

20P163

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Name:

Reg. No:

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS-PG)

(Regular/Supplementary/Improvement)

CC19P CSS1 C02 - ADVANCED DATA STRUCTURES

(Computer Science)

(2019 Admission onwards)

Time: Three Hours

Maximum: 30 Weightage

Part A

Answer any *four* questions. Each question carries 2 weightage.

1. Write worst case and best case complexity of linear search algorithm.
2. Write an algorithm to find the 5th smallest element from an array.
3. Discuss Huffman algorithm and its relevance, in brief.
4. Write an algorithm to implement circular queue.
5. Define the following terms.
 - a. Binary Tree
 - b. Strictly Binary tree
 - c. Complete Binary tree.
 - d. Almost Complete Binary tree
6. Define a Graph. How does it differ from a tree?
7. What is a priority queue? What is the minimum number of queues needed to implement the priority queue?

(4 x 2 = 8 Weightage)

Part B

Answer any *four* questions. Each question carries 3 weightage.

8. Why do we use asymptotic notation in the study of algorithm? Describe commonly used asymptotic notations and give their significance.
9. What is recursion? What are the different types of recursion?
10. What is the significance of Sparse Matrix and how do we implement it?
11. Write short notes on: Red Black Tree, Tries and Treaps.
12. List the properties of binary search tree. Write an algorithm to search an element from a binary search tree.
13. Build an AVL tree with the following values: {15, 20, 24, 10, 13, 7, 30, 36, 25, 42, 29}
14. Construct a binary tree having the following traversal sequences:
Preorder traversal : A B C D E F G H I
Inorder traversal : B C A E D G H F I b)

(4 x 3 = 12 Weightage)

Part C

Answer any *two* questions. Each question carries 5 weightage.

15. a. Explain quick sort algorithm. Write its complexity.
b. Explain heap sort algorithm. Write its complexity.
c. Illustrate the quick and heap sort algorithms on the input 35, 15, 40, 1, 60, 10.
16. Write an algorithm to perform the following operations in a singly linked list.
 - a. Insert a new node after a given node
 - b. Delete last node
 - c. Count the number of elements in the list
 - d. Search and element
 - e. Iterative traversal
17. a) Define hashing. What are the properties of a good hash function? With necessary examples, explain four different hashing techniques.
b) Define collision. What is linear probing? The following keys 10, 16, 11, 1, 3, 4, 23, 15 are to be inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \text{ mod } 10$ and linear probing. What is the resultant hash table?
18. a. How will you represent a max-heap sequentially? Explain with an example.
b. Write an algorithm to insert an element to a max-heap that is represented sequentially.

(2 x 5 = 10 Weightage)
