

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

Time: 3 Hours

3EU3022

Maximum Marks: 100
Min. Passing marks: 33

Instructions to candidates: -

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

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

PART C : Descriptive-Analytical Problem solving questions 5×10 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 algoritm.

Q.4 Give Comparision 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 ?

To 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 :

$$6\ 8\ 2\ 4\ +\ -\ * \rightarrow ?$$

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?

$$\{x - (y + b)\} \cdot c$$

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?

