

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022
COMPUTER SCIENCE AND ENGINEERING
(2020 SCHEME)**

Course Code : 20CST201

Course Name: Data Structures

Max. Marks : 100

Duration: 3 Hours

PART A*(Answer all questions. Each question carries 3 marks)*

1. What are the properties that an algorithm should have?
2. How the performance of an algorithm is evaluated?
3. Differentiate between queue and circular queue.
4. Convert the given infix expression to prefix expression.
 $(A + B) * C - (D - E) * (F + G)$
5. What is dynamic memory allocation? List any two advantages of dynamic memory allocation.
6. Write the algorithm for best-fit allocation.
7. What is binary tree? How a binary tree is represented using an array?
8. Explain any two applications of graphs.
9. Define Maxheap.
10. What is hashing? Explain any two hash functions with examples.

PART B*(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. a) Write the algorithm for linear search and analyze its best case and worst case complexity. (8)
- b) Explain different asymptotic notations used to describe the running time of an algorithm. (6)

OR

12. a) Explain system life cycle in detail. (10)
- b) Find the time complexity of finding the maximum value from an unsorted array of n values. (4)

MODULE II

13. a) Write an algorithm to convert infix expression to postfix. Trace the algorithm for the expression.
 $((A + B) * (C - D) + E) / (F + G)$ (10)

- b) Explain the triplet representation of sparse matrix with an example. (4)

OR

14. a) Write an algorithm to implement insertion and deletion operations on a queue using array. Give an example. (10)
b) Compare linear search and binary search algorithms. (4)

MODULE III

15. a) How doubly linked list can be used to find palindromes? Explain the algorithm with an example. (10)
b) Explain self-referential structures with example. (4)

OR

16. a) Write an algorithm to implement stack using linked list. Give an example. (10)
b) Compare array and linked list. (4)

MODULE IV

17. a) Explain Binary Search Tree. Create a Binary Search Tree using the following data entered sequentially and perform the three traversal on the tree. (10)
10, 5, 14, 7, 12, 18, 15, 13
b) Explain Full binary tree and Complete binary tree with examples. (4)

OR

18. a) Write algorithms for DFS and BFS traversal on a graph. Explain with an example. (10)
b) Give two representations of graphs. (4)

MODULE V

19. a) Write an algorithm for Quick sort. Trace the working of the algorithm on the given input 36, 7, 2, 29, 46, 66, 42. (10)
b) What is open hashing? How is it used to resolve collisions in a hash table? (4)

OR

20. a) Given the values {2341, 4234, 2839, 430, 22, 397, 3920} a hash table of size 7 and a hash function $h(x) = x \text{ mod } 7$, show the resulting table after inserting the values in the given order with each of the following collision strategies. (10)
(i) separate chaining
(ii) linear probing
(iii) double hashing with second hash function $h_1(x) = (2x - 1) \text{ mod } 7$.
b) Write the algorithm for insertion sort. (4)
