

**B.Tech. III-Sem. (Main/Back) Exam Jan. 2019**  
**Computer Science Engineering**  
**3CSU02 Data Structures and Algorithms**  
**3EU3022**

Time: 3 Hours

Maximum Marks: 100  
Min. Passing marks: 33

*Instructions to candidates: -*

**PART A :** Short answer questions (up to 25 words) 10 x 2 marks = 20 marks.  
*All ten questions are compulsory.*

**PART B :** Analytical Problem Solving questions (up to 100 words) 6 x 5 marks  
= 30 marks. Candidates have to answer six questions out of eight.

**PART C :** Descriptive Analytical Problem solving questions 5 x 10 marks =  
50 marks. Candidates have to answer five questions out of seven.

**PART A**

Q.1 Why we need to do algorithm analysis ?

Q.2 Discuss BST.

Q.3 Write the name of an algorithm which can be used as a single source single destination shortest path algorithm.

Q.4 Give Comparison between tree and graph ?

Q.5 Define Spanning tree. What is MST ?

Q.6 Which data structures are used for BFS and DFS of a graph ?

Q.7 What are linear and non-linear data structures ?

Q.8 What is linked list? What are its types?

Q.9 Explain the advantages of Binary search over linear search ?

It access data randomly

Q.10 How is an array different from Linked list ?

### PART B

Q.1 Write the following infix expressions in their postfix and prefix forms:

(a)  $D-B+C$

(b)  $(A+B)*C-D*F+C$

Q.2 What is queue? How it is different from stack and how is it implemented ?

Q.3 Create lexically ordered Binary Search Tree for the following :-

JAN, FEB, MAR, APR, MAY, JUNE, JULY, AUG, SEPT, OCT, NOV, DEC.

Q.4 Write the essential differences between complete binary tree and strict binary tree?

Q.5 Calculate the address of the element  $A[3,2]$  using row major order for an array  $A[1..5, 1..5]$  of elements. It is stored at location 2033 and the size of each element is 3 Bytes. <http://www.rtuonline.com>

Q.6 How insertion and selection sorts are different ? Explain.

Q.7 What is the value of the following postfix expression :

$6\ 8\ 2\ 4\ +\ -\ * \ - \ \>\ 1\ ?$

Q.8 What is asymptotic analysis of an algorithm ? What are asymptotic notations ?

### PART C

Q.1 Create the AVL tree.

21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7.

Q.2 Write an algorithms for inserting a node and deleting a node from a doubly linked list ? What are the advantages of doubly linked list over singly linked list ?

Q.3 Define AVL tree ? Discuss the term "Balance factor". Explain the various rotations of AVL tree?

$f(2, -(2+6)) = 6$

**Q.4 Analyze the running time for merge sort algorithm. Argue upon its worst case, best case and average case running time.**

**Q.5 Write short note (any two) :-**

(i) Heap sort

(ii) B- tree

(iii) Tree traversal techniques

**Q.6 What are the various ways to represent a graph? Find the following two for the graph given below in Q.7 :**

(i) Adjacency list representation

(ii) Adjacency matrix representation

**Q.7 Using Prim's and Kruskal's algorithm, find the minimum spanning tree for the following graph? What is the weight of a minimum spanning tree of the following graph?**

