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Name.....

Reg. No.....

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)  
EXAMINATION, NOVEMBER 2021**

(CBCSS)

Computer Science

CSS 1C 02—ADVANCED DATA STRUCTURES

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

**General Instructions**

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

**Section A**

*Answer any **four** questions.*

*Each question carries 2 weightage.*

1. Define the terms "data structures" and "abstract data type".
2. Compare recursive and non-recursive functions.
3. Compare doubly linked list with singly linked list.
4. What is a Treap ?
5. Explain "Extended Binary Tree".
6. Explain "Rehashing".
7. What is a Deap ?

(4 × 2 = 8 weightage)

**Turn over**

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**Section B**

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

8. Explain time complexity. Demonstrate the importance of time complexity with examples.
9. Explain the organization and advantage of deterministic skip lists.
10. Give the structure and advantage of array based circular queue. Write functions to insert and delete elements for an array based circular queue.
11. Demonstrate with an example, the steps in the deletion of a node from a Red-black tree. .
12. Explain any one graph traversal algorithm.
13. Write a note on Hash tables and Hash functions.
14. Write short notes on : (i) Binomial queues ; and (ii) Splay trees.

(4 × 3 = 12 weightage)

**Section C**

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

15. Explain the characteristics, advantages and drawbacks of recursion. Write recursive functions for the following :
  - (i) To reverse a singly linked list.
  - (ii) To print the n terms of the series defined by
$$F(0) = 1, F(1) = 1, F(i) = F(i - 1) + F(i - 2).$$
16. Explain the properties of Binary Search tree. Write and explain algorithms/functions for the insertion of a new data into a BST and for the deletion of an existing data from a BST.
17. Explain the concepts in open addressing. Illustrate with example linear and quadratic probing.
18. Explain the properties of Min-Max heaps. Give examples. Demonstrate the steps in constructing a Min Heap. Highlight any *one* application of Min-Max heaps.

(2 × 5 = 10 weightage)