

**M.C.A. DEGREE II SEMESTER EXAMINATION APRIL 2013****CAS 2202 DATA STRUCTURES USING 'C'**  
(Regular and Supplementary)

Time: 3 Hours

Maximum Marks: 50

**PART A**  
(Answer *ALL* questions)

(15 × 2 = 30)

- I. (a) Define data structure. What data structure you will use to implement recursion?  
(b) Differentiate between linear data structure and non linear data structure? Give examples.  
(c) State any one application of queue.
- II. (a) Define binary search tree. Develop a procedure to verify a binary search tree.  
(b) How many binary trees can be constructed from N nodes?  
(c) How an AVL tree is different from normal binary tree?
- III. (a) What is hash table? Why it is better than other data structures?  
(b) Is it possible for a Fibonacci heap to contain a tree that isn't a binomial tree? If so, how would this happen?  
(c) What is the difference between binary heap and binomial heap?
- IV. (a) Explain the depth of recursion with an example.  
(b) What is Rat In A Maze problem?  
(c) What is N-Queen problem?
- V. (a) Give an example for quick sort which will take worst case complexity.  
(b) Give a non comparison based sorting algorithm.  
(c) Obtain the average case time complexity of heap sort.

**PART B**

(5 × 4 = 20)

- VI. A. Write a program in C to reverse a list.  
**OR**  
B. Write a program in C to implement linked stack.
- VII. A. Write a program in C to create the mirror copy of a tree.  
**OR**  
B. Keys 1, 2, 3, .....,  $2^k - 1$  are inserted in order into an initially empty AVL tree. Prove that the resulting tree is perfectly balanced.
- VIII. A. Explain union operation in binomial heap with example.  
**OR**  
B. Explain union operation in Fibonacci heap with example.
- IX. A. Obtain Fibonacci series using recursion.  
**OR**  
B. Explain 8 – Queens problem and mention backtracking points.
- X. A. Obtain average case complexity of merge sort.  
**OR**  
B. Obtain average case complexity of heap sort.

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