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Name:	
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Invigilator's Signature :	

CS/B.TECH/CSE (N)/IT (N)/SEM-3/CS-302/2012-13 2012

DATA STRUCTURE & ALGORITHMS

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

 $10 \times 1 = 10$

- i) Reserve Polish notation is often known as
 - a) Infix

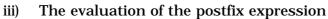
b) Prefix

c) Postfix

- d) none of these.
- ii) Which of the following algorithm should execute the slowest for large values of N?
 - a) 0(N)

- b) $0 (N^2)$
- c) $9 (\log 2 N)$
- d) None of these.

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3, 5, 7,
$$*$$
, + , 12, % is

a) 2

b) 3

c) 0

d) 3·17.

iv) A machine needs a minimum of 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately

- a) 72.7 sec
- b) 11.2 sec
- c) 50·2 sec
- d) 6.7 sec.

v) Linked list are not suitable for

a) Stack

- b) Deque
- c) AVL Tree
- d) Binary search.

vi) What will be the time complexity for selection sort to sort an array of *n* elements ?

- a) $O(\log n)$
- b) $O(n \log n)$

c) O(n)

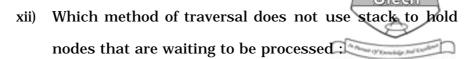
d) $O(n^2)$.

vii) The depth of a complete binary tree with n nodes

- a) $\log (n+1) 1$
- b) $\log(n)$
- c) $\log (n-1) + 1$
- d) $\log (n) + 1$.

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viii)	In a	binary search tree, if	the	number of nodes of a	
	tree is 9, then the minimum height of the tree is				
	a)	9	b)	5	
	c)	4	d)	none of these.	
ix)	Dynamic memory allocation use				
	a)	Calloc	b)	Malloc	
	c)	Free	d)	all of these.	
x)	A vertex with degree one in.a graph is called				
	a)	Leaf			
	b)	Pendant vertex			
	c)	End vertex			
	d)	None of these.			
xi)	Adja	ncency matrix of a diagr	aph i	s	
	a)	Identity matrix			
	b)	Symmetric matrix			
	c)	Asymmetric matrix			
	d)	None of these.			



- a) Breadth-first
- b) Depth-first
- c) D-search
- d) None of these.

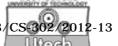
GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- 2. a) Define big *O* notations.
 - b) $T(n) = 4n^2 + 3n \log n$, express T(n) in Big (0) notations. 2+3
- 3. a) How the polynomial $4x^3 10x^2 + 3$ can be represented using a linked list?
 - b) Compare and contrast between an array and a single linked list. 2+3
- 4. a) Consider the array int a [10] [10] and the base address 2000, then calculate the address of the array a [2] [3] in the row and column major ordering.
 - b) Write the advantage of circular queue over linear queue. 3+2

3202 (N)



What do you mean by recursion? Write down a C function 5. to find out the GCD of two nos. using recursive technique.

1 + 4

6. What is binary tree? Construct a binary tree using the inorder and postorder traversal of the node given below:

Inorder: D Ε G C L J Η K G Postorder: F \mathbf{E} В L J K Η \mathbf{C} D Α

1 + 4

GROUP - C

(Long Answer Type Questions)

Answer any three of the following. $3 \times 15 = 45$

7. Draw a minimum heap tree from the below list: a)

12, 11, 7, 3, 10, -5, 0, 9, 2

Now do the heap sort operation over the heap tree which you have formed. Write the insertion sort algorithm. 2 + 2 + 3

- b) What is a minimum spanning tree? Describe Huffman's 3 + 4Algorithm.
- What are the differences between AVL Tree & Binary c) Search Tree? 1

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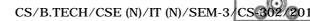
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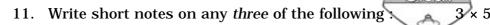
8. Radix Sort the following list: a) 189, 205, 986, 421, 97, 192, 535, 839, 562, 674 Write the Radix sort algorithm. 3 + 5b) Find the time complexity of Binary Search Algorithm. c) What is hashing? 3 9. Construct an AVL tree using the below list. Show all the a) steps 12, 11, 13, 10, 09, 15, 14, 18, 7, 6, 5, 4. 5 b) What is a priority queue? 3 Write the recursive algorithm to find $x \nmid n$. c) 4 d) Find the postfix notation of $(a + b * x) \setminus (a! - d) s - c \times y$ (show all steps). 3 Write the advantage of circular queue over linear 10. a) queue. 4 b) What is a self referential structure? 2 + 2Describe a string reversal algorithm. 3 c) d) Write the difference between a[][] and ** a. 2

e)

What is difference between Union & Structure?

2





- a) Abstract Data type
- b) BFS
- c) BTree
- d) Tail recursion
- e) Merge Sort.

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