Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent Institution of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
END SEMESTER EXAMINATIONS, NOVEMBER 2018
SUBJECT: DATA STRUCTURES & ALGORITHMS [ELE 4018]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 24, NOVEMBER 2018** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions. Graph sheet will be provided.
- Missing data may be suitably assumed.

1A. Write an algorithm with detailed comments to reverse a singly linked list. Assume that the address of the 1st node is stored in HEAD. ***(05)***

1B. Write a pseudo-code with detailed comments to insert a node in 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 with detailed comments to check for balanced parentheses using stack. ***(06)***

2B. Convert the given arithmetic expression into postfix. Then evaluate the postfix expression for A = 2, B = 3, C = 4 & D = 6 showing step by step operation on stack.

Infix expression: **A + (B * C) / D** ***(04)***

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

In-order	D	B	H	E	A	I	F	J	C	G
Preorder	A	B	D	E	H	C	F	I	J	G

(06)

3B. Represent the following arithmetic expression using a binary tree.

(A + B * C) – ((D * E + F) / G) ***(04)***

4A. Write a pseudo-code with detailed comments for sorting an array of integers using the technique of quick-sort. ***(04)***

4B. Draw a binary search tree for the data given below:

Capricorn, Aquarius, Aries, Cancer, Pisces, Gemini, Leo, Libra, Taurus, Scorpio, Virgo ***(02)***

4C. For merge sort algorithm do the time complexity analysis. ***(04)***

5A. Following is the incidence matrix ***I*** where the rows represent vertices and the columns represent edges and $a_{ij} = 1$ if ***j***th edge is incident to the ***i***th vertex of an undirected graph of 5 vertices and 8 edges. Draw the graph and obtain its adjacency matrix.

$$I = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 & 1 & 1 & 0 & 0 \end{bmatrix}$$

(02)

5B. Write a pseudo-code with detailed comments to insert a vertex between 3rd and 4th vertices in the matrix representation of the graph obtained in Q.5A. ***(03)***

5C. Write an algorithm with detailed comments to sort an array of integers using merge-sort. ***(05)***