Code No: 113BP **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

DATA STRUCTURES

(Common to CSE, IT)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Compare singly and doubly linked linear lists. [2]

b) Write a recursive function in C to compute x^n where x and n are integers. [3]

c) Give the ADT specification of a stack. [2]

d) Write a C function for popping an integer item from a stack. Assume that stack is implemented as an array. [3]

e) Give the ADT specification of a max priority queue. [2]

f) Write a recursive function in C for the inorder traversal of a binary tree. Assume that binary tree is already created. Assume linked representation for binary tree. [3]

g) Sort the following list of integers in ascending order using insertion sort:
11, 41, 35, 10, -11
Show the contents of the list at the end of each pass. [2]

h) What is meant by a collision in hashing? List any two methods used for resolving collisions in hashing? [3]

i) Define a Red-Black tree. [2]

j) Write a function in C that returns the location of the smallest integer in a binary search tree of integers. Assume that binary search tree of integers is already created. Assume linked representation for the binary search tree. [3]

PART- B

(50 Marks)

2.a) Define the space complexity of a program.

b) Write a C function for deleting an integer element from doubly linked list of integer elements. Assume that the doubly linked list of integers is already created. [5+5]

OR

3.a) Explain with an example the linked representation of a sparse matrix.

b) Define the asymptotic notations (Big Oh, Omega and Theta) used in algorithm analysis. [5+5]

4.a) Write a C function for deleting an integer element from a circular queue of integers. Assume array representation for the circular queue.

b) Explain with an example how recursion is implemented using stack. [5+5]

OR

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PART- B

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b) Explain with an example how recursion is implemented using stack. [5+5]

OR

5.a) Show how to represent a deque (double ended queue) in a singly linked list.
b) Write functions in C which insert and delete integer elements at either end of the above deque. [5+5]

6.a) Give an example for a threaded binary tree.
b) Write a non recursive procedure for the preorder traversal of a binary tree. Assume that the binary tree of elements is already created. [5+5]

OR

7.a) Give an example for the adjacency list representation of a graph.
b) Write a procedure for the bfs of a graph. [5+5]

8.a) Write a recursive binary search function in C to search for an integer key in a sorted (ascending order) array of integers.
b) Compare the performance of binary search with linear search. [5+5]

OR

9.a) Write quick sort algorithm for sorting a list of integers in ascending order.
b) What is the time complexity of quick sort algorithm in the worst case? [5+5]

10.a) Define an AVL tree. Give an example for it.
b) Write a non recursive function in C to search for an integer key in a binary search tree of integers. Assume that the binary search tree of integers is already created. [5+5]

OR

11.a) What is a bottom-up splay tree?
b) Write a procedure for inserting an element into a B-tree. [5+5]

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