Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: DATA STRUCTURES & ALGORITHM [ELE 429]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 06 January 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A. Write a pseudo-code with detailed comments to insert a node in a singly linked list after the node containing KEY as its data. Assume that the address of the 1st node is stored in HEAD. ***(05)***

1B. Write a pseudo-code with detailed comments to delete a node from a doubly linked list after the node containing KEY as its data. Assume that the address of the 1st node is stored in HEAD. ***(05)***

2A. Write a pseudo-code for a function that takes a number (say, n) as an argument and uses a stack "S" to print the binary representation of the number. Assume that a command "stack()" creates a new stack, "push(stack address, data)" pushes data into the stack whose address is passed as argument and "pop()" takes out the topmost element from the stack. ***(05)***

2B. Write a pseudo-code to print the first "n" Fibonacci numbers using an integer queue called IntQueue. Assume that the command "enqueue(int)" adds an integer to the queue and "dequeue()" removes an element from the queue. ***(05)***

3A. Construct the binary tree which has the following in-order and post-order traversals:

In-order	N1	N2	N3	N4	N5	N6	N7	N8	N9
Post-order	N1	N3	N5	N4	N2	N8	N7	N9	N6

(04)

3B. A Binary Search Tree (BST), containing integer data is implemented using linked list. Write a pseudo-code, with detailed comments, which performs the following operation:

A node with data, say ITEM, is to be inserted in the BST. But before doing that the tree is searched from the root node. If ITEM is found, print a message "Item already there" and then exit, otherwise insert the data at the dead end where the search halts. Also check for empty tree. Given the address of the root node is ROOT. ***(06)***

4A. Write a pseudo-code with detailed comments for sorting an array of integers using the technique of insertion-sort. Also compute its time complexity. ***(06)***

4B. Given an array of size "N". Write a pseudo-code to search for the key "KEY". If it is found then the code should print the location of the KEY otherwise display a message. Also do the time complexity analysis for average case scenario of the above pseudo-code. ***(04)***

5A. A directed graph is shown in Fig. 5A below.

i. Obtain its adjacency matrix.

ii. Now a new vertex "8" is inserted between the vertices "4" and "1" such that the edges are directed from "4" to "8" to "1". Obtain the adjacency matrix of this new graph. ***(04)***

5B. Write a pseudo-code with detailed comments for adding a new vertex "8" in between the vertices "4" and "1" such that the edges are directed from "4" to "8" to "1" for the graph shown in Fig. 5A. Assume that the graph is represented in matrix form. ***(06)***

6A. Write a short note on Huffman Coding. ***(05)***

6B. Write a short note on Strassen's matrix multiplication. Also comment on its time complexity. ***(05)***

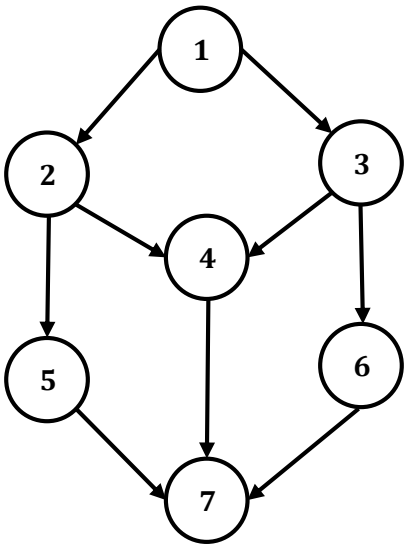

Fig. 5A