21/11/13.

Reg. No. | | | | | | | | | | |

B.E (Full Time) DEGREE ARREAR EXAMINATIONS, NOV / DEC 2013

CSE BRANCH

III Semester

CS 8302 Data Structures

(Regulation 2012)

Time : 3 Hours **Answer ALL Questions** **Max. Marks 100**

PART-A (10 x 2 = 20 Marks)

1. Provide the asymptotic complexity for calculating the Sum of n numbers in an array.
2. Write a C++ function length to count the number of nodes in a chain?
3. Draw and explain the structure of a node in threaded binary tree.
4. Write code to perform post order traversal in a binary search tree.
5. State the properties of Red-Black tree.
6. What is the minimum number of nodes in AVL tree of height 12?
7. Differentiate between the internal and external sorting techniques.
8. Define the k^{th} order Fibonacci numbers and its application.
9. Compare linear and binary search algorithm techniques.
10. Mention how cylinders are indexed for fast retrieval.

Part – B (5 x 16 = 80 marks)

11. i) Write a code to create generic data structure called *deque* which consists of a list of items. The following operations are performed in *deque:* (12)
    a. push(x): Insert item x on the front of the *deque.*
    b. pop(): Remove the front item from the *deque* and return it.
    c. inject(x): Insert item x on the rear end of the *deque.*
    d. eject(x): Remove the rear item from the *deque* and return it.

    ii) Trace the stack for the conversion of ((((A / B) – C) + (D * E)) – (A * C)) from infix to postfix. (4)

12. a) i) Write the representation for the graph shown in Figure 1 as
    a. Adjacency matrix
    b. Adjacency lists
    c. Adjacency multilists (8)

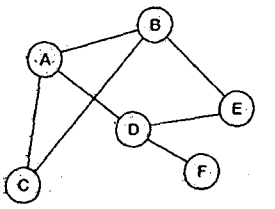

Figure 1. Graph

ii) Write generic code to insert into a binary search tree (8)

OR

b) i) Construct a binary tree to satisfy the following orders:
Inorder: 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 15, 19, 20
Postorder: 3, 2, 5, 6, 4, 8, 11, 9, 15, 20, 19, 12, 7 (8)

ii) Write algorithm to compute the depth first search and apply the same to Figure1. List the vertices in the order they would be visited. (8)

13. a) i) Perform the operations onto Splay tree (draw after each operation):
insert(3), insert(9), insert(12), insert(55), insert(1), insert(3), delete(3), delete(9), delete(60), insert(3), search(12) (10)

ii) Write the four AVL rotation functions only. (6)

OR

b) i) Perform the operations onto Red-Black Tree (draw after each operation):
insert 10, 7, 2, 8, 9, 15, 13, 12, 3, 5, 11, 17, 14, 16, 4
delete 9, 10, 17, 16 (12)

ii) Compare min heaps and leftist trees (4)

14. a) i) Write the Quicksort algorithm (8)

(ii) Show how quicksort processes the input 142, 543, 123, 65, 453, 879,579, 434, 111, 242, 811, 102 with pivot chosen as the larger of first two distinct elements (8)

OR

b) i) Write the HeapSort algorithm (8)

(ii) Show how heapsort processes the input 142, 543, 123, 65, 453, 879, 579, 434, 111, 242, 811, 102 (8)

15. a) i) Insert into a B-Tree of order 5 with the following data: 8,96,116,2,7,104,110,37,86,55,46,137,145,4,5,58,6 (10)
ii) Consider a B-Tree of order m = 200. Calculate the number of keys searched in 4 passes (6)

OR

b) i) Write functions to insert/retrieve an item into/from a hash table of size 31 using open addressing and linear probing. Devise your own hash function and obtain the hash addresses for the keys 78, 101, 155, 289, 2345, 4000. Assume the following for the item. (16)

```
typedef struct item{
        int key;
        double info;
}ITEM;
```