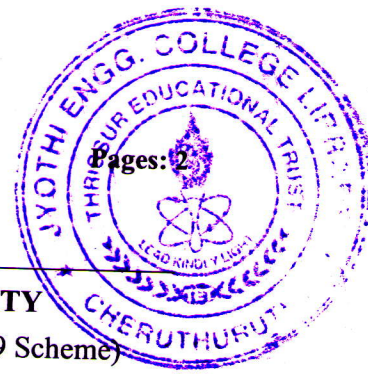


B

0800CST201122005



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**

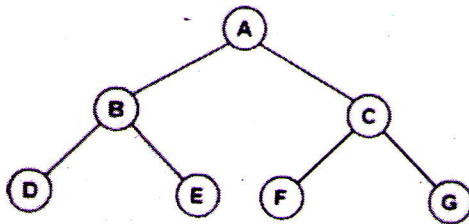
Max. Marks: 100

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)  |

## 0800CST201122005

- 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)

\*\*\*