

ALCCS – (OLD SCHEME)

Code: CS21
Time: 3 Hours

Subject: DATA STRUCTURES & ALGORITHM DESIGN
Max. Marks: 100

MARCH 2011

NOTE:

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.

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- Q.1**
- Doubly linked lists are better as far as traversing the elements is concerned. Why don't we then always use them?
 - Find the address of the element $A[6,4,8,10]$ in 4-dim array.
 - Write an algorithm to add an element in i^{th} stack of multiple stacks.
 - What is maximum no of nodes in a binary tree of depth k ?
 - How will you find cycle in an AOV (activity on vertex) network?
 - Using binary tree represent the data: X1, I, J, Z, FST, X2, K.
 - What do you understand by strongly connected component in a graph? (7×4)
- Q.2**
- What is 0/1 Knapsack problem? Discuss its solution. (9)
 - For the key values 10, 15, 20, 25, 30, 35, 40, 45, 50, construct B-tree and insert a key value 38 in that tree. (9)
- Q.3**
- Discuss Radix sort method with an example. (8)
 - How will you count the number of binary trees for given number of nodes say n . (10)
- Q.4**
- Use heap sort for the data: 26, 5, 77, 1, 61, 11, 59, 15, 48, 9 for sorting. (9)
 - Represent the polynomial $x^{10}y^3z^2 + 2x^8y^3z^2 + 3x^8y^2z^2 + x^4y^4z + 6x^3y^4z + 2yz$ using generalized list. (9)
- Q.5**
- Given positive numbers w_i , $1 \leq i \leq n$ and m . Find out all subsets of w_i whose sum is m . (9)
 - How will you handle overflow and collision detection in a hash table? Discuss methods. (9)

- Q.6** a. Sort the following data using merge sort. Discuss the time complexity of the algorithm if the data size is n.
15, 10, 2, 11, 17, 12, 5, 8, 9, 1, 3, 13, 6, 14, 7, 16, 4 (9)
- b. Discuss an algorithm to free a block using boundary tags. (9)
- Q.7** a. Discuss an algorithm for inserting a string after i^{th} character of another string. (9)
- b. Discuss topological sort algorithm. (9)