Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA - SEMESTER–II • EXAMINATION – SUMMER 2013

Subject Code: 620001   **Date: 03-06-2013**
Subject Name: Data Structures
Time: 10.30 am - 01.00 pm   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	Answer the following:
		1. Which of the following offers best searching time?
		  (A) Array (B) Linked List (C) Binary Search Tree (D) Height Balanced Tree
		2. The technique of mapping the key space to address space is used in _____.
		  (A) Trie Structure (B) Garbage Collection (C) BFS and DFS (D) Hashing
		3. Which of the following traversal of binary search tree gives data in sorted order?
		  (A) Pre-Order (B) Post-Order (C) In-Order (D) All of these
		4. Draw Threaded Storage Representation of Empty Tree.
		5. The merge sort algorithm closely follows the _____ approach. (divide-and-conquer, incremental)
		6. When an algorithm contains a recursive call to itself, its running time can often be described by a _____ equation. (recurrence, polynomial)
		7. Tower of Hanoi is an application of _____ (recursive, non-recursive)
			07

	(b)	Do as directed.
		  1. Write a formula for calculating address of 2-D array.
		  2. Write any two real life applications of Queue.
		  3. Write any four applications of Data Structure.
		  4. Define Primitive and Non-primitive Data Structure.
		  5. What is Queue Overflow Fetal Error?
		  6. Write any three operations on Data Structure.
		  7. Write any three applications of Stack.
			07

Q.2	(a)	Differentiate Stack and Queue. Convert the following Infix expression to the corresponding Reverse Polish expression: (a + b↑ c↑ d) * (e + f / d) Give the trace of the steps including Stack Contents and Rank in tabular form.	07
	(b)	Explain DFS and BFS in brief with suitable example.	07
		OR	
	(b)	Define Queue and Circular Queue. How Circular Queue differs from Queue? Write an algorithm for insertion of new element into Circular Queue.	07
Q.3	(a)	Explain Asymptotic Notation in brief.	07

	(b)	Write an analysis of Insertion Sorting method.	**07**
		OR	
Q.3	**(a)**	1. Construct a tree for the expression (a+b)*(c+d)/(e+f). 2. Construct a Lexically Ordered Binary Tree for the following data: 100,20,40,20,50,60,80,65,30,90,67,33	**03** **04**
	(b)	Construct an Expression Tree for the following expression. Give post-order traversal of Expression Tree. Also give its Threaded Storage Representation according to in-order traversal. (a+b)*c-d/(e+f).	**07**
Q.4	**(a)**	Differentiate Static Memory Allocation and Dynamic Memory Allocation. Write an algorithm for insertion of new node into Linked list in ascending order.	**07**
	(b)	Explain Storage Representation of Strings with suitable examples.	**07**
		OR	
Q.4	**(a)**	What are the advantages of Doubly Linked List over Singly Linked List? Draw node structure for Singly and Doubly Linked List. Write an algorithm for inserting a node to the left of a given node in a Doubly Linked List.	**07**
Q.4	**(b)**	Write a short note on KWIC Indexing.	**07**
Q.5	**(a)**	Write an algorithm for Heap Sorting. Write a trace of the construction of the heap for the initial key set: 42,23,74,11,65,58,94,36,99,87.	**07**
	(b)	Explain 2-3 Trees in detail by taking suitable example.	**07**
		OR	
Q.5	**(a)**	Write a detailed algorithm for Partition-Exchange Sort and also write dry run for the given unsorted data set: 42,23,74,11,65,58,94,36,99,87	**07**
	(b)	What is Hashing? Explain any five Hashing Functions with example.	**07**

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