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**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**THIRD SEMESTER INTEGRATED MCA DEGREE EXAMINATION (S), FEBRUARY 2024  
(2020 SCHEME)****Course Code: 20IMCAT209****Course Name: Data Structures****Max. Marks: 60****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Define the term ADT with an example.
2. How is performance analysis done for an algorithm?
3. Explain the method for determining an element's address in an array with an example.
4. Describe any two popular searching methods in data structure with an example.
5. Write down short notes on:
  - i) Circular linked list.
  - ii) Doubly linked list.
6. What are the differences between an array and a linked list?
7. What is a circular queue? Give an example.
8. Describe the algorithm for evaluating postfix expression.
9. Explain the concept of binary tree with suitable diagram.
10. What do you mean by AVL tree?

**PART B*****(Answer one full question from each module, each question carries 6 marks)*****MODULE I**

11. Explain the asymptotic notations used while analyzing an algorithm. (6)

**OR**

12. Differentiate
  - i) Linear and non-linear data structures. (6)
  - ii) Static and dynamic data structure implementations

**MODULE II**

13. Explain any two sorting techniques with algorithm and example. (6)

**OR**

14. a) Describe the memory representations for a two-dimensional array. (3)  
b) With a suitable example write down the methods for calculating address of a two-dimensional array. (3)

**MODULE III**

15. a) What is a linked list? (2)  
b) Write algorithms to  
i) Delete an element. ii) Count the number of elements in a singly linked list. (4)

**OR**

16. Write an algorithm for inserting elements in a circular linked list  
i) At the beginning. (6)  
ii) At the end.  
iii) At a specified position.

**MODULE IV**

17. Describe static and dynamic implementation of stack. (6)

**OR**

18. Write down the algorithm for converting Infix expression into Postfix expression with an example. (6)

**MODULE V**

19. Write short note on  
i. BFS (6)  
ii. DFS

**OR**

20. With an example, describe the inorder, preorder, and postorder traversal operations on a binary tree. (6)

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