Question Paper

Exam Date & Time: 27-Apr-2018 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - APRIL 2018
II SEMESTER B. S. (ENGG)
Date: 27.04.2018
Time: 9.30 A. M. TO 12.30 P.M.
Data Structures [CS 123]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

Missing data, if any, may be suitably assumed

1) A) Write a recursive functions for the following. (10)
i) To find GCD of two numbers using Euclid's technique.
ii) Tower of Hanoi problem.

B) What is a function template? In which scenario it is necessary to override the function template by an actual function? Explain with an example. (10)

2) A) What is space and time complexity? Explain. Calculate the time complexity for the following function using step count table and represent using Big-oh notation. (10)

```
void funct(int m, int n)
{       int i,j;
        for (i=0;i<m;i++)
            for (j=0;j<n;j++)
                cout<< i*j;
}
```

B) Give the algorithm for converting an Infix expression to postfix using stack. Show the working of the algorithm by considering the expression A * (B + C) * D, showing the stack contents and output after each token. (10)

3) A) Write the following functions for the class list (singly linked list) . (12)
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) { }

	B)	Write a member function to find intersection of two unsorted linked lists with the signature,list list :: getIntersection (list l2) { ...} using the functions defined in question 3A.	(8)
4)		Write C++ function push() and pop() for dynamic stack	(12)
	A)		
	B)	Implement the Insert, Delete and Display functions on ascending priority queue using an integer array of size N.	(8)
5)		What is the advantage of doubly linked list over singly linked list? Assuming that the node class is defined, give the functions for the following operations on doubly linked list: i) Search(X) - Check whether a node containing the value X exists and return 1/0 ii) Reverse() - Reverse a given list	(12)
	A)		
	B)	What is an expression tree? Write a function to create a binary treeor the given postfix expression.	(8)
6)		A Define the following terms with examples. i) Binary tree ii) Strict binary tree iii) Complete binary tree iv) Almost complete binary tree	(12)
	A)		
	B)	Write a C++ function to delete largest element of Binary Search tree.	(8)
7)		Construct a Binary search tree for the list of alphabets given below by taking the first element as root: J, R, D, G, T, E, M, H, P, A, F, Q Also write down the output of inorder and preorder traversal for the above tree.	(8)
	A)		
	B)	Give the function for Quick Sort algorithm. Also mention the time complexity of Quick Sort. Trace the function for the following input values: 45, 26, 27, 70, 14, 90	(12)
8)		Write short notes on the following: A. Adjacency Matrix B. Depth First Search C. Hashing. D. Non Linear data structure (5*4)	(20)

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