Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. 10562CS10101

CS/IT–305

B. E. (Third Semester) EXAMINATION, Dec., 2011

(Grading/Non-Grading System)

(Common for CS & IT Engg. Branch)

DATA STRUCTURE/DATA STRUCTURE AND ALGORITHM

Time : Three Hours

Maximum Marks : { *100 (Non-Grading)* / *70 (Grading)* }

Note : Attempt *five* questions in all selecting *one* question from each Unit. All questions carry equal marks.

Unit–I

1. (a) What is recursion ? How does it differ from iteration ? Write an algorithm to generate first ten Fibonacci numbers recursively.

   (b) How is a two-dimensional array represented in memory ? Calculate amount memory required to store this array and the accessing function for it.

Or

2. (a) What are Asymptotic Notations ? Explain each relation with example and diagram.

   (b) Solve the following recurrence relation $T(n) = T(n-1) + 1$ with $T(0) = 0$ as initial condition. Also find big Oh notation.

P. T. O.

Unit – II

3. (a) Write functions for the following :
   (i) Finding size
   (ii) Checking empty
   (iii) Checking full
   For the implementation of a queue in circular array with index values to indicate emptiness.

   (b) Explain how the following polynomial can be represented using linked list :

$$7x^2y^2 - 4x^2y + 5xy^2 - 2$$

Or

4. (a) Compare array implementation with linked list implementation. Write function to insert a node in doubly linked list after a node having element μ. What is the difference between "P = Null" and μP is undefined ?

   (b) Write an algorithm to convert infix to postfix expression. Explain with example.

Unit – III

5. (a) Explain the operation of AVL tree.

   (b) Following nodes are insert into empty tree in order :
   5, 16, 22, 45, 2, 10, 18, 30, 50, 12, 1
   Construct :
   (i) Binary Search Tree
   (ii) AVL Tree

Or

6. (a) Write an algorithm to delete operation in any binary search tree (taking all cases).

   (b) Write a recursive algorithm for preorder and post-order traversals of a binary tree.

Unit – IV

7. (a) Write an algorithm to sort the elements using Quick sort. Explain with example.

   (b) Explain insertion sort and selection sort briefly.

Or

8. (a) Explain how balance is restored when an insertion into height balanced tree puts a node out of balance.

   (b) What are advantages and disadvantages of the various collision resolution strategies ?

Unit – V

9. (a) Write an algorithm to find the shortest path between any *two* nodes in graph using Dijkstra algorithm.

   (b) Explain spanning tree and minimum cost spanning tree.

Or

10. (a) Work down the depth first traversal algorithm and breadth first traversal.

    (b) Explain the Kruskal algorithm with example.