

Code: CSCS1T1

**I M.Tech-I Semester-Regular Examinations-April 2013**

**DATASTRUCTURES & ALGORITHM ANALYSIS  
(COMPUTER SCIENCE & ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

- 1 (a) What is an Algorithm? Write an algorithm for the function GCD(a,b) and calculate Time Complexity and Space Complexity. 7 M
- (b) Explain with an example the creation of a linked list, insertion and deletion of nodes, and swapping of any two nodes. 7 M
- 2 (a) What is abstract data type? 4 M
- (b) Write an algorithm for sorting the list of integers using Quick sort algorithm. Obtain the worst case and average case time complexity of this algorithm. Show the trace of the algorithm for following key sequence.  
62, 22, 36, 6, 79, 26, 75, 13, 31, 76 10 M
- 3 (a) Explain the operations of insertion of nodes into and deletion of nodes from, a binary search tree with code. 10 M

- (b) Construct an expression tree for the expression  
 $(a + b * c) + ((d * e + 1) * g)$   
Give the outputs when you apply preorder, in order and  
post order traversals. 4 M
- 4 (a) Define stack with suitable example. Implements a stack,  
each item on the stack is a varying number of integers.  
Choose a data structure for such a stack and design a *push*  
and *pop* function for it. 7 M
- (b) Explain the process of conversion from infix  
expression to postfix expression using stack. 7 M
- 5 (a) Write the primitive operations of ADT queue. 6 M
- (b) Compare and contrast the ADTs Queue and Priority  
Queue. 4 M
- (c) Difference between internal & external sorting. 4 M
6. (a) Construct a binary tree to accommodate the given list of  
integers. 47, 56, 23, 17, 64, 36, 29, 22 and balance the tree  
7 M
- (b) Find the in order, preorder and post order sequence of  
nodes of the above tree. Explain the process of deletion of  
node '23' from the above tree and draw the resultant tree.  
7 M

- 7 (a) State & Prove maximum level & height of an AVL Tree. 6 M
- (b) Explain different rotations of AVL-Tree. 4 M
- (c) Construct an AVL-Tree with 47,56,23,17,64,36,29,22 4 M
- 8 (a) Give the analysis of insertion and deletion operations of nodes in binary search Tree. 7 M
- (b) Explain the operations which are done in B-Tree with examples. 7 M