INTERNATIONAL CENTRE FOR APPLIED SCIENCES (Manipal University) III SEMESTER B.S. DEGREE EXAMINATION – APRIL / MAY 2017

Reg.No.

SUBJECT: DATA STRUCTURES (CS231)

(BRANCH: CS & CE)

Tuesday, 9 May 2017

Time: 3 Hours

- ✓ Answer ANY FIVE full Questions.
- ✓ Missing data, if any, may be suitably assumed
- 1A. Explain in brief how the performance of a program is measured?
- 1B. Write an algorithm for evaluation of postfix expression using stack. Also evaluate the following postfix expression using the same algorithm.

128*+3-

- 2A. Write a recursive functions for the following.
 - i) To find GCD of two numbers using Euclid's technique.
 - ii) Tower of Hanoi problem.
- 2B. What is a linear queue? Implement a linear queue with constructor, destructor, insert, deletion and display along with isFull and isEmptymethods.Show the method invocation in main().
- 3A. Write the following functions for the singly linked list class.
 - i) int list:: isPresent (int data) { } to search for a node with data as info field and return True or False.
 - ii) void list ::ins_at_front(intnew_data) { } to insert a node with new_data at the beginning of the list.
- 3B. Write a member function to find the intersection of two sorted linked lists with the signature, voidlist :: getIntersection (list 11,list 12) { ...} using the functions defined in question 3A.
- 4A. What are the merits of doubly linked list over singly linked list?
- 4B. Write the member functions to implement the following on doubly linked list:
 - i) To reverse a doubly linked list.
 - ii) To count number of nodes of a list.
- 4C. Construct a BST for the following numbers. Also write pre-order, in-order, post-order and level-order traversals for the tree obtained.
 - 50,26,74,48, 64, 78,12,25
- 5A. Define the following terms with examples.
 - i) Binary tree
 - ii) Strict binary tree
 - iii) Complete binary tree
 - iv) Almost complete binary tree
- 5B. What are linear and nonlinear data structures? Give two examples for each.

(12+8)



(12+8)

(10+10)

(10+10)

Max. Marks: 100

- 6A. Write an algorithm for quick sort.
- 6B. For the maximum heap shown below show the tree structures for removing the first and second largest elements from the heap.



(10+10)

- 7A. Write a recursive function for linear search. Write thetime complexity of linear search in best, average and worst cases.
- 7B. Write an algorithm for BFS of a graph. Illustrate with an example.
- 7C. Write an iterative member function for pre-order traversal of a binary tree.

(6+6+8)

- 8A. Write a Merge sort function to merge two sorted arrays.
- 8B. Briefly explain the different storage representations of binary tree along with their merits and demerits.
- 8C. Write a short note on hashing.

(6+8+6)

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