

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE)/S1 (PT)(S) June 2024 (2019 Scheme)/S3 (WP)(R) December 2023 Examination

**Course Code: CST201****Course Name: DATA STRUCTURES**

Max. Marks: 100

Duration: 3 Hours

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

Marks

- | | | |
|----|---|-----|
| 1 | Explain various aspects in the verification phase of system life cycle | (3) |
| 2 | Can you say the Big-oh notation for the function $f(n) = 3n^3 + 2n^2 + 5n + 25$ is n^3 .
Justify your answer | (3) |
| 3 | Compare stack and queue | (3) |
| 4 | Show the steps involved in evaluating the postfix expression $5\ 2\ 3\ -\ -\ 2/$ | (3) |
| 5 | Write an algorithm to insert an element at the end of circular linked list. | (3) |
| 6 | Compare first fit, next fit and best fit memory allocation schemes | (3) |
| 7 | Differentiate binary tree and Binary Search Tree | (3) |
| 8 | Explain adjacency matrix representation of Graph with an example | (3) |
| 9 | What do you mean by heap? Give an example | (3) |
| 10 | What do you mean by linear probing? Explain with an example | (3) |

PART B*Answer any one full question from each module. Each question carries 14 marks***Module 1**

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|----|---|---|-----|
| 11 | a | Write Linear search algorithm and explain average, best and worst case complexities based on it. | (9) |
| | b | Derive Big-O notation for the function $f(n) = 5n^3 + 2n + 6$ | (5) |
| 12 | a | Write an algorithm to find the sum of two matrices and calculate its time complexity using frequency counting method. | (7) |
| | b | Explain various phases in system life cycle | (7) |

Module 2

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|----|---|---|-----|
| 13 | a | What do you mean sparse matrix? Write an algorithm to represent sparse matrix.
Give example. | (7) |
| | b | Write and illustrate postfix evaluation algorithm | (7) |

- 14 a What do you mean by dequeue ? Write algorithms to insert and delete element from circular queue (7)
- b Write and illustrate binary search algorithm (7)

Module 3

- 15 a Write an algorithm to add two polynomials represented by linked list and illustrate with an example (8)
- b Explain first-fit, best-fit, and worst-fit algorithms with an example (6)
- 16 a Write algorithms for any two insert and delete operations on circular linked list (8)
- b Write an algorithm to copy values from one linked list to another. Explain with the help of examples.. (6)

Module 4

- 17 a Write an algorithm to insert an element in a BST. Illustrate this algorithm on the set of elements : 12, 45, 3, 32, 7, 43, 26. (8)
- b Write and explain recursive pre-order, in-order and post-order tree traversal algorithms (6)
- 18 a Write and illustrate DFS and BFS on a graph (10)
- b Explain the following terminologies used in Graph (4)
1. Isolated vertex
 2. Pendent Vertex
 3. Cyclic Graph
 4. Connected Graph

Module 5

- 19 Write and illustrate Heap sort algorithm (10)
- Illustrate selection sort on the set of elements 12, 34, 6, 7, 21, 56 (4)
- 20 a What do you mean by hash collision? How does it can be solved ? (7)
- b Given the input keys = { 5, 13, 2, 6, 4, 8, 56 } and a hash function $h(X) = X \bmod$ table size. The initial table contain 10 slot with starting index 0. Show the resulting table after rehashing when the **load factor is .5**, using linear probing. (7)