a) Depth First Search (DFS) (b) Breadth First Search (BFS)
17. Minimum Spanning Tree – (a) Prim's Algorithm (b) Kruskal's Algorithm.
    Solve the below Graphs using Prim's and Kruskal's Algorithms.







18. Define Hash Function with an example.
19. Collision Resolution Strategies in Heap – (a) Linear Probing (b) Quadratic Probing

Unit-IV:

20. Sorting Techniques (Internal Sorting – (a),(b),(c),(d) & External Sorting-(e))
    (a) Bubble Sort (b) Selection Sort (c) Insertion Sort (d) Quick Sort (e) Merge Sort
21. Write Python programs for Q.20
22. Sort the following list for Q.20
    (a) 76,67,36,55,23,14,6
    (b) 25,57,48,37,12,92,86,33
    (c) 3,1,4,1,5,9,2,6,5,4
    (d) 7,23,31,40,56,78,9,2
23. Compare all sorting algorithms.
24. Explain AVL Tree with an example.
25. Define Heap. Explain Min-Heap and Max-Heap.
26. Explain Heap Sort with an example.