Register No.: ……………………………… Name: ………………………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (S), MAY 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. Between O(n log n) and O(log n) which one is better and why?
2. Write an algorithm for swapping two values.
3. Convert the expression((A/(B-D+E))*(F-G)*H) to postfix form.
4. Given an array int marks [] = {99,67,78,56,88,90,34,85}, calculate the address of marks [4] if the base address = 1000.
5. Compare singly linked list and doubly linked list.
6. Write an algorithm to count the number of occurrences of a character in a linked list
7. Differentiate binary tree and binary search tree.
8. Write an iterative algorithm to perform in-order traversal of a binary tree.
9. Differentiate between min-heap and max-heap.
10. List out any two advantages and disadvantages of separate chaining.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Adapting Big O Notation Show that

    (i) $4n^2 = O(n^3)$. (6)

    (ii) $10n^3 + 20n \neq O(n^2)$.

    b) Write a brief note on System life cycle and discuss all the phases of life cycle. (8)

OR

12. a) (i) Find the complexity of the below function: (8)

```
function(int n) {
    for (int i = 0; i<n; i++)
        for(int j=i; j<i*i; j++)
            if (j %i == 0){
                for (int k = 0; k < j; k++)
                    printf(" * ");
            }

}
```

(ii) Find upper bound for $f(n) = 3n + 8$

b) Discuss the best case, worst case, average case, time complexity of an algorithm. (6)

MODULE II

13. a) Discuss an algorithm to convert an infix expression to prefix expression with an example. (8)

b) List out various operation involved in Double ended queue. (6)

OR

14. a) Distinguish between linear search and binary search. Using the linear search and binary search algorithms search the element 42 from the given set of elements - 12,23,27,35,39,42,50. (9)

b) Write an algorithm to insert and delete elements from a Priority Queue (5)

MODULE III

15. a) Write an algorithm to multiply two polynomials represented using linked list. (9)

b) How doubly linked list can be used to find palindromes? (5)

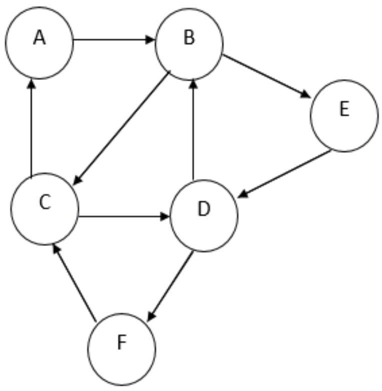
OR

16. a) Design an algorithm to perform deletion on doubly linked list. (5)

b) Given five memory partitions of 100Kb, 500Kb, 200Kb, 600Kb (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb, and 426 Kb (in order)? (9)

MODULE IV

17. a) Define Graph. Represent the given graph using the adjacency matrix and Adjacency list. (8)



b) Perform depth-first search and breadth-first search traversal using graph given in question 17.a (6)

OR

18. a) Write the algorithm and construct the binary search tree by inserting the following elements 66,40,90,50,30,75,110,120,100,80,70,55,45,35 and 20. (8)

b) Consider the binary search tree constructed above(Question 18.a). Perform in-order, pre-order and post-order traversals. (6)

MODULE V

19. a) Write an algorithm to implement Insertion sort with suitable example. (6)

    b) Explain merge sort algorithm with an example. Mention the best case and worst case time complexity. (8)

OR

20. a) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989) and a hash function h(x)= x(mod 10), show the resulting,

    (i) Separate chaining hash table.

    (ii) Hash table using linear probing. (10)

    (iii) Hash table using quadratic probing.

    (iv) Hash table with second hash function h2 (x) = 7 − (x mod 7).

    (v) Closed hash table using linear probing.

    b) Define Hashing and list out few hash functions. (4)

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