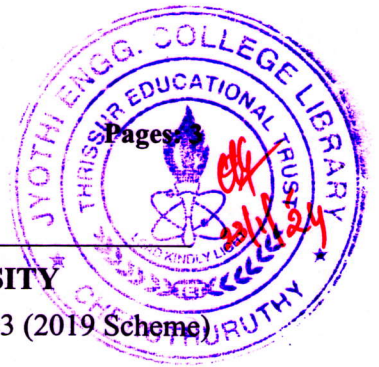


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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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

Course Code: CST201

Course Name: DATA STRUCTURES

Max. Marks: 100

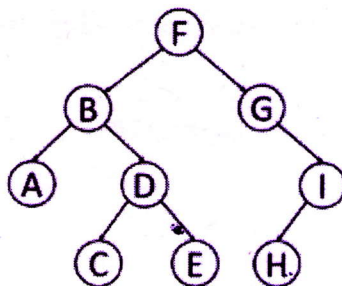
Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks

Marks

- 1 Explain the best case, worst case, average case of linear search algorithm. (3)
- 2 What is frequency count? Calculate the frequency count of the statement $x = x + 1$; in the following code segment (3)
for ($i = 0$; $i < n$; $i++$)
for ($j = 1$; $j < n$; $j *= 2$)
 $x = x + 1$;
- 3 What are the applications of stack? (3)
- 4 Differentiate between simple queue with circular queue (3)
- 5 Write an algorithm to insert an element at the end of doubly linked list. Illustrate with the help of an example. (3)
- 6 What do you mean by self-referential structure? Give one example (3)
- 7 Differentiate between complete binary tree and full binary tree with suitable example. (3)
- 8 Write the output of inorder, preorder and postorder traversals on the following tree (3)



- 9 Illustrate insertion sort algorithm. (3)
- 10 What do you mean by Double Hashing? Explain with an example. (3)

PART B

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

Module 1

- 11 a Explain any three asymptotic notations used to express the complexity of algorithm with the help of suitable examples. (9)
- b Derive Big-O notation for the function $f(n) = n^3 + 2n^2 + 5$. (5)
- 12 a Write an algorithm to find the sum of n numbers and calculate its time complexity. (7)
- b Explain various phases in system life cycle. (7)

Module 2

- 13 a Write the algorithm to add two polynomials represented by arrays and illustrate with an example (9)
- b Write an algorithm to reverse a string using a stack. (5)
- 14 a What do you mean by the data structure Priority Queue? Write algorithms to insert an element into a priority queue. (5)
- b Write an algorithm to convert an infix expression into its equivalent postfix expression. Convert the expression $((A/(B-D+E))*(F-G)*H)$ to postfix form. Show each step in the conversion including the stack contents. (9)

Module 3

- 15 a What do you mean by a circular linked list? Write an algorithm to perform insert and delete operations on a circular linked list. (7)
- b Given five memory partitions of 400Kb, 600Kb, 350Kb, 200Kb, 800Kb (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 520 Kb, 617 Kb, 200 Kb, and 750 Kb (in order)? (7)
- 16 a Write an algorithm to insert an element at the beginning, end and intermediate position of a doubly linked list. (7)
- b Write an algorithm to append one linked list to another. Explain with an example. (7)

Module 4

- 17 a Write and discuss algorithm to insert an element to Binary search tree. Show the structure of the binary search tree after adding each of the following values in that order: 2, 5, 1, 7, 10, 9, 11, 6. (7)
- b Write and illustrate non recursive pre-order tree traversal algorithm (7)

- 18 a Write and illustrate Depth first search algorithm (7)
- b Explain various graph representations with example (7)

Module 5

- 19 a Write and illustrate Merge sort algorithm with a suitable example. (9)
- b Write selection sort algorithm with the help of an example (5)
- 20 a Hash the following keys using open chaining method and closed linear probing method. Size of table is 11 and the Hash function $H(K) = K \bmod 11$. (6)
Keys = {17, 22, 34, 23, 19, 66}
- b Explain any four hash functions with examples. (8)
