Reg. No.										

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION – MAY 2016

SUBJECT: DATA STRUCTURES (CS 231)

19th May, 2016

Time: 3 Hours Max. Marks: 100

- ✓ **Answer ANY FIVE Questions.**
- ✓ **Missing data, if any, may be suitably assumed.**

1 A) How the performance of a program is measured? Explain.

1 B) Give an algorithm for evaluation of post fix expression using stack. Using the same algorithm evaluate the following postfix expression. 1 2 8 * + 3 –

(10+10)

2 A) Write recursive functions for the following.

i) To find GCD of two numbers using Euclid's technique.

ii) Tower of Hanoi problem.

2 B) What is a linear queue? Define a class Queue, to implement a linear queue, with the following member functions:

i) constructor
ii) destructor
iii) insert
iv) deletion
v) display
vi) isFull
vii) isEmpty .

Also show the methods invocation in main(). (10+10)

3 A) Write the following functions for the class list (singly linked list) .

i) Int list:: isPresent (int data) { } to search for a node with data as info field.

ii) void list :: ins_at_front(int new_data) { }

3 B) Write a member function to find intersection of two unsorted linked lists with the following prototypes.

void list :: getIntersection (list l1,list l2) { ...} using the functions defined in question 3A.

(12+8)

4 A) How the doubly linked list is advantageous over the singly linked list?

4 B) Write member functions for the following:

i) To reverse a doubly linked list only by changing links.

ii) To count the number of nodes of a doubly linked list.

4 C) 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 (4+10+6)

5 A) Explain the following in brief with examples:

i) Binary tree

ii) Strict binary tree

iii) Complete binary tree

iv) Almost complete binary tree

5 B) Distinguish between linear and non-linear data structures. Give two examples for each. (12+8)

6 A) Write quick sort algorithm.

6 B) Show the tree structures for removing the first and second largest elements from the maximum heap in Fig. 6 B.

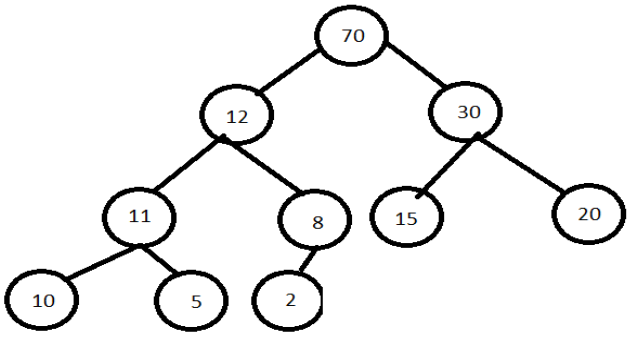

Fig. 6 B

(10+10)

7 A) Write a recursive function for linear search. Also write the time complexity in best, average and worst cases for the same function.

7 B) Write an algorithm for BFS of a graph. Illustrate with an example.

7 C) Write an iterative member function for pre-order traversal of a binary tree. (6+6+8)

8 A) Write a Merge sort function to merge two sorted arrays.

B) Briefly explain the left child - right sibling representation of Binary tree for the tree shown in Fig. 8 B and also convert that tree into binary tree.

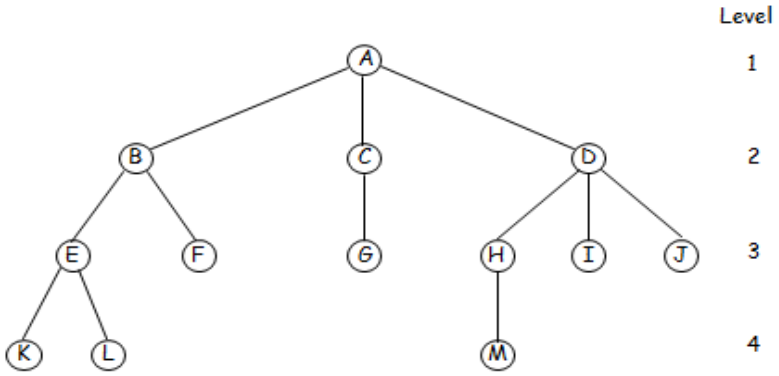

Fig. 8 B

C) Write a short note on hashing. (6+8+6)