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MANIPAL INSTITUTE OF TECHNOLOGY Manipal University VI SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION - April/May 2017 SUBJECT: DATA STRUCTURE AND ALGORITHMS (ECE - 4024)

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A.	Define a STUDENT class with private data members USN, Name and Marks in 3 tests of a subject and public member functions to display and to find the average marks. Create an array of objects for 'n' student using dynamic memory allocation. Using appropriate function, find the average of two better marks for each student. Write a program to display the USN, Name and the average marks of all the students. Use default and parameterized constructor for initializing the data members.
1 B .	Write an algorithm and C++ program to delete an element at j^{th} position.
1C.	The default access level assigned to members of a class is
	(5+4+1)
2A.	Convert manually the following infix expression to postfix and prefix. Show the intermediate steps. (Note: A \$B is nothing but A ^B)
AD	i.A+(B * C-(D/E\$F)*G)*H $ii.A$B$C+(D+(E-F/G)+H*I)$J$
2 B .	What are the differences between arrays and linked lists? Write a $C++$ function to perform the following operations on a Circular Queue represented using array: i) Insert ii) Delete
2C.	data structure can't store the non-homogeneous data elements.
	(5+4+1)
3A.	Write a C++ program to add two polynomials using linked list.
3B.	Define a recursive mathematical function to find the sum of individual digits of a given number. Write a recursive function called sum (int) to implement the function defined by you. Invoke this function in the main to test the function sum (int).
3C.	A variant of the linked list in which none of the node contains NULL pointer is
	(5+4+1)
4A.	Construct a binary tree for a given a inorder traversal: D, B, E, I, H, A, F, C, G, J and the preorder traversal : A, B, D, E, H, I, C, F, G, J.
4B.	Construct a Binary Search Tree (BST) 200, 100, 300, 90,150,400,250,120, 180 in the order of the given values for the initial empty tree. How do you construct a threaded binary tree? Using the same convert the BST drawn by you into the threaded binary tree.
4C.	In tree, parent node has a key value greater than or equal to the key value of both of its children.
	(5+4+1)

5A.	Describe the Merge sort algorithm for the input array : 54, 26, 93, 17, 77, 31, 44, 55, 20. Also write a program to sort the elements using same algorithm.
5B.	Explain the sequential search algorithm with example. Write a C++ program to implement the same.
5C.	The complexity of sorting algorithm measures the as a function of the number \mathbf{n} of items to be sorter.
	(5+4+1)