Progressive Education Society's

Modern College of Engineering

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

F.Y MCA (2024 Pattern) (Semester – I)

Data Structures and Algorithms (MCA01503)

Practice Questions-Unit1 & Unit2

Unit1

1. List the types of data structures
2. Apply array implementation to represent and add two polynomials.
3. Define space complexity & time complexity.
4. Apply the array representation to implement a sparse matrix
5. List the characteristics of a good Algorithm.
6. Solve the problem of reversing a number by writing an appropriate pseudocode.
7. Construct the sparse matrix for given 5×5matrix by showing the steps also perform the transpose.

$$\begin{bmatrix} 0 & 0 & 3 & 0 & 0 \\ 0 & 0 & 0 & 0 & 7 \\ 0 & 8 & 0 & 0 & 0 \\ 6 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 \end{bmatrix}$$

8. What is an Abstract Data Type (ADT)?
9. Write a function to traverse a linked list and print its elements
10. Differentiate between primitive and non-primitive data structures. Provide examples for each category.
11. Analyze time and space complexity for linear search and binary search also calculate performance efficiency.
12. Identify the difference between primitive and non-primitive data structures
13. Describe how a flowchart helps in algorithm development.
14. Differentiate between static and dynamic data structures with examples.
15. Draw a flowchart to find the largest of three numbers.
16. Write a pseudocode to compute the factorial of a number.
17. Develop an algorithm to search an element in a linked list.
18. Implement polynomial addition using arrays.
19. Write pseudocode to compute the transpose of a sparse matrix.
20. Explain the concept of sparse matrix representation using an example.

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Practice Questions-Unit1 & Unit2

Unit 2

1. Explain Doubly linked list data structure with suitable diagram.
2. Build Pseudocode to delete last node from Singly Linked List with suitable diagram
3. Apply search operation to find a specific node in a linked list.
4. Compare Array & Linked List data structures.
5. Build Pseudocode to delete 3rd node from Singly Linked List with suitable diagram.
6. Apply traversal to display all elements of a linked List.
7. Explain Singly linked list data structure with suitable diagram.
8. Build Pseudocode to delete first node from Singly Linked List with suitable diagram.
9. Apply Count operation to count total no of nodes in Singly Linked List.
10. List the basic operations performed on a linked list.
11. Identify the difference between a singly and doubly linked list.
12. Explain how nodes are added and deleted in a linked list.
13. Develop an algorithm to insert a new node at the beginning of a linked list.
14. Implement a function to delete a node by value from a singly linked list.
15. Implement polynomial addition using linked list representation.
16. Write an algorithm to add a node at the end of a doubly linked list.
17. Examine the advantages and disadvantages of circular linked lists compared to linear linked lists.
18. Write a C program to create a singly linked list and display its nodes.
19. Explain the advantages of using linked lists over arrays.
20. Describe the role of prev and next pointers in a doubly linked list.

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