Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (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 is frequency count? Explain with an example. (3)

2 Derive the Big O notation for $f(n)= 3n^3+2n+7$. (3)

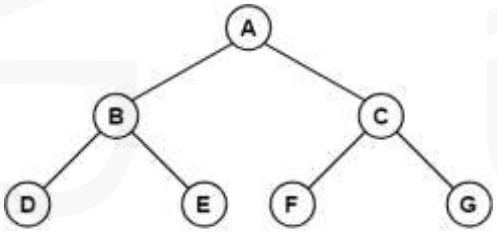
3 Write any three applications of Stack. (3)

4 Explain PUSH and POP operations in stack. (3)

5 What is dynamic memory allocation? List any two advantages of dynamic memory allocation. (3)

6 Write an algorithm to count number of nodes in a singly linked list. (3)

7 Write the output of inorder, preorder & postorder traversals on the following tree. (3)



8 Differentiate between complete binary tree and full binary tree. Give examples for each. (3)

9 Explain Max Heap with an example. (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. (10)

b) What are asymptotic notations? Give examples. (4)

12 a) How the performance of an algorithm is evaluated? Explain the best, worst and average case analysis of an algorithm with the help of an example. (10)

b) What is the difference between algorithm and pseudocode? (4)

Module 2

13 a) What is sparse matrix? Write an algorithm to add two sparse matrices. (10)

b) Write an algorithm to insert an element to a circular queue using array. (4)

14 a) Convert P*(Q+R)/S to postfix notation. Write algorithm and step-by-step conversion using the stack. (10)

b) Write an algorithm to search an element using binary search. Discuss its time complexity. (4)

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. (10)

b) Explain the advantages and disadvantages of First-fit and Best-fit memory allocation schemes. (4)

16 a) How can a linked list used to represent the polynomial $3x^4+2x^2+5$. Write an algorithm to add two polynomials represented using linked list. (10)

b) Write an algorithm to delete a given node in a singly linked list. (4)

Module 4

17 a) Write an algorithm to insert an element to a binary search tree. Explain with an example. (10)

b) Explain any two graph representation methods with example for each. (4)

18 a) Write algorithm to perform DFS in a graph. Explain with an example. (10)

b) 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. What is the height of the created tree? (4)

Module 5

19 a) Explain Quick sort algorithm with an example. (10)

b) What is meant by collision? Give an example. (4)

20 a) Explain the four different hashing functions with examples. (8)

b) Illustrate the differences between selection sort and insertion sort with example. (6)

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