SARASWATHI NARAYANAN COLLEGE
(Autonomous Institution Affiliated to Madurai Kamaraj University)
(Reaccredited with Grade 'B' by NAAC)
Madurai – 625 022.
B.Sc. Computer Science –Summative Examinations
Code: LUCSCT22 **Semester: II**
DATA STRUCTURES AND ALGORITHMS
Duration: 3 Hrs. **Max: 75 Marks**

SECTION – A **5 x 1 = 5**

Answer ALL questions. Choose the correct answer.

1. Data structure is _____. (K2)
   a) A way to store and organize data
   b) A programming language
   c) An algorithm
   d) A user interface
2. What is the purpose of a queue? (K2)
   a) To store data randomly
   b) To store data in a sorted manner
   c) To implement Last-In-First-Out (LIFO) behavior
   d) To implement First-In-First-Out (FIFO) behavior
3. In a doubly linked list, each node has pointers to: (K2)
   a) Only the next node.
   b) Only the previous node.
   c) Both the next and previous nodes.
   d) Neither next nor previous nodes.
4. What is a binary tree? (K2)
   a) A tree with three child nodes per parent.
   b) A tree with two child nodes per parent.
   c) A tree with no child nodes.
   d) A tree with variable child nodes.
5. In binary search, what is the key assumption about the input data? (K2)
   a) Data must be in random order.
   b) Data must be sorted.
   c) Data must be in reverse order.
   d) Data must be unsorted.

II. Fill in the blanks **5 x 1 = 5**

6. An Abstract Data Type (ADT) is a conceptual model defining a set of operations on _____. (K1)
7. _____ operation is used to add an element to a queue. (K1)
8. _____ type of linked list allows traversal only in one direction. (K1)
9. _____ is a node has no left or right child. (K1)
10. _____ is a sequential search algorithm. (K1)

SECTION-B **5 x 2 = 10**

Answer all the questions.

11. Explain the Last In First Out (LIFO) principle used in Stack. (K2)
12. What is the primary purpose of using a circular queue? (K3)
13. Explain the concept of a linked list. (K2)
14. Describe the structure of a binary tree. (K4)
15. Analyze the linear search algorithm. (K5)

SECTION – C **5 x 5=25**

Answer all questions choosing either (a) or (b) in about 2 pages in each.

16. a) Explain the implementation of a stack using an array. (K3)

(Or)

b) Explore applications of stacks in computer science. (K3)

17. a) Explain how the implementation of a queue using a linked list differs from an array-based queue. (K2)

(Or)

17. b) Discuss a real-world scenario where a queue data structure is a crucial component. Describe the key features of the queue that make it suitable for the given scenario. (K2)
18. a) Give the advantages and disadvantages of singly linked list. (K4)

(Or)

b) Explore the applications of linked lists. (K4)

19. a) Describe the process of inserting a new node into a binary tree. (K2)

(Or)

b) Explain the concept of threaded binary trees. (K2)

20. a) Describe the binary search algorithm. (K5)

(Or)

b) Discuss the bubble sort algorithm. (K5)

SECTION – D **3 x 10 = 30**

Answer any THREE questions in about 4 pages in each.

21. Describe the implementation of a stack using a linked list with illustration. (K3)
22. Discuss the applications of queues in computer systems, emphasizing their role in job scheduling and print spooling. (K5)
23. Describe a real-world scenario where a circular linked list is a suitable choice. (K2)
24. What are the different methods of traversing a binary tree. Discuss. (K1)
25. Explain about the divide and conquer strategy applied for merge sort. Discuss the advantages of merge sort over other sorting algorithms. (K5)