

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE) (FT/WP/SIPT) Examinations May/June 2026 (2019 Scheme)



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 What are the different criteria that an algorithm should satisfy? (3)
- 2 Derive the Big-O notation for $f(n) = 4n^2 + 6n + 9$. (3)
- 3 Write enqueue and dequeue operations on queue. (3)
- 4 What is row major tuple representation of Sparse Matrix? Explain with an example. (3)
- 5 Write algorithm to find largest data node in a singly linked list. (3)
- 6 Explain dynamic memory allocation and list its advantages. (3)
- 7 Create a Binary Search Tree for the following values 69, 24, 86, 19, 115, 9, 85, 25, 87, 35, 29 (3)
- 8 Explain applications of graph with example. (3)
- 9 Write an algorithm to sort a set of numbers using selection sort (3)
- 10 What is hashing? List any two applications of hashing. (3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

- 11 a) Explain the System life cycle in detail. (8)
- b) What is time Complexity? Calculate the time complexity using frequency count of each statement in the following code segment: (6)
for ($i = 0; i < n; i++$)
 for ($j = 0; j < n; j++$)
 $x = x + 1;$
- 12 a) Explain the different criteria to measure the performance analysis of algorithms. (8)
- b) Explain various asymptotic notations used in the analysis of algorithms. (6)

Module 2

- 13 a) Discuss an algorithm to evaluate postfix expression with example. (8)

- b) Convert infix expression $P*(Q+R)/S$ to postfix notation. Write algorithm and step-by-step conversion using the stack. (6)
- 14 a) Explain the data structure Stack in detail with following operations isfull(), isEmpty(), Push(), Pop(), Display(), (8)
- b) Write algorithms to insert and delete elements from a circular Queue (6)

Module 3

- 15 a) Write an algorithm to insert a node in the beginning and end of a doubly linked list. Demonstrate with an example. (8)
- b) Explain the advantages and disadvantages of First-fit and Best-fit memory allocation schemes (6)
- 16 a) How can a linked list used to represent the polynomial $3x^4 + 2x^3 + 9x + 10$. Write an algorithm to add two polynomials represented using linked list (8)
- b) Write an algorithm to delete a given node in a singly linked list with a particular data. (6)

Module 4

- 17 a) Write an algorithm to remove an element from a Binary Search Tree. Demonstrate each case with an example. (8)
- b) What do you mean by a BST? Write algorithm to create a binary search tree. (6)
- 18 a) Write algorithms for Depth First Search and Breadth First Search of a Graph with example. (8)
- b) Explain any two graph representation methods with example for each. (6)

Module 5

- 19 a) Explain with examples the different techniques for open addressing. (8)
- b) Hash the following keys using open chaining method and closed linear probing method. Size of table is 7 and the Hash function is $H(K) = K \bmod 7$.
Keys = {16, 21, 23, 50, 19, 26} (6)
- 20 a) Explain the algorithm for Quick sort with an example. (8)
- b) Explain the algorithm for Merge Sort with an example (6)
