D 13235 (Pages : 2) Name.................................

Reg. No.............................

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2016

(CUCSS)

Computer Science

CSS 1C 02—ADVANCED DATA STRUCTURES

(2014 Admissions)

Time : Three Hours   Maximum : 36 Weightage

Part A

Answer **all** *questions.*

1. Define Big Oh. How does it help in assessing the merit of an algorithm ?

2. Calculate the address of an array element A[5] [2], given A is a 2D integer array of size 10x5, the base address of A is **1000** (address of **A[0] [0]) and the** system uses 2 bytes per integer.

3. State the merits and demerits of recursion.

4. Explain recursive list.

5. Write ADDQ and DELETEQ functions for a circular array queue.

6. What is a "Deap" ?

7. What is a Binomial Queue ?

8. What do you mean by hashing ?

9. When do we go for rehashing ?

10. Define Complete and **Full binary tree. What is the height of a complete** binary tree with n nodes.

11. Explain the need for tree balancing. Define heap tree.

12. Write a function to print the node values of a complete binary tree, level by level.

(12 x 1 = 12 weightage)

Part B

Answer any six questions.

13. What do you mean by an ADT ? **Give suitable example. Justify the relevance of** ADT.

14. Write a recursive function to count the number of nodes in a singly linked list.

15. Write a recursive function to find the sum of elements of a singly linked list of integers.

Turn over

16. What is a priority Queue ? Give any two situations where priority Queue is preferred. Discuss any *two* approaches for the implementation of Priority queue.

17. Explain construction of **Min** heap with suitable example.

18. What is a skew heap ? Give suitable example. Explain merging of two skew heaps.

19. With suitable example explain extendible hashing and separate chaining.

20. Write a function for inorder traversal of a inorder threaded binary tree.

21. With suitable example, explain the structure of Treaps. Briefly explain the operations performed on Treaps.

(6 **x** 2 = 12 **weightage**)

Part C

Answer any **three** *questions.*

22. (i) Write and explain Quick sort algorithm. Comment on its time complexity.

    (ii) Explain any *one* application of doubly linked list. Write a function to delete $i^{..}$ node from a doubly linked list. Include appropriate steps for exception handling.

23. (i) Write and explain a suitable scheme for efficient representation of sparse matrices. Write a function to find the transpose of a sparse matrix, represented with your scheme.

    (ii) What is a deterministic skip list ? Give example(s). Demonstrate advantage of skip list over a simple linked list. Explain how a new element can be inserted into a skip list.

24. (i) Explain the basics of Fibonacci Heaps. Discuss how a node is inserted into a Fibonacci heap.

    (ii) Define pairing heap. Explain the important operations performed on pairing heaps.

25. Explain the properties of a good hash function. Discuss Open addressing, linear probing and quadratic probing with examples.

26. Discuss different graph representation approaches and advantages/limitations of each representation. Explain graph traversal algorithms.

27. Explain Huffman algorithm for extended binary tree. Illustrate the algorithm with suitable example.

(3 **x** 4 = 12 **weightage**)